

Meta-cognitive Strategies, Automated Writing Evaluation Feedback and English Writing Performance of Chinese EFL College Students

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Abstract: The research aimed to assess the associations among the implementation of meta-cognitive strategies, the support of automated writing evaluation feedback system and the English writing performance of Chinese EFL college students. The findings of the research indicated that incorporating meta-cognitive strategies during the writing process and utilizing automated writing evaluation feedback significantly contributed to the enhancement of English writing skills among students. A majority of the respondents reported actively employing various meta-cognitive strategies while writing and receiving substantial knowledge, intellectual, and emotional support through automatic writing evaluation feedback, resulting in noticeable improvements in their writing abilities. This study offers English administrators and teachers' valuable insights that can help foster English language proficiency among Chinese EFL college students. Furthermore, the study recommended that future research should explore additional challenges and concerns related to English writing for EFL college students, providing opportunities for academics to delve deeper into this area.

Keywords: Meta-cognitive Strategies, Automated Writing Evaluation Feedback System, the English Writing Performance.

1. Introduction

The identified issues in English writing instruction in China, notably in Henan, highlight a predominant focus on repetitive practices at the expense of comprehensive guidance, neglecting cognitive development. In response, the potential of meta-cognitive strategies to enhance learning and the role of automated writing feedback systems in catering to a vast student population are recognized. This study endeavors to investigate the correlations among Meta-cognitive Strategies, Automated Writing Evaluation Feedback, and English Writing Performance among Chinese EFL College Students. By exploring how the utilization of these strategies and feedback mechanisms influences students' writing proficiency, the research aims to bridge an existing gap in understanding. Ultimately, the study seeks to offer valuable insights for more effective language instruction methodologies.

2. Methods

2.1. Research Design

This study adopted a descriptive quantitative research approach to investigate the relationship among meta-cognitive strategies, automated writing evaluation system, and English writing performance among Chinese EFL college students.

2.2. Participants

The participants in this study were 699 Chinese college students from four universities located in Henan Province, China, with a population of 100,000 students. This sample size was computed through Raosoft calculator with an error margin of 3.7% and a confidence level of 95%.

2.3. Instrument

This study utilized an adapted questionnaire which consists of three scales measuring meta-cognitive strategies, automated writing evaluation feedback systems, and English writing performance. The questionnaires were developed based on existing literature and modified to serve as the measurement tool for this study. After establishing content validity, the questionnaire was pilot-tested with a sample of participants from a Chinese university. The total reliability of the three scales was assessed, resulting in a reliability coefficient greater than 0.7 for each scale. The reliability of the dimensions within each scale was deemed good for 3 dimensions and acceptable for the rest.

2.4. Data Analysis

The study utilized SPSS. 22 to conduct data analysis, employing descriptive statistical methods. This involved computing descriptive statistics like frequencies, percentages, means, and standard deviations. Composite and weighted means were derived to gauge the overall and specific variable measures.

The Likert scale aided in assessing participants' behaviors. Additional analyses, including frequency distribution, percentage, rank, and T-tests, addressed specific research questions. These statistical tools collectively provided insights into participants' behaviors, attitudes, and performance regarding meta-cognitive strategies, automated writing evaluation feedback, and English writing performance.

3. Result and Discussion

3.1. Percentage Distribution of the Respondents Profile

Table 1. Percentage Distribution of the Respondents Profile

Sex	Frequency	Percentage %
Male	184	26.3
Female	515	73.7
Major		
Liberal Arts	395	56.5
Science and Engineering	304	43.5
Grade Level		
Freshman	261	37.3
Sophomore	211	30.2
Junior	146	20.9
Senior	81	11.6
English Ability		
CET-4 exam passed	274	39.2
CET-4 exam failed	425	60.8

Among the 699 participants, 184 are male students, accounting for 26.3 percent, while the number of female students is 515, which only accounts for 73.7 percent. It can be seen that nearly three times as many female students as male students participated in this survey. As the questionnaire was voluntary, it was, on one hand, related to the fact that the participants were more Chinese arts majors than science majors. 395 students from liberal arts majors, accounting for 56.5 percent, and 304 students from science majors, accounting for 43.5 percent. On the other hand, it reflects that women show relatively stronger interest in English language learners.

Gender difference is not the focus of this study, but the difference in the ratio of male to female can provide inspiration for college English teaching: pay attention to English writing teaching or pay attention to male students in the whole English teaching due to the differences between male and female students in various aspects of physiology, language learning talents and learning characteristics. In teaching, teachers should notice the subtle differences as much as possible, so as to accurately grasp the learning characteristics of students, adjust their teaching methods and improve teaching efficiency.

In terms of grades, the students who participated in the survey covered four college grades. Freshmen (37.3%) and sophomores (30.2%), have just experienced the college entrance examination and have been in contact with college English writing teaching for one year. Juniors (20.9%) and seniors (11.6%) account for a slightly lower proportion, who are basically familiar with college English writing teaching methods and are relatively familiar with the use of automatic evaluation feedback system. Through the investigation of meta-cognitive situation, automatic evaluation feedback system and English writing performance of students in different grades, the writing learning state of students in different grades can be reflected, and personalized writing teaching strategies for different grades can be better analyzed and proposed.

Finally, the level of English writing reflects the students' basic English ability and potentially affects their use of meta-cognition and automatic evaluation feedback system (Akpur, 2021; Saeed et al., 2023). CET-4 is an important indicator to measure the English level of Chinese college students, especially non-English majors. About one third (39.2%) of the students who participated in the survey passed CET-4. However, learners with different basic levels have certain differences in their meta-cognition and use of automatic feedback evaluation system in writing and their writing performance. The analysis of these differences underscores the importance of understanding the factors contributing to English language learning difficulties among these students, which could potentially inform strategies for improvement in English language education.

In short, the analysis of the data from Table 2 highlights the gender imbalance, diverse academic backgrounds, and the prevalence of lower-grade students with English learning difficulties among the respondents. These insights are valuable for tailoring English language education strategies to better address the specific needs and challenges faced by this group of students.

3.2. Relationship between meta-cognitive Writing Strategies and Automated Writing Feedback

Table 2. Relationship between meta-cognitive Writing Strategies and Automated Writing Feedback

Planning	rho-value	p-value	Interpretation
Knowledge support	.304**	0.000	Highly Significant
Intellectual support	.449**	0.000	Highly Significant
Emotional support	.608**	0.000	Highly Significant
Selective Attention			
Knowledge support	.283**	0.000	Highly Significant
Intellectual support	.434**	0.000	Highly Significant
Emotional support	.536**	0.000	Highly Significant
Self-monitoring			
Knowledge support	.316**	0.000	Highly Significant
Intellectual support	.482**	0.000	Highly Significant
Emotional support	.619**	0.000	Highly Significant
Self-evaluation			
Knowledge support	.389**	0.000	Highly Significant
Intellectual support	.510**	0.000	Highly Significant
Emotional support	.992**	0.000	Highly Significant

Legend: Significant at p -value < 0.01

This table reveals the association between meta-cognitive writing strategies and Automated Writing Feedback. The computed rho-values indicate a moderate direct correlation, consistent with several previous studies on the positive relationship between meta-cognitive strategies and writing performance (Lee, 2018). The resulted p-values were all below the alpha level, signifying significant relationships. This finding aligns with existing research, implying that the better the writing strategies employed, the more effective the automated writing feedback becomes.

These correlations between meta-cognitive strategies and automated feedback align with existing research, illustrating the importance of integrating meta-cognitive awareness into writing practices to optimize feedback efficacy. Inconsistencies might arise due to contextual differences in educational approaches, highlighting the need for tailored

interventions in diverse learning environments. Besides, the analysis underscores the pivotal role of integrating meta-cognitive strategies into writing pedagogy to optimize the efficacy of automated feedback systems. Incorporating meta-cognitive awareness within writing practices empowers students to effectively utilize automated feedback, thereby enhancing their writing skills.

In addition, the observed strong correlation between emotional support strategies and the effectiveness of automated feedback underscores the need to focus on students' emotional responses to feedback. Educators should aim to cultivate emotional regulation strategies, aiding students in managing emotional reactions to feedback, thereby improving their engagement with it. Besides, the intricate relationship between planning strategies in meta-cognitive and automated feedback emphasizes the importance of goal-oriented planning. Encouraging students to set clear, attainable writing goals and utilizing feedback to assess goal achievement could significantly enhance their writing competencies. It is also advisable to promote reflective practices and empower students to actively monitor their writing processes using automated feedback as a self-assessment tool to significantly enhance writing quality.

3.3. Relationship between Meta-cognitive Strategies and English Writing Performance

Table 3. Relationship between Meta-cognitive Strategies and English Writing Performance

Planning	rho-value	p-value	Interpretation
Accuracy	.434**	0.000	Highly Significant
Complexity	.372**	0.000	Highly Significant
Fluency	.401**	0.000	Highly Significant
Selective Attention			
Accuracy	.494**	0.000	Highly Significant
Complexity	.340**	0.000	Highly Significant
Fluency	.440**	0.000	Highly Significant
Self-monitoring			
Accuracy	.494**	0.000	Highly Significant
Complexity	.396**	0.000	Highly Significant
Fluency	.457**	0.000	Highly Significant
Self-evaluation			
Accuracy	.514**	0.000	Highly Significant
Complexity	.483**	0.000	Highly Significant
Fluency	.493**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Table 3 highlights the robust association between Meta-cognitive Writing Strategies and English Writing Performance. The computed rho-values demonstrate highly significant correlations between meta-cognitive strategies and each dimension of writing performance. These results suggest a moderate direct correlation, all with p-values falling below the alpha level. This emphasizes a substantial relationship, indicating that stronger writing strategies correspond to better performance.

To begin, acknowledging the diverse educational settings and student characteristics becomes imperative in employing meta-cognitive strategies effectively (Hosseini, 2021; Liu, 2021). Educators should tailor strategies to suit specific contexts, considering factors like proficiency levels, learning

backgrounds, and preferences (Yang & Dai, 2015). Moreover, integrating varied teaching approaches or combining meta-cognitive strategies with other pedagogical tools may yield more favorable results (Barrot, 2023; Fu et al., 2019).

Furthermore, emphasizing a holistic approach that encompasses not just meta-cognitive strategies but also cognitive techniques and academic goals appears promising in enhancing overall academic achievement (Abedini & Zarei, 2020). As seen in studies by Abedini and Zarei (2020) and Festas et al. (2015), a comprehensive strategy incorporating diverse elements could significantly influence student performance.

Educators should also consider the importance of assessment tools in evaluating writing proficiency (Kessler et al., 2022). Employing standardized criteria or varied assessment methods might offer a more comprehensive understanding of students' writing capabilities and the impact of applied strategies.

3.4. Relationship between Automated Writing Feedback and English Writing Performance

Table 4 Relationship between Automated Writing Feedback and English Writing Performance

Knowledge support	rho-value	p-value	Interpretation
Accuracy	.286**	0.000	Highly Significant
Complexity	.296**	0.000	Highly Significant
Fluency	.300**	0.000	Highly Significant
Intellectual support			
Accuracy	.394**	0.000	Highly Significant
Complexity	.372**	0.000	Highly Significant
Fluency	.380**	0.000	Highly Significant
Emotional support			
Accuracy	.516**	0.000	Highly Significant
Complexity	.484**	0.000	Highly Significant
Fluency	.494**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Table 4 displays the association between Automated Writing Feedback and English Writing Performance. The calculated rho-values reveal consistent moderate to strong correlations, all with p-values below the alpha level, signifying a notable relationship. This suggests that refined automated writing feedback corresponds to enhanced performance across various dimensions.

Notably, knowledge support within automated feedback demonstrates a moderate to strong correlation with accuracy, complexity, and fluency in writing. This highlights the significant contribution of factual accuracy, relevant content, and coherent information to enhancing specific aspects of English writing. It is in line with Kessler et al.'s (2022) study, which proves that students had a better writing performance in writing in terms of accuracy, complexity and fluency after using automated writing feedback system since it provides them with a tailored guidance in language points, especially in grammar and contents, making up for the scarcity of teacher resources.

4. Conclusion

The female student population outnumbered male students significantly, showcasing an even distribution across majors while demonstrating a moderate level of language proficiency. The respondents showcased considerable strengths in selective attention and monitoring their grammar and sentence structure, whereas planning and self-evaluation strategies were comparatively less emphasized. The respondents showed positive attitude towards the Automated Writing Feedback system, with the equal level of intellectual and emotional support and less level of knowledge support. The respondents were at a relatively low level in writing proficiency, with the better performance on accuracy and fluency, and the most difficult part and relatively weak part is complexity. No sex, major, grade, and English proficiency difference on Meta-cognitive strategies, attitude towards Automatic Writing Evaluation Feedback system and English Writing performance. Meta-cognitive strategy, automated writing feedback and English writing performance significantly correlated with each other. An enhanced language learning program to regulate the meta-cognitive strategies among students and the utilization of automated evaluation feedback for further boost their writing performance was proposed.

5. Recommendation

School administrators may offer English teachers training on effectively utilizing automated feedback tools and on teaching meta-cognitive strategies to aid students in refining accuracy, complexity, and fluency in writing. English teachers may integrate structured programs into their curriculum that emphasize the development and reinforcement of meta-cognitive strategies within writing lessons. They should may keep creating a supportive classroom environment that encourages open discussion and a growth mindset toward writing improvement. Students may actively engage in workshops or programs that foster the development of meta-cognitive strategies such as planning, selective attention, monitoring, and self-evaluation. They may also fully embrace automated writing feedback systems as guide for improving writing skills and learn to interpret and apply feedback constructively. Curriculum designers and educators can collaborate to develop innovative instructional materials integrating meta-cognitive strategies into the curriculum. These materials can encompass diverse formats such as interactive online modules, multimedia resources, or adaptive

learning platforms. Future researchers may delve deeper into understanding the nuanced impact of meta-cognitive strategies on various aspects of writing performance, explore other potential factors influencing writing proficiency, and a longitudinal studies may be conducted to track the effectiveness of meta-cognitive training over time, assessing sustained impacts on writing skills.

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