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THE RELATIONSHIP BETWEEN CLASSROOM MANAGEMENT STRATEGIES AND ACADEMIC ACHIEVEMENT, AND THE MEDIATING ROLE OF CLASSROOM

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Abstract:
Teachers' classroom management strategies, along with the classroom environment co-created by teachers and students, influence students' academic achievement. This study investigates the relationship between classroom management strategies and academic achievement, focusing on the mediating role of the classroom environment. Data were collected using questionnaires from 618 undergraduate students in China. Structural equation modeling was employed to analyze the relationships between these factors. Questionnaires of Shawer's classroom management strategies, which consist of organizational, teaching management, teacher-student relationship and teacher rewards and sanctions. Questionnaires of Fraser et al. WIHIC, Li Xianyin, Yang Na and Liu Zhongyu's academic motivation scale were used. The reliability of the questionnaires was confirmed using Cronbach's alpha test. Additionally, students' perceptions of classroom management strategies and the classroom environment positively influence their academic achievement. The classroom environment partially mediates the relationship between classroom management strategies and academic achievement. This study highlights the impactful relationship between classroom management and academic achievement. This study's findings offer valuable insights for developing effective classroom management policies to improve undergraduate academic outcomes.

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Keywords: classroom management strategies, academic achievement, classroom environment, self-determination theory

1. Introduction

Higher education is considered essential for developing skilled individuals, imparting knowledge, fostering professional qualities, enhancing critical thinking, unlocking personal potential, and preparing students for successful integration into society (Chankseliani & McCowan, 2021). The classroom serves as the primary setting for achieving these objectives. However, the classroom is more than just a physical space; it represents a dynamic and ever-evolving environment shaped by the interactions between teachers, students, and the institutional context (Bozkuş, 2021). Within this dynamic setting, classroom management and the learning environment are critical factors. Classroom management, a multifaceted aspect of teaching, encompasses the strategies educators employ to guide student behavior and learning (Samaddar et al., 2023). By continuously adapting their pedagogical approaches and knowledge to address diverse student needs, teachers strive to cultivate a positive and supportive classroom environment (French et al., 2020). Therefore, both classroom management and a conducive learning environment are essential for effective student development.

Effective teaching and student learning are contingent upon a well-managed classroom (Galindo-Dominguez, 2021). Effective classroom management techniques are crucial for student success, as they can significantly enhance the learning process for both students and teachers. A productive classroom fosters an environment where students and teachers feel engaged, respected, and at ease (Samaddar, 2023). Numerous factors contribute to successful classroom management, including a positive learning environment, structured classroom organization, and strong teacher-student relationships (Panzola et al., 2024). Cultivating positive teacher-student relationships is particularly vital, as it promotes positive classroom behavior in a constructive and effective manner (Wubbels et al., 2014).

Maintaining effective classroom management necessitates proactive classroom management strategies. These strategies prioritize preventing inappropriate behavior rather than reacting to it. Proactive strategies involve teachers collaborating with students to establish classroom rules rather than imposing them (Paramita et al., 2020). In contrast, reactive strategies typically involve punishments for behaviors unlikely to result in positive learning outcomes. However, research indicates that most teachers tend to employ less effective reactive classroom management strategies rather than more effective proactive strategies (Sprick et al., 2021). This is particularly concerning because disruptive student behavior can hinder the learning process and even undermine the effectiveness of well-designed courses (Jones & Jones, 2020). Through effective classroom management strategies, teachers can positively influence student behavior and foster greater enthusiasm for learning.

Many learning outcomes are achieved within the classroom setting. While classroom management strategies are known to influence academic achievement, the classroom environment also plays a significant role. The classroom environment encompasses curriculum implementation, attitudes towards learning, and the behavioral and organizational culture of educational institutions (Matoy, 2021). The learning environment fostered by teachers through their management, support, and teaching behaviors influences student behavior, emotional responses, and learning outcomes (Dörnyei & Muir, 2019). Assessing variations in classroom environments provides strong indicators for predicting student motivation and learning progress (Sungur & Senler, 2010). However, significant disparities exist in classroom atmospheres across diverse student groups and schools. Considering the impact of classroom environments on student learning, behavior, and emotional well-being, identifying the factors contributing to these differences is critical. Understanding these factors is essential for developing strategies to assist educators in improving and creating effective classroom environments (Garcia & Pintrich, 2023).

This study investigates the relationship between students' perceptions of teachers' classroom management strategies and academic achievement, examining the potential mediating role of the classroom environment.

2. Literature Review

2.1 Self-determination Theory

This study adopts Self-Determination Theory (SDT) as a framework to comprehend the behaviors that stimulate or inhibit students' proactive learning within classroom environmental factors. Sergis et al. (2018) argue that students' needs for stimulation or inhibition in the classroom are significantly addressed. They receive support that fulfills their autonomy needs, developing competencies through collaborative activities led by themselves and peers (with only teacher support as a supplement). Students' behaviors are influenced by classroom management policies, resulting in actions that either enhance or disrupt the classroom environment, inhibiting or stimulating their learning motivation, and ultimately impacting academic performance. When management strategies meet the basic psychological needs for autonomy, relatedness, and competence, the willingness for self-determined autonomous learning is facilitated through external measures. When the same student in the same classroom experiences a higher level of autonomy support in a more comfortable environment, he or she is more likely to integrate into the environment, abide by rules, engage in autonomous learning to satisfy their psychological needs and learn for self-determined reasons, which is associated with higher perceived learning performance (Yu & Levesque-Bristol, 2020).

2.2 Classroom Management Strategies and Academic Achievement

Modern research into effective teaching practices suggests that classroom management is a key factor directly influencing student academic performance (Wang et al., 1993).

Effective classroom management strategies have been shown to not only increase student engagement during instruction but also to directly improve academic outcomes (Marzano et al., 2003). Moreover, a teacher's chosen classroom management strategies are crucial in shaping the overall learning environment and impacting student success (Djigic & Stojiljkovic, 2011).

The concept of classroom management encompasses the creation of a structured and organized learning space where positive expectations are established and students are encouraged to collaborate on academic tasks (Ahmad et al., 2017). While a positive correlation between effective classroom management and student achievement has been established (Sunday-Piaro, 2018), the specific mechanisms by which this occurs require further exploration. A well-managed classroom can facilitate a more conducive learning environment, potentially leading to improved teaching efficacy and, consequently, enhanced student performance.

Based on this, the study proposes the first research hypothesis:

H1: Classroom management strategies have a positive and significant impact on academic achievement.

2.3 Classroom Management Strategies and Classroom Environment

The classroom environment is intrinsically linked to the broader learning environment and plays a significant role in shaping student behavior and learning outcomes. A strong connection exists between the classroom environment and students' academic performance. Classrooms characterized by a high degree of cohesion, clear goals, minimal disruption, and low levels of conflict are more likely to provide students with a supportive environment conducive to academic success (Adelman & Taylor, 2005). Furthermore, a classroom environment where mutual respect and understanding are fostered can function as a motivating factor in the learning process (Miller & Pedro, 2006). Fostering a classroom environment that encourages open thought is crucial for students to readily exchange ideas and explore new learning content. Establishing such an environment necessitates teachers to implement classroom management strategies grounded in constructive and fruitful relationships with their students.

Based on this, the study proposes the second research hypothesis:

H2: Classroom management strategies have a positive and significant impact on the classroom environment.

2.4 Classroom Environment and Academic Achievement

While specific elements within the classroom environment can influence academic achievement, the extent of this impact can vary depending on the specific dimension being examined. For instance, a high-quality teacher-student relationship has been linked to positive academic and behavioral outcomes (Vandenbroucke et al., 2018). Research has shown a moderate correlation between the quality of teacher-student interactions and student engagement, as well as their overall course grades (Quin, 2017). Furthermore, Vandenbroucke et al. (2018) highlight a small but significant association between the

quality of teacher-student interactions and students' executive function, working memory, and inhibitory control.

Based on this, this study proposes a third research hypothesis:

H3: The classroom environment has a positive and significant impact on academic achievement.

2.5 The Relationship between Classroom Management Strategies, Academic Achievement and Classroom Environment

The perception of the classroom environment has a direct and significant impact on student progress. The perception of classroom management strategies also exerts an indirect influence on academic achievement through the classroom atmosphere. Furthermore, classroom atmosphere also has a direct and significant effect on students' academic achievement (Erdem & Kaya, 2023). Cayubit (2022) highlights factors in a classroom atmosphere that influence learning strategies, including engagement, student cohesion, satisfaction, task orientation, innovation, and personalization. When the classroom atmosphere is favorable, it can assist students in selecting appropriate and effective learning regulation strategies, encourage their participation in learning activities, and ultimately enhance their academic achievement. Dolinting and Pang (2022) emphasize that schools should strive to create a positive classroom atmosphere that emphasizes student cohesion, task orientation, inquiry, and fairness to support students' knowledge, cognition and regulation, thereby improving academic performance.

Based on this, the study proposes the fourth research hypothesis:

H4: Classroom environment mediates the relationship between classroom management strategies and academic achievement.

3. Material and Methods

3.1 Research Framework

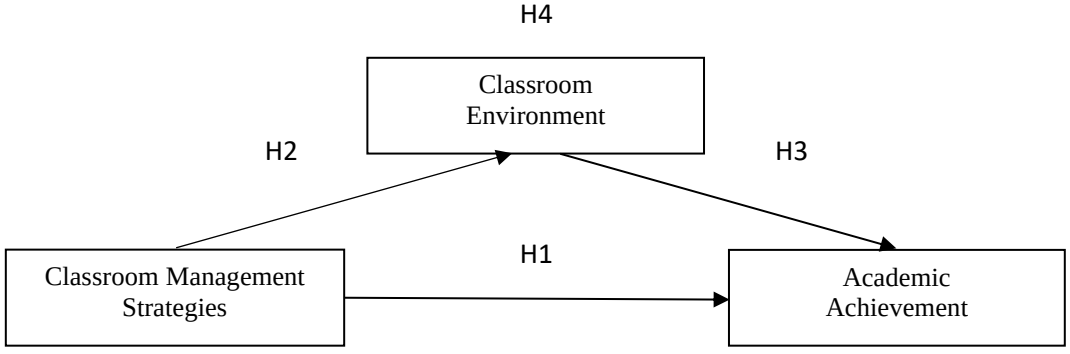

Figure 1: Research Framework

3.2 Participants

This study employed a convenience sampling method to survey undergraduate students from various universities in Heilongjiang Province. Following the guideline of Hair et al.

(2009), which recommends a total sample size five times the number of items in the largest subscale, and given the 115 items in the questionnaire, a target sample size of 700 students was established. Data collection was facilitated through an online survey platform of Wenjuanxing. The questionnaires were sent to students by contacting teachers in schools. The estimated completion time for the questionnaire, comprising three scales, was approximately 10 minutes, with an additional 5 minutes allocated for instructions and consent, resulting in a total participation time of roughly 15 minutes. Participants were instructed to complete the questionnaire independently and provide honest responses based on their personal experiences. During the collection process, students could stop answering the questionnaire at any time. The whole process of answering the questionnaire was anonymous, and students were informed that the relevant information of the questionnaire was only used for this study and would not be disclosed to third parties. Out of the 700 questionnaires distributed, 648 were returned, yielding a response rate of 92.57%. After excluding 30 incomplete responses, 618 valid questionnaires were retained for analysis, resulting in an effective response rate of 88.29%, which constitutes a robust sample size for this study. Among the respondents, 288 were female, accounting for 46.6%, and 330 were male, accounting for 53.4%.

3.3 Measures

3.3.1 Classroom Management Strategies

The survey questionnaire developed by Shawer (2010) was utilized as the data collection instrument. Comprising four subsections, the questionnaire covers the components of classroom management: organization (8 items), instructional management (11 items), teacher-student relationships (10 items), and teacher-disciplinary strategies (8 items). Respondents utilized a 5-point Likert scale (ranging from 'often' to 'never') to describe their perceptions of teacher CMS. Higher scores indicate better CMS and greater confidence in teachers' behaviors in the classroom. According to Shawer (2010), the validity and reliability of the questionnaire were assessed using Cronbach's Alpha (CA), yielding values of 0.910 and 0.940, respectively.

3.3.2 Academic Achievement

The revised scale developed by Li Xianyin, Yang Na, and Liu Zhongyu (2016) was employed. Following subsequent revisions, the scale retained 12 items, covering interpersonal facilitation (3 items), cognitive learning abilities (3 items), communication skills (3 items), and self-management abilities (3 items). The overall scale Cronbach's Alpha reliability coefficient (CARC) for university students' AcA was 0.824. The CARC for interpersonal facilitation and cognitive learning abilities were 0.787 and 0.776, respectively, both exceeding 0.7, indicating high internal consistency within the scale. The CARCs for self-management abilities and communication skills were 0.643 and 0.623, respectively, both exceeding 0.6, falling within an acceptable range of reliability.

3.3.3 Classroom Environment

The "What Is Happening In this Class?" (WIHIC) Developed by Fraser et al. (1996). The WIHIC aims to streamline the measurement of the CE by combining modified versions of existing questionnaires with items adapted to contemporary educational issues (Fraser, 2012). In Aldridge et al.'s (1999) study, the CA coefficients ranged from 0.81 to 0.93. These values indicate satisfactory internal consistency reliability for all WIHIC scales. The seven dimensions include student cohesion, teacher support, involvement, task orientation, cooperation, fairness, and investigation, each consisting of 8 items.

4. Results and Discussion

4.1 Relationship between Classroom Management Strategies, Academic Achievement and Classroom Environment

4.1.1 Reliability Analysis of Classroom Management Strategies, Academic Achievement, and Classroom Environment

In research models, reliability and stability are often assessed by examining the values and consistency of questionnaire dimensions. For the classroom management strategies scale, Cronbach's Alpha values were as follows: organizational strategy (0.953), teaching management strategy (0.958), teacher-student relationship strategy (0.957), and teacher reward and punishment (0.942). On the academic achievement scale, Cronbach's Alpha values were: interpersonal promotion (0.905), learning cognitive ability (0.877), communication ability (0.877), and self-management ability (0.868). The WIHIC scale showed the following Cronbach's Alpha values: student cohesion (0.952), teacher support (0.945), involvement (0.944), task orientation (0.947), cooperation (0.945), equity (0.947), and investigation (0.948). All values were above 0.7, indicating good reliability.

Additionally, the CR values for the classroom management strategies scale, academic achievement scale, and WIHIC scale were 0.988, 0.968, and 0.992, respectively, all above 0.7, indicating good reliability. The AVE values were 0.688 for classroom management strategies, 0.696 for academic achievement, and 0.690 for WIHIC, all exceeding the recommended threshold of 0.5, indicating good convergent validity. See Table 1 for details.

Table 1: Reliability of Scales and Dimensions

Scale	Dimension	Cronbach's Alpha	Scale Cronbach's Alpha (CR)	AVE
Classroom Management Strategies	Organizational	0.953	0.988	0.688
	Teaching Management	0.958		
	Teacher-Student Relationship	0.957		
	Teacher Rewards and Sanctions	0.942		
Academic Achievement	Interpersonal Promotion	0.905	0.968	0.696
	Learning Cognitive Ability	0.877		
	Communication Ability	0.877		
	Self-Management Ability	0.868		
WIHIC	Student Cohesion	0.952	0.992	0.690
	Teacher Support	0.945		
	Involvement	0.944		
	Task Orientation	0.947		
	Cooperation	0.945		
	Equity	0.947		
	Investigation	0.948		

Note: Compiled from study results.

4.1.2 Validity Analysis of Classroom Management Strategies, Academic Achievement, and Classroom Environment

Regarding the structural validity of classroom management strategies, the absolute fit indices were: $\chi^2/df = 1.497$, less than the reference value of 5 (Hair et al., 2009); RMSEA = .243, less than .100 (Browne & Cudeck, 1992); GFI = .927, greater than .900 (Bentler & Bonett, 1980); and AGFI = .971, greater than .800 (Marsh et al., 1988), all indicating good fit. The relative fit indices (CFI = .987, IFI = .987, NFI = .963, NNFI = .986) exceeded the .90 threshold (Abedi et al., 2015), and the simplified fit indices (PNFI = .903, PGFI = .824) were above .050 (Abedi et al., 2015). These results suggest that the classroom management strategy demonstrates a good fit, as presented in Table 2.

For the structural validity of academic achievement, the absolute fit indices were: $\chi^2/df = 1.047$, RMSEA = .428, GFI = .987, and AGFI = .979, all surpassing their respective thresholds (Hair et al., 2009; Browne & Cudeck, 1992; Bentler & Bonett, 1980; Marsh et al., 1988). Similarly, the relative fit indices (CFI = 1, IFI = 1, NFI = .993, NNFI = 1) and simplified fit indices (PNFI = .722, PGFI = .607) indicated good model fit (Abedi et al., 2015). These findings, also shown in Table 2, confirm the good fit of the academic achievement model.

The structural validity of the classroom environment was assessed with the following absolute fit indices: $\chi^2/df = 1.294$, RMSEA = .0201, GFI = .904, and AGFI = .896. All values met the criteria for good fit (Hair et al., 2009; Browne & Cudeck, 1992; Bentler & Bonett, 1980; Marsh et al., 1988). Likewise, the relative fit indices (CFI = .989, IFI = .989, NFI = .952, NNFI = .988) and simplified fit indices (PNFI = .905, PGFI = .829) indicated good model fit (Abedi et al., 2015). Table 2 presents these results, demonstrating the good fit of the classroom environment model.

Table 2: Fit Indices for Classroom Management Strategies, Academic Achievement, and Classroom Environment

Model Fit Indices	Classroom Management Strategies	Academic Achievement	Classroom Environment
x^2/df	1.497	1.047	1.294
RMSEA	0.243	0.428	0.201
GFI	0.927	0.987	0.904
AGFI	0.971	0.979	0.896
CFI	0.987	1.000	0.989
IFI	0.987	1.000	0.989
NFI	0.963	0.993	0.952
NNFI	0.986	1.000	0.988
PNFI	0.903	0.722	0.905
PGFI	0.824	0.607	0.829

Note: Compiled from study results.

4.3 Model Path Analysis

In the structural equation model, the path coefficient reflects the magnitude of the independent variable's effect on the dependent variable. This effect encompasses both direct and indirect influences. Perceived classroom management strategies demonstrated a significant positive impact on academic achievement ($\beta = 0.133$; $t = 3.510$). Similarly, perceived classroom management strategies positively influenced the classroom environment ($\beta = 0.355$; $t = 9.261$), which in turn had a significant positive impact on academic achievement ($\beta = 0.458$; $t = 11.950$). The classroom environment accounted for 27.1% of the variance in academic achievement, while classroom management strategies explained 12.6%, as illustrated in Table 4.

Table 4: Path Analysis

Hypothetical path	Path coefficient	*t* value
Classroom Management Strategies —> Academic Achievement	.133***	3.510
Classroom Management Strategies —> Classroom Environment	.355***	9.261
Classroom Environment —> Academic Achievement	.458***	11.950

Note: *** $p < 0.001$.

4.4 Mediating Effect and Bootstrap Analysis

In structural equation modeling, testing the mediating effect requires examining the confidence interval (CI). A significant mediating effect is indicated when the 95% CI does not include 0 (Mackinnon, 2008), which corresponds to $p < 0.05$ (Cheung & Lau, 2008; Lau & Cheung, 2012). This study analyzed the indirect effect using a bootstrapped structural equation model with 1000 resamples to calculate the 95% CI (Efron & Tibshirani, 1993). As shown in Table 5, the indirect, direct, and total effects were all statistically significant (95% CI did not include 0), indicating partial mediation.

Table 5: Mediating Effect and Bootstrap Analysis

Hypothesized Path	Direct Effects	Indirect Effects	Total Effects
Classroom Management Strategies —> Academic Achievement	[.027, .176]	[.049, .119]	[.100, .256]
Classroom Management Strategies —> Classroom Environment	[.129, .266]		[.129, .266]
Classroom Environment —> Academic Achievement	[.307, .492]		[.307, .492]

5. Discussion

5.1 Classroom Management Strategies and Academic Achievement

Classroom management strategies have a significant positive impact on academic achievement (Herman et al., 2022). A strong teacher-student relationship is positively correlated with students' academic achievement. Such relationships can effectively curb disruptive behavior, mitigate student apathy and dropout rates, and significantly influence academic outcomes (Kincade et al., 2020). Furthermore, students' learning engagement is enhanced when teachers demonstrate positive attitudes, high academic expectations, and utilize motivational strategies (Miller et al., 2021). Similarly, student engagement increases when teachers establish fair and consistent reward and punishment systems (Mudzakkir & Darmawan, 2024). Effective classroom organization is also crucial for academic success (Nisar et al., 2019). Herman et al. (2022) further confirmed the significant positive relationship between classroom management strategies and student academic achievement, suggesting that undergraduate students who perceive robust classroom management strategies tend to achieve higher academic results.

5.2 Classroom Management Strategies and Classroom Environment

Classroom management strategies have a significant positive impact on the classroom environment (Reyes et al., 2012). Positive relationships between students and teachers, as well as among students, can effectively improve the classroom learning atmosphere (Panzola et al., 2024). Furthermore, fostering student participation is a key element of effective classroom management strategies (Pattnaik, 2024). A positive classroom environment, which promotes cognitive and emotional skills, is established through teaching principles, teacher actions, and effective management and organization (Colling et al., 2022). Therefore, the classroom environment is crucial for students' academic development (Baek & Choi, 2002). Findley and Varble (2006) also found a significant positive relationship between classroom management strategies and classroom environment, indicating that when college students perceive positive classroom management strategies, a classroom environment conducive to learning is created.

5.3 Academic Achievement and Classroom Environment

Student perceptions of the classroom environment have a significant positive impact on academic achievement (Baek & Choi, 2022). This environment provides support in multiple dimensions, with teacher support during class being a key factor in promoting student engagement (Pedler et al., 2020). Studies have shown that flipped classrooms, which encourage active student participation, lead to significantly higher academic achievement compared to traditional classrooms (Polat & Karabatak, 2022). This suggests that increased student involvement and collaboration on group tasks contribute to a more cohesive learning environment, ultimately benefiting academic performance. Furthermore, the physical conditions of the classroom, such as lighting and layout, also play a role in influencing student achievement (Brink et al., 2021). Mantooth et al. (2020) further reinforce this notion by highlighting the positive correlation between a harmonious classroom environment, as perceived by students, and improved academic outcomes.

6. Conclusion

This study focused on data collection within a specific timeframe and region. This methodology is inherently limited by its scope, hindering in-depth analysis of the factors influencing academic achievement. While the research investigated the relationship between classroom management strategies, classroom environment, and academic achievement, it did not consider other potential contributing factors. Prior research suggests that a positive classroom environment can enhance student engagement (Cooper & Fry, 2020) and foster intrinsic motivation, leading to sustained, active participation in learning (Atik & Çelik, 2021). Future research could expand upon these findings by examining the impact of additional factors, such as student engagement (Akpan & Umobong, 2013), self-efficacy (Atoum & Al-Momani, 2018), and burnout (Madigan & Curran, 2021), on academic achievement. Furthermore, the reliance on questionnaires, while providing valuable insights into student perceptions of classroom activities and behaviors, may not fully capture the complexities of the classroom environment and its influence on undergraduate student achievement. Further investigation is needed to gain a more comprehensive understanding of these nuanced relationships.

This study highlights the impactful relationship between classroom management and academic achievement. The classroom management strategies employed by teachers in China undergraduate institutions effectively enhance student academic performance. For undergraduates in this region, classroom management strategies, including classroom organization, teaching management, teacher-student interaction, and teacher rewards and punishments, are essential for academic success and overall development. Therefore, institutions should prioritize improving classroom management strategies to bolster student engagement and, consequently, academic achievement. This study's

findings offer valuable insights for developing effective classroom management policies to improve undergraduate academic outcomes.

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Institutional Review Board Statement
The Ethical Committee of the Dhurakij Pundit University, Thailand, approved this study on Feb 8, 2024. (Reference number: DPU_BSH 080267/2566).

Transparency Statement
The authors confirm that the manuscript is an honest, accurate, and transparent account of the study, that no vital features of the study have been omitted, and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Data Availability Statement
The data that support the findings of this study are available from the corresponding author upon reasonable request. These data are not publicly available due to privacy reasons.

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The author declares that there are no conflicts of interest regarding the publication of this paper.

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