The Influence of Growth Mindset Activation on English Writing Persistence and Strategy Use among Rural High School Students in China: A Field Experimental Study

Wu Cong

Anhui Hualiang Senior High School, Anqing, Anhui, 246513, China

Abstract: This study aimed to examine the immediate effects of a brief growth mindset priming intervention on the behavioral persistence, cognitive strategy use, and psychological traits of rural high school students in an English writing task. The single-group pre- and post-test experimental design was adopted. Forty - six senior three students from rural high schools in Anhui Province were primed with growth mindset through text reading. Then, they were required to complete a challenging time - limited English micro - writing task. Their voluntary persistence time, frequency of writing strategy use, and pre - and post - test psychological trait data were recorded.

The results indicated that: The results indicated that: (1) The intervention significantly increased students' voluntary persistence time ($M = 731.82$ seconds, $p < 0.001$); (2) However, there was no significant change in the frequency of writing strategy use ($p = 0.384$); (3) There was also no significant improvement in writing self - efficacy and the level of growth mindset ($p = 0.053$), and there was no significant correlation between the additional persistence time and the two ($p > 0.05$).

The conclusion suggests that a brief growth mindset priming can effectively stimulate the writing behavioral persistence of rural high school students, but fails to simultaneously promote their strategy use and psychological trait development. It is recommended that in rural English writing teaching, such light - weight interventions can be used as a starting point for behavioral motivation, but systematic strategy teaching needs to be further combined to achieve the transformation from "willing to write" to "good at writing".

Keywords: Growth mindset intervention; English writing; Academic perseverance; Writing strategies; Rural senior high school students; Field experiment

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1. Introduction

English writing ability is an important manifestation of students' language proficiency and cross - cultural communication skills. Especially for rural senior high school students, its development is not only related to academic achievements but also affects their future social participation opportunities. However, in the current rural English education environment, students generally show the phenomena of "avoiding challenges" and "insufficient use of strategies" in writing tasks. This not only reflects the limitations of teaching resources but also reveals the deep - rooted cognitive and motivational dilemmas of students.

To address this challenge, researchers have attempted various teaching and psychological interventions. However, long - term and resource - intensive programs are often difficult to promote in rural contexts. In recent years, the growth mindset theory, which emphasizes the belief that "abilities can be developed through effort and strategies," has provided new ideas for stimulating students' perseverance and strategy use in challenging tasks. Brief growth mindset priming

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About the Author

Wu Cong (1995-), female, Han, Anqing, Anhui, China. professional teacher, master degree, Anhui Hualiang Senior High School, Educational and developmental psychology.

interventions, characterized by their low cost and easy implementation, are particularly suitable for rural educational scenarios with limited resources. Nevertheless, existing studies have not fully investigated the immediate behavioral and cognitive effects of such interventions in English writing among rural high school students. In particular, there is a lack of simultaneous examination of perseverance (behavior), strategy use (cognition), and psychological traits (beliefs).

Therefore, this study aims to explore the following questions through a field experiment:

(1) Can a brief growth mindset priming significantly increase the voluntary persistence time of rural high school students in challenging English writing tasks?

(2) Can this intervention promote students' use of meta-cognitive strategies in the writing process?

(3) Will the intervention enhance students' writing self-efficacy and growth mindset level?

This study not only provides empirical evidence for the application of the growth mindset theory in the context of rural EFL writing but also offers rural English teachers a lightweight and operable psychological support tool. It helps students shift from "writing avoidance" to "strategic participation" and lays the behavioral and cognitive foundation for the sustainable development of their writing abilities.

2. Literature Review

(1) Overview of the theory and intervention research on growth mindset

Growth Mindset was proposed by Carol Dweck, emphasizing that abilities can be improved through effort and strategies.[1] This theory suggests that students with a growth mindset are more likely to view challenges as learning opportunities, demonstrating higher academic resilience and perseverance, and are more proactive in using learning strategies.[2] In recent years, growth mindset intervention has become a research hotspot, with forms including long - term courses and brief priming interventions.

Long-term interventions [3] have demonstrated lasting effects in rural education, yet they incur relatively high implementation costs. Brief start interventions have attracted attention due to their low cost and ease of operation. [4] Some studies point out that if students lack effective strategies, a growth mindset may even lead to a "reverse growth trap".[5]

(2) Growth mindset, academic perseverance, and resilience

Academic persistence refers to students' behavioral performance of continuously investing effort when facing challenges. Growth mindset promotes persistence and academic resilience by influencing students' attribution and coping strategies for failure.[6] Research has shown that growth mindset intervention can enhance students' effort regulation[7] and willingness to pursue challenges [8]. Most existing studies rely on self - reports to measure persistence, while the use of objective behavioral indicators (such as the duration of persistence beyond the time limit) is still relatively scarce.

(3) Growth mindset and English writing strategy use

English writing strategies, especially meta-cognitive strategies (e.g., planning, monitoring, and revising), are key factors influencing writing performance.[9] High - level writers significantly outperform low - level writers in the use of meta-cognitive strategies.[10] Growth mindset can predict the use of meta-cognitive strategies,[11] and interventions can encourage students to adopt these strategies.[12] However, there are still few studies directly exploring the immediate impact of brief growth mindset priming on writing meta-cognitive strategies.

(4) Challenges faced by rural EFL learners and applicability of interventions

Rural high school students generally face problems of "avoiding challenges" and "lack of strategies" in English writing,

which are related to limited educational resources and traditional teaching models. Growth mindset intervention has shown potential in rural contexts,[3] but its effectiveness may be constrained by socioeconomic status.[13] Chen[5]warned that if students lack effective strategies, the growth mindset may not translate into academic improvement, highlighting the necessity of combining strategy training.

(5) Research gaps and entry points of this study

The existing studies have the following limitations:

There is a lack of investigation into the immediate effects of brief growth mindset priming on English writing in rural high schools, especially studies that simultaneously measure behavioral persistence (an objective indicator) and the use of cognitive strategies; Insufficient attention has been paid to task avoidance tendency as a pretest variable. The immediate quantitative assessment of meta-cognitive strategies is relatively limited.

Therefore, this study intends to conduct a field experiment to examine the immediate effects of a brief growth mindset priming intervention on the persistence (voluntary persistence duration beyond the time limit) and the number of meta-cognitive strategy uses of rural high school students in English writing tasks, so as to fill the above research gap and provide empirical evidence for rural English writing teaching.

3. Method

(1) Participants

In this study, a convenience sampling method was employed to select a natural class of liberal arts students in the senior year of a rural high school in Huating Town, Susong County, Anqing City, Anhui Province as the research subjects, with a total of 46 valid samples included. All participants were rural - registered students aged between 17 and 19 years, and they had all been learning English as a foreign language for more than 6 years.

(2) Research design

This study employed a single-group pre - posttest quasi - experimental design. A growth mindset priming intervention was implemented within the same class, and relevant data on behaviors, cognitions, and psychological traits were collected before and after the intervention.

(3) Intervention materials and procedures

The intervention was conducted in a regular English class, lasting approximately 45 minutes in total and divided into two stages:

Growth mindset activation stage (approximately 10 minutes)

Students read a short passage about "brain plasticity" and "abilities can be improved through effort", with the content emphasizing that English writing skills can be continuously developed through practice and the use of strategies. After reading, students are required to briefly write down their understandings and insights to enhance the activation effect.

Challenging English micro-writing task stage (time limit + voluntary perseverance)

Students are required to immediately complete a challenging English micro-writing task. The topic is related to what has been learned in class but with higher requirements. The task is divided into two time periods:

Time-limited stage (5 minutes): Students must complete the first draft within the specified time of 5 minutes.

Voluntary persistence stage(no time limit): Students can choose whether to continue revising or improving their compositions. The system automatically records their voluntarily persisted extra time (Extra_Time) in minutes.

(4) Measurement tools

Variable types	Measurement tools/indicators	Illustration
Use of writing strategies	Self-reported thinking step coding (Strategy_Num)	Immediately after the task, students reported the thinking steps in the writing process, and the number of meta-cognitive strategies was extracted through coding.
Behavioral persistence	Voluntary persistence time	The teacher records the time (in minutes) that students voluntarily continue writing after the time limit ends.
Psychological traits	Writing self-efficacy questionnaire, Growth mindset scale	The Chinese revised versions of well-established domestic and international scales were used, and the measurements were conducted once for both the pre - test and the post - test.

(5) Data analysis

All data were processed and analyzed using SPSS 26.0. The specific methods are as follows:

Paired-samples t-test: Used to compare the differences in the total writing scores and the frequency of writing strategy use between pre-test and post-test. One-sample t-test: Used to test whether the mean of the voluntary persistence time (Extra_Time) is significantly greater than 0. Correlation analysis: Pearson correlation analysis was used to explore the relationships between the voluntary persistence time and the post - test psychological traits (self - efficacy, growth mindset).

The significance level was set at $\alpha = 0.05$.

4. Results

(1) Differences in the total writing scores between the pre - test and post - test

To examine the effect of the growth mindset priming intervention on students' English writing performance, a paired-samples t-test was conducted to compare the total writing scores between the pre-test (Pre_Score) and the post-test (Post_Score). The results are presented in Table 1 as follows:

Table 1 Results of paired - sample t - test for pre - and post - test of total writing scores

	Average value	Standard deviation	t	Significance (two-tailed)
Pre_Score - Post_Score	-0.13636	0.45505	-1.988	0.053

The results showed that the difference in the total writing scores between the pre - test and post - test did not reach the statistically significant level ($t = -1.988$, $p = 0.053$), indicating that this growth mindset priming intervention did not significantly improve the overall English writing performance of students.

(2) Analysis of voluntary persistence time

To investigate students' behavioral persistence in challenging writing tasks, a one-sample t-test was used to examine whether the mean of the voluntary persistence time (Extra_Time) was significantly greater than zero. The results are presented in Table 2 as follows:

Table 2 Results of one-sample t-test for voluntary persistence time

	Average value	Standard deviation	t	Significance (two-tailed)
Extra_Time	731.8182	161.4653	30.064	0.000

The results showed that the voluntary persistence time was significantly greater than 0 seconds ($t = 30.064$, $p < 0.001$), indicating that students still voluntarily devoted a large amount of extra time to continue writing after the time-limited task ended, and their behavioral persistence was significant.

(3) Changes in the frequency of use of writing strategies

To explore whether the intervention promoted students' use of writing strategies, a paired-samples t-test was

conducted to compare the average score of the "Writing Strategy Use" item in the pre-test questionnaire with the post-test self-reported strategy frequency (Strategy_Num). The results are shown in Table 3:

Table 3 Results of paired-sample t-test for pre- and post-tests of writing strategy use

	Average value	Standard deviation	t	Significance (two-tailed)
Use of writing strategies - Strategy_Num	0.31818	2.39935	0.88	0.384

The results indicated that there was no significant difference in writing strategy use between the pre - test and the post - test ($t = 0.880$, $p = 0.384$), suggesting that this intervention did not significantly increase the frequency of students' use of metacognitive strategies during the writing process.

(4) Correlation between voluntary persistence time and psychological traits

To further understand the relationship between behavioral persistence and psychological traits, Pearson correlation analysis was used to examine the correlation between the voluntary persistence time and the post - test psychological traits (self - efficacy, growth mindset). The results are shown in Table 4.

Table 4 Correlation analysis between voluntary persistence time and post-test psychological traits

		Post-test self-efficacy	Post-test growth mindset
Extra time	r^2	-0.129	-0.101
	P	0.404	0.513

Correlation analysis showed that there was no significant correlation between the voluntary persistence time and the post-test self-efficacy ($r = -0.129$, $p = 0.404$) or the post-test growth mindset ($r = -0.101$, $p = 0.513$).

To more intuitively present the relationships among variables, scatter plots are drawn as shown in Figure 1 and Figure 2:

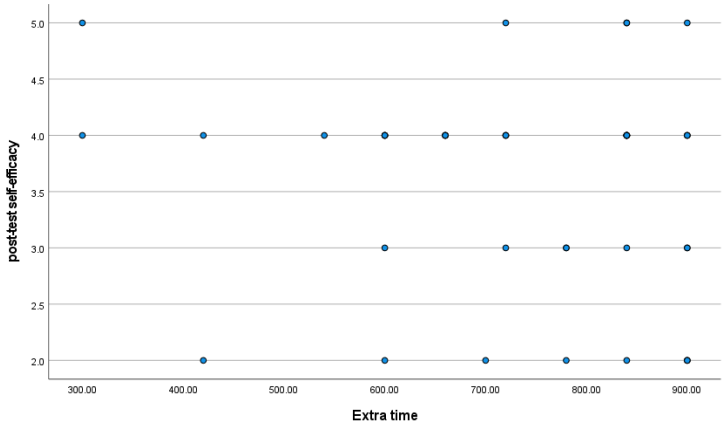


Figure 1

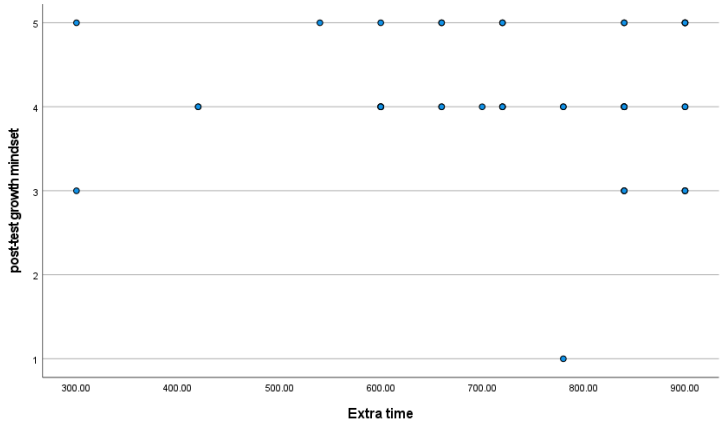


Figure 2

The points in the figure are relatively scattered, showing no obvious linear trend, which further supports the conclusion that the additional time investment has not been directly translated into the improvement of self-efficacy or the level of growth mindset.

5. Discussion

This study explored the effects of a brief growth mindset priming intervention on rural high school students' behavioral persistence, writing strategy use, and psychological traits in a challenging English writing task through a field quasi-experiment. The main findings can be summarized into the following three aspects:

(1) There was a significant improvement in behavioral perseverance, yet it was not accompanied by the simultaneous enhancement of strategy use and psychological traits

This study found that after receiving the growth mindset priming, students showed significant behavioral persistence in challenging writing tasks. The average voluntary persistence time exceeded 12 minutes ($M = 731.82$ seconds), and it was significantly greater than zero ($p < 0.001$). This result supports Hypothesis H1, indicating that brief growth mindset priming can effectively stimulate students' persistent engagement behaviors when facing difficult tasks and reduce their task avoidance tendencies.

However, contrary to Hypothesis H2, there was no significant change in the self-reported frequency of meta-cognitive strategy use by students during the writing process before and after the intervention ($p = 0.384$). This finding is inconsistent with the view held by some studies that "a growth mindset can promote strategy use" [11]A possible reason is that although a brief belief priming can stimulate behavioral engagement, it does not provide specific strategy guidance or cognitive training. Despite students' willingness to spend more time, they do not systematically apply meta-cognitive strategies such as planning, monitoring, and revising. [14] This also echoes the issue of "inefficient meta-cognitive strategies" warned by Chen,[5] that is, without effective strategy support, simply emphasizing "effort" may not translate into cognitive improvement.

(2) Psychological traits did not change significantly and were not directly associated with behavioral persistence

This study did not find a significant improvement in writing self-efficacy and growth mindset level after the intervention (total scores of pre - and post - tests, $p = 0.053$). Additionally, there was no significant correlation between the voluntary persistence time and the post - test psychological traits ($p > 0.05$). This indicates that although a single brief priming can promote immediate changes at the behavioral level, it is insufficient to trigger a systematic transformation of deep - seated psychological traits. This result contrasts with some long - term intervention studies,[3] suggesting that the cultivation of psychological traits may require more continuous and structured intervention support.

(3) Educational implications: the shift from "time investment" to "strategy empowerment"

The results of this study have important practical implications for English writing teaching in rural areas.

Brief priming can serve as a starting point for behavior activation: Short-term growth mindset priming is easy to implement and low-cost, making it suitable for rural schools with limited resources. It can effectively reduce students' writing avoidance behavior and enhance their task engagement.

It is necessary to combine strategy teaching to promote cognitive development. Simply initiating beliefs is insufficient to improve the ability to use strategies. It is recommended to embed meta-cognitive strategy training (e.g., planning templates, revision checklists, peer evaluation) in the intervention to guide students to transform "more time" into "better strategies"

The cultivation of psychological traits requires long - term influence: Teachers should continuously convey information about the growth mindset in daily teaching, create a classroom culture of "mistakes are learning opportunities", and help students gradually establish a stable belief in the malleability of abilities

(4) Research limitations and future directions

This study has the following limitations:

Limited representatives of the sample: Only one rural class was included, and the sample size was relatively small (n = 46). Caution should be exercised when generalizing the results.The intervention was single and brief: the cumulative effects of long-term or multiple activation were not investigated. Strategy measurement relying on self - reports may be subject to recall bias or social desirability effects.

Future research can:

1) Design an integrated intervention of "belief priming + strategy training" and examine its synergistic promoting effects on behavior, cognition, and psychological traits.

2) Extend the intervention period and conduct follow - up measurements to investigate the long - term effects of growth mindset priming.

3) Combining with process data (e.g., writing process videos, eye - tracking), the mechanism of strategy use can be analyzed more objectively.

6. Conclusion

Through a field experiment, this study examined the immediate effects of a brief growth mindset priming on the English writing behavior, cognition, and psychological aspects of rural high school students. The main conclusions are as follows:

(1) Summary of research conclusions

The results of this study indicate that a brief growth mindset priming can effectively stimulate the behavioral persistence of rural high school students in challenging English writing tasks, but it fails to simultaneously increase the frequency of their meta-cognitive strategy use or the level of their psychological traits. This suggests that in the rural teaching environment with limited resources, lightweight psychological intervention can serve as an effective tool for "behavioral priming." However, if we expect students to make the leap from "persisting in writing" to "being good at writing," on the basis of belief stimulation, systematic strategy teaching and continuous psychological support need to be further incorporated.

(2) Research contributions

Theoretical contributions:This study reveals the "asynchrony" between behavioral change and cognitive improvement in the activation of growth mindset, providing empirical evidence from the context of EFL learning in rural China for understanding the mechanism of action and boundary conditions of this intervention. The findings of the study echo the academic appeal for "combining growth mindset intervention with strategy training", highlighting the necessity of the synergistic effect of belief activation and strategy empowerment.

Practical Insights: It provides a "low-threshold and easy-to-implement" behavior stimulation tool for rural English teachers. Teachers can quickly activate students' willingness to participate in writing through methods such as short reading and reflective writing. Meanwhile, the study also indicates that belief activation alone is insufficient to bring about substantial development in writing ability. Subsequent teaching should focus on embedding metacognitive strategy training (e.g., writing planning, process monitoring, feedback and revision) to help students convert "time

invested" into "effective learning".

(3) Future outlook

1) Design an integrated intervention course that organically combines the activation of growth mindset with writing strategy teaching.

2) Conduct longitudinal follow - up studies to investigate the long - term effects and fading trajectories of short - term priming.

3) Expand the research to different regions and educational stages to examine the universality of the research conclusions and the moderating factors.

4) Multimodal process data (e.g., writing process videos, log analysis) are employed to comprehensively uncover the micro - mechanisms of strategy use.

In conclusion, the activation of growth mindset provides a "lightweight entry point" for rural English writing teaching. However, the realization of its effectiveness cannot be achieved without the subsequent structured support of "strategy empowerment". Only by combining the belief of "I believe I can improve" with the strategies of "knowing how to improve" can rural students be truly helped to transform from "participation" to "growth" in English writing.

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