

The Influence of Effort Regulation and Affective Strategies on the Writing Process: A PLS-SEM Analysis

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ABSTRACT

Writing is a fundamental academic skill that requires learners to manage cognitive, motivational, and behavioural demands throughout the writing process. This study investigates the influence of effort regulation and affective strategies on the writing process, specifically during the planning, translating, and reviewing stages. This study is grounded in the Cognitive Process Theory of Writing, Self-Regulated Learning theory, and Expectancy-Value Theory. A quantitative research design was employed, and data were collected from university students using a questionnaire adapted from Raofi et al. (2017), which measured metacognitive, cognitive, effort regulation, and affective writing strategies using a five-point Likert scale. The data were analysed using Partial Least Squares Structural Equation Modeling (PLS-SEM) through SmartPLS 4 to evaluate both the measurement and structural models. The findings revealed that effort regulation has significant relationships with all three stages of the writing process: planning, translating, and reviewing, indicating that students who sustain effort and persist in writing tasks are more engaged in managing the different stages of writing. In contrast, affective strategies showed a significant relationship only with the translating stage, suggesting that emotional control and motivation mainly influence the drafting process. Effect size analysis further indicated medium effects for effort regulation on planning and reviewing, and for affective strategies on translating, while effort regulation had a smaller effect on translating. Overall, the findings highlight the importance of persistence, motivation, and emotional regulation in supporting students' writing development. The study contributes to a deeper understanding of how effort regulation and affective strategies shape the writing process and suggests that writing instruction should incorporate strategy-based approaches that promote both self-regulation and positive emotional engagement to enhance students' writing performance.

Keywords: Effort Regulation, Affective Strategies, Writing Process, Self-Regulated Learning, PLS-SEM

INTRODUCTION.

Writing is a fundamental academic skill that plays an essential role in preparing students for higher education and professional communication. However, writing is often considered a complex task that requires careful planning, drafting, and revision to produce coherent and meaningful texts. Previous studies have emphasized the importance of writing strategies in helping learners manage the cognitive and motivational demands of the writing process. For instance, (Nurfiza Abdul Alahdad et al., 2025) highlight that writing strategies such as

metacognitive, cognitive, effort regulation, social, and affective strategies are closely interconnected and collectively contribute to effective writing performance. Their findings suggest that the interaction between cognition, behaviour, and the learning environment supports the development of students' writing abilities and promotes self-directed learning. Similarly, Baharudin et al. (2024) report that ESL learners employ a range of writing strategies when completing academic writing tasks, with metacognitive and cognitive strategies being most frequently used, followed by self-regulation and affective strategies. The study also found strong relationships among these strategies, indicating that successful writing involves the coordinated use of multiple strategic processes. In addition, Teng et al. (2022) demonstrate that self-regulatory writing strategies, including goal-oriented monitoring, evaluation, and emotional control, significantly predict students' writing performance in an EFL context. These findings suggest that students who actively regulate their learning processes are better able to manage the challenges involved in writing tasks.

Despite the growing recognition of writing strategies in improving writing performance, several studies suggest that effort regulation and affective components remain underexplored aspects of the writing process. (Skar et al., 2023) argues that motivational beliefs, such as writing self-efficacy and attitudes toward writing, influence whether students engage in writing tasks, the level of effort they invest, and the cognitive resources they apply during writing. Their findings show that students with stronger self-regulation efficacy and more positive attitudes toward writing tend to produce better writing quality. Similarly, Dari et al. (2022) indicate that writing strategies are frequently applied during different stages of the writing process, particularly during the while-writing stage, followed by pre-writing and revising stages, suggesting that strategic effort and emotional engagement are necessary throughout the writing process. Although previous research has established relationships between various writing strategies and writing performance, there is still limited empirical evidence examining how effort regulation and affective strategies specifically influence the writing process as integrated constructs. Furthermore, many studies have focused on descriptive or correlational analyses, with limited use of advanced analytical techniques to examine the structural relationships among these variables. Therefore, this study addresses this gap by investigating the influence of effort regulation and affective strategies on the writing process using Partial Least Squares Structural Equation Modeling (PLS-SEM), which provides a more comprehensive understanding of the relationships between these key constructs in students' writing development. Figure 1 displays the model with the positioning of each hypothesis (1-12).

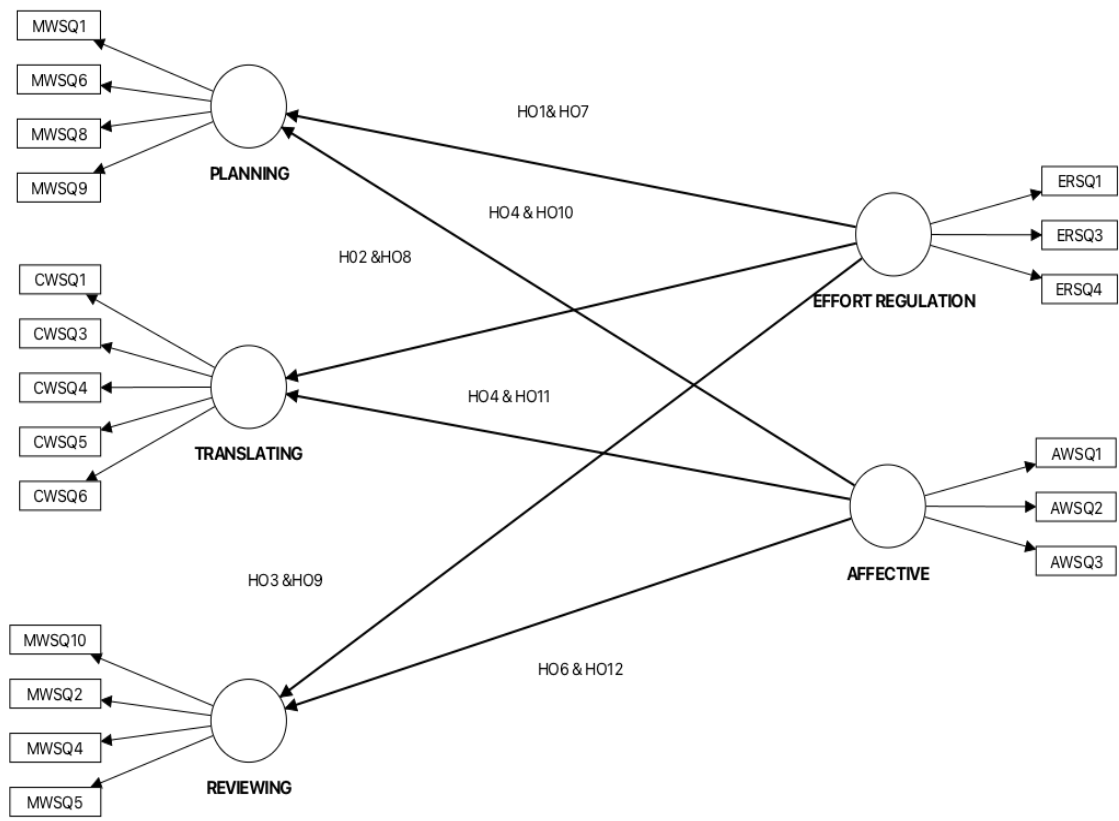


Figure 1- Model and the Positioning of Research Hypotheses (1-8)

The research questions will be answered using SmartPLS analysis using both measurement and structural models. Table 1 shows the list of research objectives, questions, and hypotheses. The research objectives are divided into four main categories. The first category explores the relationship between effort regulation and the three stages in the writing process (planning, translating, and reviewing). The second category investigates the relationship between affective components and all three ages in the writing process. The third category looks at the effect of effort regulation and the three stages in the writing process. Lastly, the fourth category explores the effect of affective components and all three ages in the writing process. Each category is supported by three research objectives.

Table 1- Research Objective, Questions, and Hypotheses

RO	RQ	Research
		Hypothesis
To investigate if there is a significant relationship between Effort Regulation and Planning Stage	Is there a significant relationship between Effort Regulation and Planning Stage?	Ho1: There is no significant relationship between Effort Regulation and Planning Stage
To investigate if there is a significant relationship between Effort Regulation and Translating Stage	Is there a significant relationship between Effort Regulation and Translating Stage?	Ho2: There is no significant relationship between Effort Regulation and Translating Stage
To investigate if there is a significant relationship between Effort Regulation and Reviewing Stage	Is there a significant relationship between Effort Regulation and Reviewing Stage?	Ho3: There is no significant relationship between Effort Regulation and Reviewing Stage
To investigate if there is a significant relationship between Affective Components and Planning Stage	Is there a significant relationship between Affective components and Planning Stage?	Ho4: There is no significant relationship between Affective components and Planning Stage
To investigate if there is a significant relationship between Affective Components and Translating Stage	Is there a significant relationship between Affective Components and Translating Stage?	Ho5: There is no significant relationship between Affective Components and Translating Stage
To investigate if there is a significant relationship between Affective Components and Reviewing Stage	Is there a significant relationship between Affective Components and Reviewing Stage?	Ho6: There is no significant relationship between Affective Components and Reviewing Stage
To investigate if there is a significant effect between Effort Regulation and Planning Stage	Is there a significant effect between Effort Regulation and Planning Stage?	Ho7: There is no significant effect between Effort Regulation and Planning Stage
To investigate if there is a significant effect between Effort Regulation and Translating Stage	Is there a significant effect between Effort Regulation and Translating Stage?	Ho8: There is no significant effect between Effort Regulation and Translating Stage
To investigate if there is a significant effect between Effort Regulation and Reviewing Stage	Is there a significant effect between Effort Regulation and Reviewing Stage?	Ho9: There is no significant effect between Effort Regulation and Reviewing Stage

To investigate if there is a significant effect between Affective Components and Planning Stage	Is there a significant effect between Affective Components and Planning Stage?	Ho10: There is no significant effect between Affective Components and Planning Stage
To investigate if there is a significant effect between Affective Components and Translating Stage	Is there a significant effect between Affective Components and Translating Stage?	Ho11: There is no significant effect between Affective Components and Translating Stage
To investigate if there is a significant effect between Affective Components and Reviewing Stage	Is there a significant effect between Affective Components and Reviewing Stage?	Ho12: There is no significant effect between Affective Components and Reviewing Stage

LITERATURE REVIEW

Theoretical Framework

Three anchor theories support the concept of this study. The cognitive process of writing is used to establish the stages in the writing process: planning, translating, and reviewing. Self-Regulated Learning theory is used to explain effort regulation and finally, Expectancy-Value Theory supports affective components.

Cognitive Process of Writing

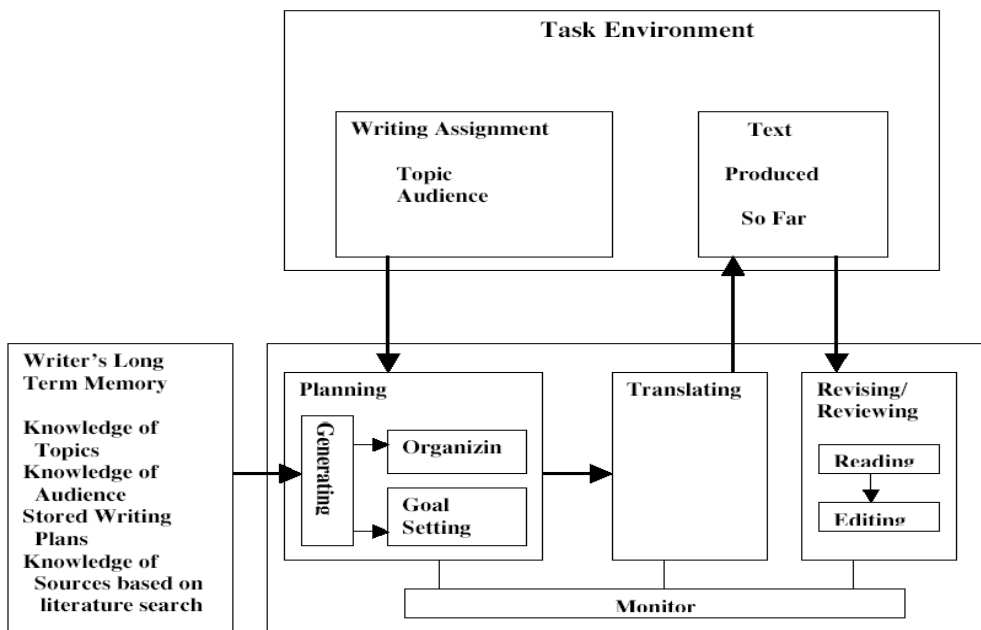


Figure 2- The Cognitive Process Theory of Writing (source: Flower and Hayes, 1981)

With reference to Figure 2 above, the Cognitive Process Theory of Writing proposed by Flower & Hayes, 1981) conceptualizes writing as a complex, recursive cognitive activity rather than a simple linear process. According to this theory, writing involves three main processes: planning, translating, and reviewing, which writers continuously move between while composing a text. In the planning stage, writers generate ideas, organize information, and set goals for their writing based on the task requirements and audience. During the translating stage, writers convert their planned ideas into written language by selecting appropriate vocabulary, sentence structures, and expressions. The reviewing stage involves evaluating and revising the written text to improve clarity, coherence, and overall quality. (Flower & Hayes, 1981) Flower and Hayes (1981) also emphasize that these processes operate within a broader framework that includes the task environment, the writer's long-term memory, and monitoring mechanisms that guide decision-making during writing. This model highlights that

effective writing requires continuous cognitive control as writers plan, draft, and revise their work to produce meaningful and well-structured texts.

Self-Regulated Learning Strategies

The Self-Regulated Learning (SRL) theory proposed by (Zimmerman (2020) explains how learners actively control their cognition, motivation, and behavior to achieve academic goals, which is closely related to effort regulation during the writing process. In the planning stage, self-regulated learners set goals, generate ideas, and organize their thoughts before writing, while consciously allocating effort to understand the task and prepare a clear structure. During the translating stage, where ideas are transformed into written text, effort regulation becomes essential because writers must persist despite challenges such as difficulty expressing ideas, limited vocabulary, or fatigue; students who apply SRL strategies maintain focus and continue drafting even when the task becomes demanding. In the reviewing stage, self-regulated writers monitor and evaluate their work, revising and editing their drafts to improve clarity and coherence, which requires sustained effort and persistence. Thus, Zimmerman's (2020) SRL theory explains effort regulation in writing as the learner's ability to deliberately sustain effort, remain focused, and persist across the recursive stages of planning, translating, and reviewing to complete complex writing tasks.

Expectancy-Value Theory

Expectancy-Value Theory, proposed by Allan Wigfield and Jacquelynne S. Eccles (2000) explains that learners' motivation and emotional responses toward a task depend on their expectations for success and the value they attach to the task, which also influences the use of affective strategies in writing. During the planning stage, students who believe they can succeed in the writing task and who value it are more likely to manage emotions such as anxiety or uncertainty by using affective strategies like positive self-talk, maintaining interest, or reducing stress while generating and organizing ideas. In the translating stage, when ideas are transformed into written text, writers often face difficulties such as limited vocabulary or difficulty expressing ideas; expectancy beliefs help them regulate emotions, stay motivated, and maintain a positive attitude toward the task. During the reviewing stage, writers who expect their efforts to improve their writing are more willing to manage frustration and remain emotionally engaged while revising and editing their work. Therefore, Expectancy-Value Theory explains affective strategies in writing as the ways learners monitor and regulate their emotions, motivation, and attitudes throughout the planning, translating, and reviewing stages, enabling them to remain engaged and confident in completing complex writing tasks.

Past Studies on Effort Regulation, Attitude

Previous studies have highlighted the significant role of effort regulation in supporting students throughout the writing process. Effort regulation refers to learners' ability to maintain persistence and continue working on writing tasks despite challenges such as difficulty generating ideas or organizing content. Research has shown that writing strategies, including effort regulation, are closely interconnected with other strategies that support effective writing performance. For instance, (Nurfiza Abdul Alahdad et al., 2025) found that effort regulation is strongly related to metacognitive, cognitive, social, and affective strategies, forming an integrated network that enhances students' writing performance. Their study, which involved university students learning Arabic as a third language, demonstrated that the interaction between cognition, behaviour, and the environment contributes to improved writing outcomes and promotes self-directed learning. Similarly, (Baharudin et al., 2024) reported that ESL learners employ a range of strategies when writing, including self-regulation strategies that help them manage the writing process. Although metacognitive strategies were most frequently used, the study also showed strong relationships among various writing strategies, suggesting that persistence and self-regulation play an important role in helping learners produce effective academic writing. In addition, (Dari et al., 2022) observed that students tend to apply writing strategies most frequently during the while-writing stage, followed by pre-writing and revising stages. This finding highlights the importance of maintaining effort across all stages of the writing process, including planning, drafting, and revising.

In addition to effort regulation, affective components such as motivation, attitude, and emotional control have also been found to influence students' writing performance. Motivational beliefs and emotional engagement can

determine whether learners choose to engage in writing tasks and how much effort they invest in completing them. For example, (Skar et al., 2023) found that students’ motivational beliefs, particularly writing self-efficacy and attitudes toward writing, significantly contribute to the quality of their writing. Their study revealed that students who have more positive attitudes toward writing and stronger confidence in their ability to regulate their writing tend to produce better writing outcomes. Similarly, (Teng et al., 2022) identified emotional control as an important component of self-regulatory writing strategies. Their findings indicated that strategies such as emotional control, goal-oriented monitoring, and evaluation significantly predict students’ writing performance in an EFL context. These results suggest that managing emotions and maintaining motivation are essential for sustaining engagement throughout the writing process. Overall, past research indicates that both effort regulation and affective components are critical factors that influence how students plan, develop, and revise their writing, ultimately contributing to improved writing performance.

Conceptual Framework and Proposed Model of the Study

The conceptual framework for this study (Figure 3) integrates theories of the cognitive process theory of writing (CPTW), self-regulated learning (SRL), and Expectancy-Value theory (EVT) to explain how effort regulation and affective strategies influence writing. The writing process is grounded in the cognitive process model proposed by Flower & Hayes (1981), which conceptualizes writing as a recursive process involving planning, translating, and reviewing that interact with the writer’s task environment and long-term memory (Flower & Hayes, 1981).

Within this process, learners must actively regulate their behaviors and persistence to manage challenges encountered during writing. Effort regulation is therefore framed through the perspective of self-regulated learning, which emphasizes learners’ capacity to sustain motivation, control their learning behaviors, and maintain effort despite difficulties (Zimmerman, 2020). According to this view, students who effectively regulate their effort are more likely to remain engaged in planning, drafting, and revising during the writing process.

In addition, affective strategies are explained through the Expectancy-Value Theory of motivation developed by (Wigfield & Eccles, 2000), which suggests that learners’ attitudes, expectations for success, and perceived value of tasks influence their engagement and performance (Wigfield & Eccles, 2000). When students hold positive attitudes toward writing and believe in their ability to succeed, they are more likely to employ effective affective strategies that support persistence and engagement in writing activities. Together, these theoretical perspectives suggest that effort regulation and affective strategies play a significant role in shaping students’ engagement with the writing process (Flower & Hayes, 1981; (Zimmerman, 2020; Wigfield & Eccles, 2000)

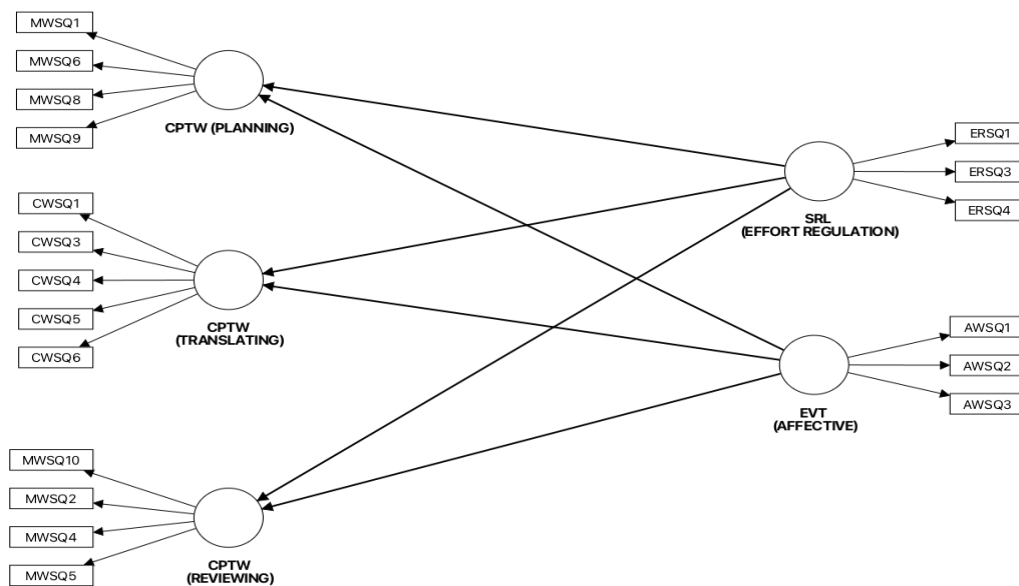


Figure 3- Conceptual Framework of the Study

The Influence of Effort Regulation and Affective Components on the Writing Process

METHODOLOGY

Research Design

This study employs a quantitative design. The research goal is to explore the influence of Effort Regulation and Affective Components on the Writing Process. The model (Figure 1) chosen for this study is a hierarchical component model, Type II, which utilizes a combination of reflective-reflective models. According to (Fornell (1981), a reflective model is employed when the construct is a trait and explains the indicators.

Population and Sample

The demographic analysis is presented in percentages. According to Ziegenfuss (2021), researchers report demographic data in percentages to establish sample representatives and allow for generalizability to a larger population. Presenting in percentages also provides an overview of participants' characteristics and offers a clear and understandable picture of the sample makeup. 109 respondents participated in this study. According to (J. F. Hair et al., 2011), a general minimum sample size for PLS-SEM is considered reasonable.

Table 2- Percentage for Demographic Profile

Question	Demographic Profile	Categories	Percentage (%)
1	Gender	Male	26%
		Female	74%
2	Level	Bachelor	69%
		Post-Grad	31%

Table 2 presents the demographic profile of the respondents in terms of gender and academic level. For gender distribution, the majority of respondents were female, representing 74% of the sample, while male respondents accounted for 26%. This indicates that the study sample was predominantly composed of female participants. In terms of academic level, most of the respondents were enrolled in bachelor's degree programs, comprising 69% of the total participants, whereas 31% were post-graduate students. This distribution suggests that the study mainly involved undergraduate students, with a smaller proportion of respondents pursuing postgraduate studies. Overall, the demographic data show that the participant group was largely female and primarily consisted of bachelor-level students.

Instrument

Table 3 presents the distribution of items included in the questionnaire. The instrument used a 5-point Likert scale, with scale 1 being "never". Scale 2 represents "rarely". Scale 3 represents "sometimes", while scale 4 is "often", and scale 5 is "always". The instrument is adapted from (Raofi et al., 2017), who presented five types of writing strategies: metacognitive, effort regulation, cognitive, social, and effective.

Table 3- Distribution for Item in Instrument

SECTION	WRITING STRATEGY	CONSTRUCT	Indicator
B	Metacognitive	Planning	4
		Reviewing	6
C	Effort Regulation		5
D	Cognitive	Translating	6
E	Affective		3
			26

Table 3 presents the distribution of indicators across different writing strategy constructs used in the study. Section B focuses on metacognitive writing strategies, which include the constructs of planning and reviewing, consisting of 4 and 6 indicators, respectively. Section C represents effort regulation, which contains 5 indicators

that measure students' ability to sustain effort and persist during writing tasks. Section D addresses cognitive writing strategies, specifically the construct of translating, with a total of 6 indicators that assess how learners transform ideas into written text. Section E includes affective strategies, comprising 3 indicators that evaluate learners' emotional and motivational regulation during the writing process. Altogether, the instrument contains 26 indicators distributed across the different writing strategy constructs, providing a comprehensive measure of metacognitive, cognitive, effort regulation, and affective aspects involved in the writing process.

Data Collection and Data Analysis

Data is collected via a Google Form. The data is then analyzed using SmartPLS 4 through two main stages. As suggested by Hair et.al. (2017), data analysis is done at two levels: the measurement and structural model. The first stage is the measurement model, which measures the outer model. The second stage is the structural model, which measures the inner model. The analyzed data is used to answer the research questions.

FINDINGS

The model formed for this study is that of lower order construct (LOC). The reflective measurement model was chosen. A reflective measurement model is the formation of a single unobserved latent construct, and this construct influences multiple variables (indicators). Another key feature of LOC is that the indicators are interchangeable. In this study, the constructs Confidence and Worry are examined if they have a significant relationship with the construct behavioural and physiological.

The findings are presented in two stages. The first stage presents the measurement model, and the third stage reveals the structural model as well as answers research questions.

Measurement Model

In SmartPLS, the measurement model assesses the reliability and validity of the constructs. This is done by examining the relationships between them and their observable behavior. The measurement model measures the outer model. Figure 4 below shows the measurement model for this study. Further detailed explanation of this model is elaborated in tables below.

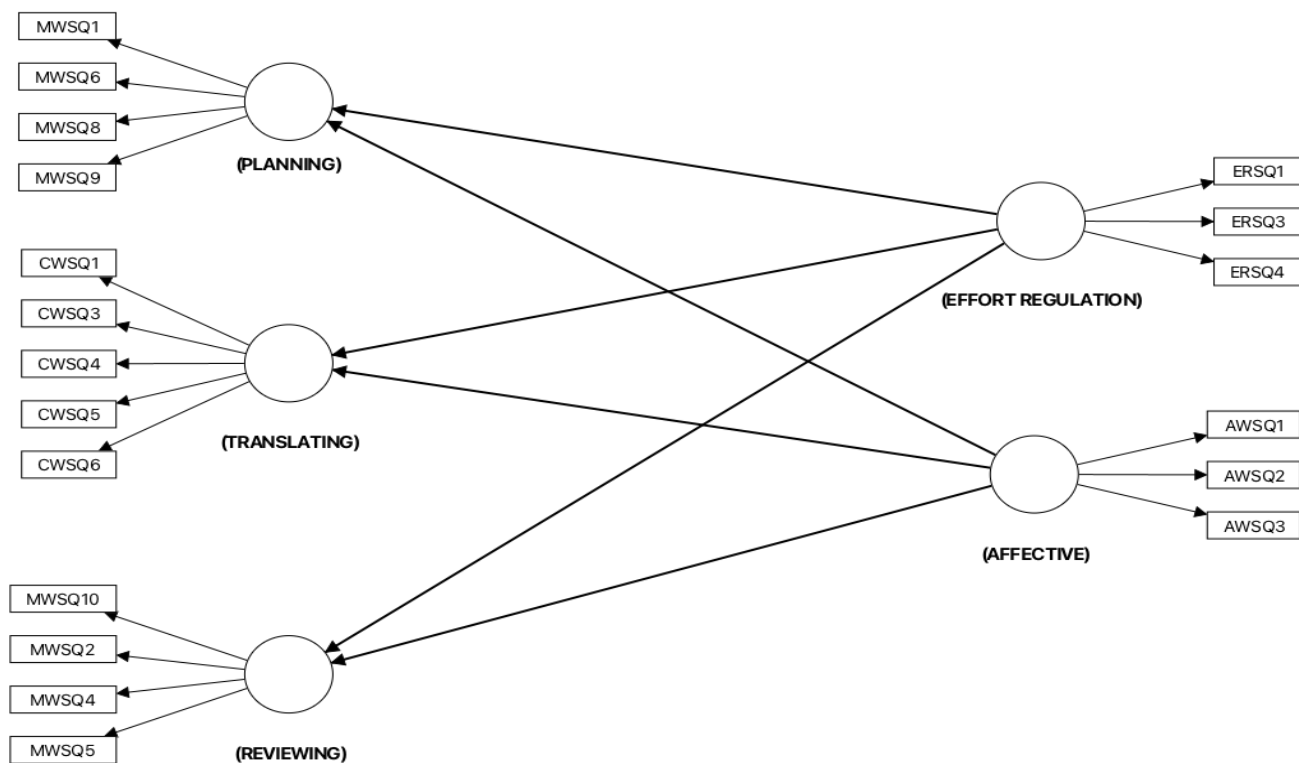


Figure 4- Measurement Model for Influence of Confidence and Worry on Behavioural and Physiological Fear

Reliability

According to Ringle & Sarstedt (2016), reliability is assessed by checking indicator reliability and internal consistency reliability. Internal consistency is done using Composite reliability (rho_c) and Cronbach’s Alpha. The cut-off value for Cronbach’s Alpha is 0.70 to 0.90. The cut-off values for composite reliability (rho_c) are 0.70-0.90. For indicator reliability, the factor loadings cut-off values are >0.70 and squared loadings ≥0.50. Finally, the cut-off values for Average Variance Extracted (AVE) ≥0.50.

Table 4 -Results for Reliability- Effort Regulation

CONSTRUCT/ITEM	FACTOR LOADING	CRONBACH’S ALPHA	COMPOSITE RELIABILITY (rho_c)	AVERAGE VARIANCE EXTRACTED (AVE)
		0.806	0.886	0.722
ERSQ1	0.798			
ERSQ3	0.863			
ERSQ4	0.885			

Table 4 presents the reliability and validity results for the Effort Regulation construct. The factor loadings for ERSQ1 (0.798), ERSQ3 (0.863), and ERSQ4 (0.885) are all above the recommended threshold of 0.70, indicating strong indicator reliability. The construct also shows good internal consistency with a Cronbach’s alpha value of 0.806 and a composite reliability of 0.886. Additionally, the average variance extracted (AVE) is 0.722, exceeding the recommended value of 0.50, which confirms adequate convergent validity. Overall, the results indicate that the effort regulation construct is reliable and valid for the measurement model.

Table 5 -Results for Reliability- Affective

CONSTRUCT/ITEM	FACTOR LOADING	CRONBACH’S ALPHA	COMPOSITE RELIABILITY (rho_c)	AVERAGE VARIANCE EXTRACTED (AVE)
		0.742	0.854	0.664
AWSQ1	0.718			
AWSQ2	0.905			
AWSQ3	0.81			

Table 5 presents the reliability and validity results for the Affective Writing Strategies construct. The factor loadings for AWSQ1 (0.718), AWSQ2 (0.905), and AWSQ3 (0.810) are all above the recommended threshold of 0.70, indicating acceptable indicator reliability. The construct demonstrates adequate internal consistency with a Cronbach’s alpha value of 0.742 and a composite reliability of 0.854. In addition, the average variance extracted (AVE) value of 0.664 exceeds the recommended minimum of 0.50, confirming satisfactory convergent validity. Overall, these results indicate that the affective writing strategies construct is reliable and valid for inclusion in the measurement model.

Table 6 -Results for Reliability- Planning

CONSTRUCT/ITEM	FACTOR LOADING	CRONBACH’S ALPHA	COMPOSITE RELIABILITY (rho_c)	AVERAGE VARIANCE EXTRACTED (AVE)
		0.801	0.871	0.63
MWSQ1	0.709			
MWSQ6	0.722			
MWSQ8	0.884			
MWSQ9	0.847			

Table 6 presents the reliability and validity results for the Planning construct. The factor loadings for the items MWSQ1 (0.709), MWSQ6 (0.722), MWSQ8 (0.884), and MWSQ9 (0.847) are all above the recommended threshold of 0.70, indicating acceptable indicator reliability. The construct also demonstrates good internal consistency, with a Cronbach’s alpha value of 0.801 and a composite reliability of 0.871. Additionally, the average variance extracted (AVE) value of 0.630 exceeds the recommended minimum of 0.50, confirming adequate convergent validity. Overall, these results indicate that the planning construct is reliable and suitable for inclusion in the measurement model.

Table 7 -Results for Reliability- Translating

CONSTRUCT/ ITEM	FACTOR LOADING	CRONBACH’S ALPHA	COMPOSITE RELIABILITY (rho_c)	AVERAGE VARIANCE EXTRACTED (AVE)
		0.868	0.904	0.655
CWSQ1	0.751			
CWSQ3	0.853			
CWSQ4	0.811			
CWSQ5	0.788			
CWSQ6	0.839			

Table 7 presents the reliability and validity results for the Translating construct. The factor loadings for the indicators CWSQ1 (0.751), CWSQ3 (0.853), CWSQ4 (0.811), CWSQ5 (0.788), and CWSQ6 (0.839) are all above the recommended threshold of 0.70, indicating strong indicator reliability. The construct also demonstrates high internal consistency, with a Cronbach’s alpha value of 0.868 and a composite reliability of 0.904. In addition, the average variance extracted (AVE) value of 0.655 exceeds the recommended minimum of 0.50, confirming satisfactory convergent validity. Overall, these results indicate that the translating construct is reliable and suitable for inclusion in the measurement model.

Table 8 -Results for Reliability- Reviewing

CONSTRUCT/ ITEM	FACTOR LOADING	CRONBACH’S ALPHA	COMPOSITE RELIABILITY (rho_c)	AVERAGE VARIANCE EXTRACTED (AVE)
		0.789	0.862	0.611
MWSQ10	0.839			
MWSQ2	0.705			
MWSQ4	0.749			
MWSQ5	0.826			

Table 8 presents the reliability and validity results for the Reviewing construct. The factor loadings for the indicators MWSQ10 (0.839), MWSQ2 (0.705), MWSQ4 (0.749), and MWSQ5 (0.826) are all above the recommended threshold of 0.70, indicating acceptable indicator reliability. The construct demonstrates good internal consistency with a Cronbach’s alpha value of 0.789 and a composite reliability of 0.862. Additionally, the average variance extracted (AVE) value of 0.611 exceeds the recommended minimum value of 0.50, confirming adequate convergent validity. Overall, these results indicate that the reviewing construct is reliable and appropriate for inclusion in the measurement model.

Validity

According to Ramayah et al., (2018) for validity, the Discriminant validity (HTMT) needs to be <0.85 or <0.90 .

Table 9- Discriminant Validity (HTMT)

	AFFECTIVE	EFFORT REGULATION	PLANNING	REVIEWING
EFFORT REGULATION	0.854			
PLANNING	0.667	0.764		
REVIEWING	0.652	0.742	0.774	
TRANSLATING	0.872	0.759	0.603	0.712

Table 9 presents the discriminant validity results among the constructs of affective strategies, effort regulation, planning, reviewing, and translating. The diagonal values represent the square root of the Average Variance Extracted (AVE) for each construct, while the off-diagonal values indicate the correlations between constructs. The square root of AVE values for effort regulation (0.854), planning (0.764), reviewing (0.774), and translating (0.712) are higher than their corresponding inter-construct correlations, indicating that each construct is more strongly related to its own indicators than to other constructs. The correlation values between the constructs range from 0.603 to 0.872, suggesting moderate relationships among the variables. Overall, the results confirm that the measurement model demonstrates acceptable discriminant validity, as the constructs are sufficiently distinct from one another.

Structural Model

In SmartPLS, the structural model visualizes the hypothesized causal relationships between constructs. The structural model (Figure 5) is thus formed after the researcher has established the reliability and validity in the measurement model. For the analysis of the structural model, the researcher runs bootstrapping and examines the collinearity, path coefficients of determination, effect size, PLS predict, and IPMA. In addition to that, the analysis in the structural model allows the researcher to answer research questions 1-6 and hypotheses 1-3). Figure 4 below shows the structural model for this study. Detailed explanation is elaborated in Tables below.

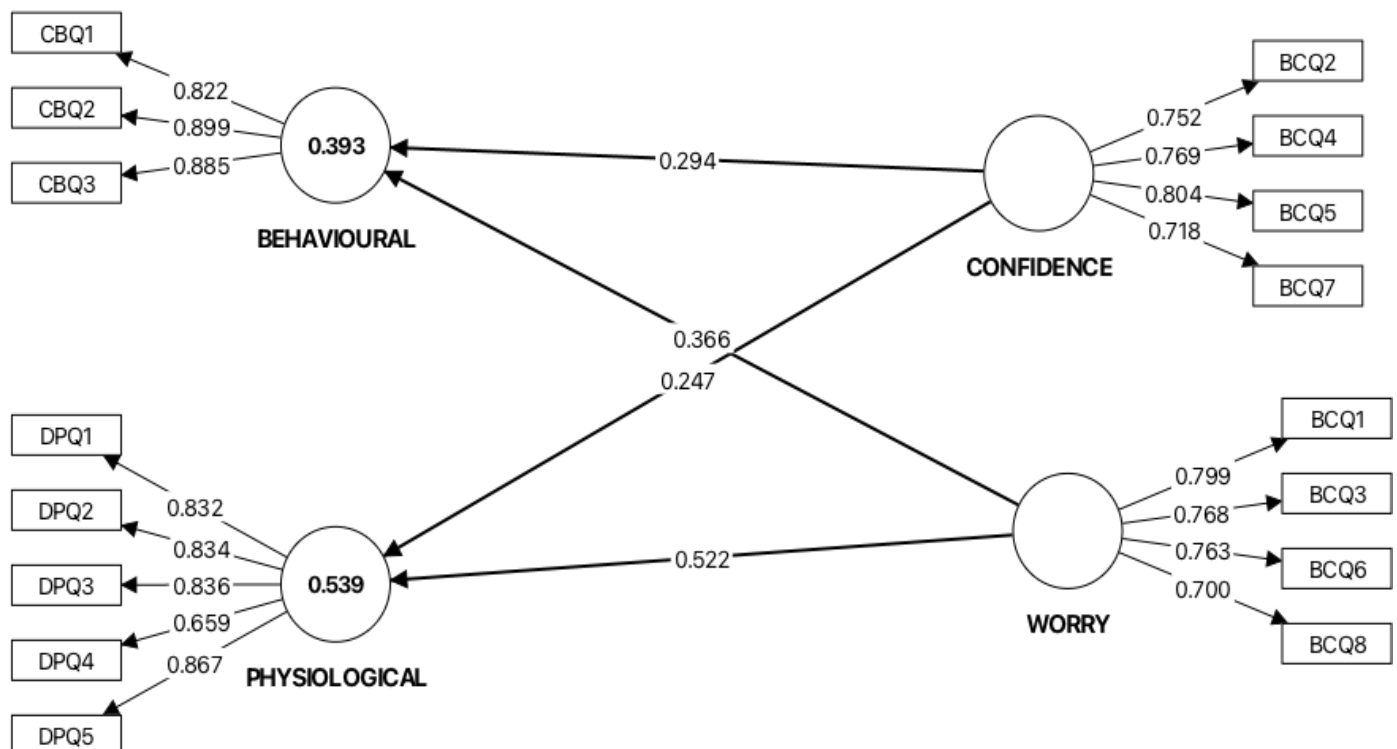


Figure 5- Structural Model for the Study

Collinearity

According to Ringle & Sarstedt (2016), the cut-off value for collinearity inner model VIF is ≤ 5.0 .

Table 10- Collinearity

	Original sample (O)
AFFECTIVE -> PLANNING	1.78
AFFECTIVE -> REVIEWING	1.78
AFFECTIVE -> TRANSLATING	1.78
EFFORT REGULATION -> PLANNING	1.78
EFFORT REGULATION -> REVIEWING	1.78
EFFORT REGULATION -> TRANSLATING	1.78
AFFECTIVE -> PLANNING	1.78

Table 10 above presents the collinearity results for this study. According to (C. Ringle & Sarstedt, 2015), the inner model VIF must be less than or equal to 5.0. All interactions met the threshold for Collinearity.

Coefficients of determination (R²)

According to (Ramayah et al., 2018), the coefficients of determination (R²) range from 0.2 to 0.7, depending on the field of study. Social Sciences & Economics follows the range above.

Table 11-R²

	Original sample (O)
PLANNING	0.403
REVIEWING	0.39
TRANSLATING	0.546

Table 11 shows the results for coefficients of determination (R²). Results indicate that the R² for Planning is 0.403, for Reviewing is 0.39, and for Reviewing is 0.546.

P-Value

Table 12- Interpretation for p-value

Thresholds	Interpretation	Decision
$p \leq 0.05$	Often considered statistically significant	Reject H ₀
$p \leq 0.01$	Indicates very strong evidence against H ₀	Reject H ₀
$p > 0.05$	Weak or no evidence against H ₀	Fai to reject H ₀

According to Goodman (1999) a threshold of p-value is the cut-off for determining statistical significance, most commonly set at 0.05. Below is the table that interprets the threshold.

Table 12 shows the interpretation for p-value. According to (Goodman, 1999), if the p-value is $p \leq 0.05$, the data is often considered statistically significant and the null hypothesis is rejected. If it is $p \leq 0.01$, then it indicates very strong evidence to reject the null hypothesis (H₀). However, a $p > 0.05$ is considered weak and there is no evidence to reject the null hypothesis.

Table 13- Interpretation for p-value

Thresholds	Interpretation	Decision
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$p > 0.05$	Weak or no evidence against H ₀	Fai to reject H ₀

Table 14-Path Coefficient for the current study

	T statistics (O/STDEV)	P values
AFFECTIVE -> PLANNING	1.741	0.082
AFFECTIVE -> REVIEWING	1.603	0.109
AFFECTIVE -> TRANSLATING	4.967	0
EFFORT REGULATION -> PLANNING	4.444	0
EFFORT REGULATION -> REVIEWING	4.277	0
EFFORT REGULATION -> TRANSLATING	3.199	0.001

Table 14 presents data to answer research questions and hypotheses. Path coefficients are presented in beta and t-value. The significant value (t-statistic) must be more than 1.65, and p-values must be less than 0.05 to show significant relationships.

For this study, two interactions did not show significant relationships, and they are (i) AFFECTIVE -> PLANNING (p=0.082; t=1.751) and AFFECTIVE -> REVIEWING (p=0.109; t=1.603).

Four interactions reveal significant relationships. The first is AFFECTIVE -> TRANSLATING (p=0; t=4.967). Next is EFFORT REGULATION -> PLANNING (p=0; t=4.444), EFFORT REGULATION -> REVIEWING (p=0; t=4.277) and lastly is EFFORT REGULATION -> TRANSLATING (p=0.0001; t=3.199)

Effect Size (f²)

According to Ramayah et al., (2018), the cutoff values for effect sizes (f²) are 0.02 (small), 0.15 (medium), and 0.35 (large). This section presents data to answer research questions and hypotheses 7-12.

According to (C. Ringle & Sarstedt, 2015), for effect size, values from 0.02 to 0.15 are considered small. Values between 0.15 and 0.35 are considered medium, while values 0.35 and above are considered large.

Table 15- Effect Size

	Original sample (O)	Interpretation
AFFECTIVE -> TRANSLATING	0.295	medium
EFFORT REGULATION -> PLANNING	0.212	medium
EFFORT REGULATION -> REVIEWING	0.199	medium
EFFORT REGULATION -> TRANSLATING	0.125	small

With reference to Table 15 above, H₀₅ is rejected. Results indicate that there is a medium effect size for all AFFECTIVE -> TRANSLATING, EFFORT REGULATION -> PLANNING, and EFFORT REGULATION -> REVIEWING. The interaction EFFORT REGULATION -> TRANSLATING reveals a small effect.

PLS Predict (Q²)

In PLS-SEM, it is stated that Q² ≥ 0 (C. Ringle & Sarstedt, 2015). Table 18 below reveals the PLS Predict (Q²) for the dependent variable. The analysis reveals the Q² for all items in the dependent variable -connectedness.

Table 16- PLS Predict (Q²)

	Q ² predict	RMSE	MAE
PLANNING	0.372	0.81	0.635
REVIEWING	0.347	0.829	0.646
TRANSLATING	0.518	0.711	0.567

Table 16 above shows the results for Q² Predict in the study. According to Cohen (1988), Q² Predict is used to interpret the magnitude of the predictive relevance. For Q² > 0 indicates the model has predictive relevance.

Secondly, **0.02** indicates **small** predictive relevance. Next, **0.15** indicates **medium** predictive relevance. Finally, **0.35** indicates **large** predictive relevance. Results for table 14 that all variables indicate predictive relevance.

Specifically, for this study, Behavioural shows large predictive relevance.

IPMA

IPMA or Importance-Performance Matrix Analysis. According to Ringle & Sarstedt (2016), IPMA is used to evaluate the performance and importance of the chosen constructs or indicators within a model. In the context of this study, individual IPMA analysis was done on each construct and reported in Table 17.

IPMA or Importance-Performance Matrix Analysis. According to (C. Ringle & Sarstedt, 2015), IPMA is used to evaluate the performance and importance of the chosen constructs or indicators within a model. In the context of this study, individual IPMA analysis was done on each construct and reported in Table 17.

Table 17- Latent Variables Average Performance (Performance)

	LV performance value, average
AFFECTIVE	68.994
EFFORT REGULATION	66.803
PLANNING	68.675
REVIEWING	73.759
TRANSLATING	75.101

Table 17 presents the average performance values of the latent variables in the model. Among the constructs, Translating shows the highest performance value at 75.101, followed by Reviewing with 73.759, indicating that these aspects of the writing process demonstrate relatively stronger performance among the respondents. Affective strategies (68.994) and Planning (68.675) show similar moderate performance levels, suggesting a comparable level of engagement in these areas. Meanwhile, Effort Regulation records the lowest performance value at 66.803, although it still reflects a moderate level overall. These results suggest that while all constructs demonstrate acceptable performance, students appear to perform slightly better in the translating and reviewing stages of the writing process compared to planning, affective strategies, and effort regulation.

CONCLUSION

Summary of Findings and Discussions

Table 18- Outcome of Research Hypothesis

RQ	RESEARCH HYPOTHESIS	RESEARCH OUTCOME
Is there a significant relationship between Effort Regulation and Planning Stage?	Ho1: There is no significant relationship between Effort Regulation and Planning Stage	Null Hypothesis rejected. There is a significant relationship between Effort Regulation and Planning Stage
Is there a significant relationship between Effort Regulation and Translating Stage?	Ho2: There is no significant relationship between Effort Regulation and Translating Stage	Null Hypothesis rejected. There is a significant relationship between Effort Regulation and Translating Stage
Is there a significant relationship between	Ho3: There is no significant relationship between Effort Regulation and Reviewing Stage	Null Hypothesis rejected. There is a significant relationship between Effort Regulation and Reviewing Stage

Effort Regulation and Reviewing Stage?		
Is there a significant relationship between Affective components and Planning Stage?	Ho4: There is no significant relationship between Affective components and Planning Stage	Null Hypothesis accepted. There is no significant relationship between Affective components and Planning Stage
Is there a significant relationship between Affective Components and Translating Stage?	Ho5: There is no significant relationship between Affective Components and Translating Stage	Null hypothesis is rejected. There is a significant effect between Affective Components and Translating Stage
Is there a significant relationship between Affective Components and Reviewing Stage?	Ho6: There is no significant relationship between Affective Components and Reviewing Stage	Null hypothesis is accepted. There is no significant relationship between Affective Components and Reviewing Stage.
Is there a significant effect between Effort Regulation and Planning Stage?	Ho7: There is no significant effect between Effort Regulation and Planning Stage	Null hypothesis is rejected. There is a significant effect between Effort Regulation and Planning Stage. Effect=Medium
Is there a significant effect Effort Regulation and Translating Stage?	Ho8: There is no significant effect between Effort Regulation and Translating Stage	Null hypothesis is rejected. There is a significant effect between Effort Regulation and Translating Stage. Effect=Small
Is there a a significant effect Effort Regulation and Reviewing Stage?	Ho9: There is no significant effect between Effort Regulation and Reviewing Stage	Null hypothesis is rejected. There is a significant effect between Effort Regulation and Reviewing Stage. Effect=Medium
Is there a significant effect Affective Components and Planning Stage?	Ho10: There is no significant effect between Affective Components and Planning Stage	Null hypothesis is accepted. There is no significant effect between Affective Components and Planning Stage.
Is there a significant effect Affective Components and Translating Stage?	Ho11: There is no significant effect between Affective Components and Translating Stage	Null hypothesis is rejected. There is a significant effect between Affective Components and Translating Stage. Effect=Medium
Is there a significant effect Affective Components and Reviewing Stage?	Ho12: There is no significant effect between Affective Components and Reviewing Stage	Null hypothesis is accepted. There is no significant effect between Affective Components and Reviewing Stage.

Table 18 above shows the presentation of the outcome of the research questions and hypotheses. The null hypotheses are accepted for Hypotheses 4,6,9, and 12. Null hypotheses are rejected for Hypotheses 1,2,3,5,7,8,9, and 11.

Implications and Suggestions for Future Research

Figure 6 below presents the proposed model for this study. Findings revealed that all interactions have significant relationships and have a variety of significant effects.

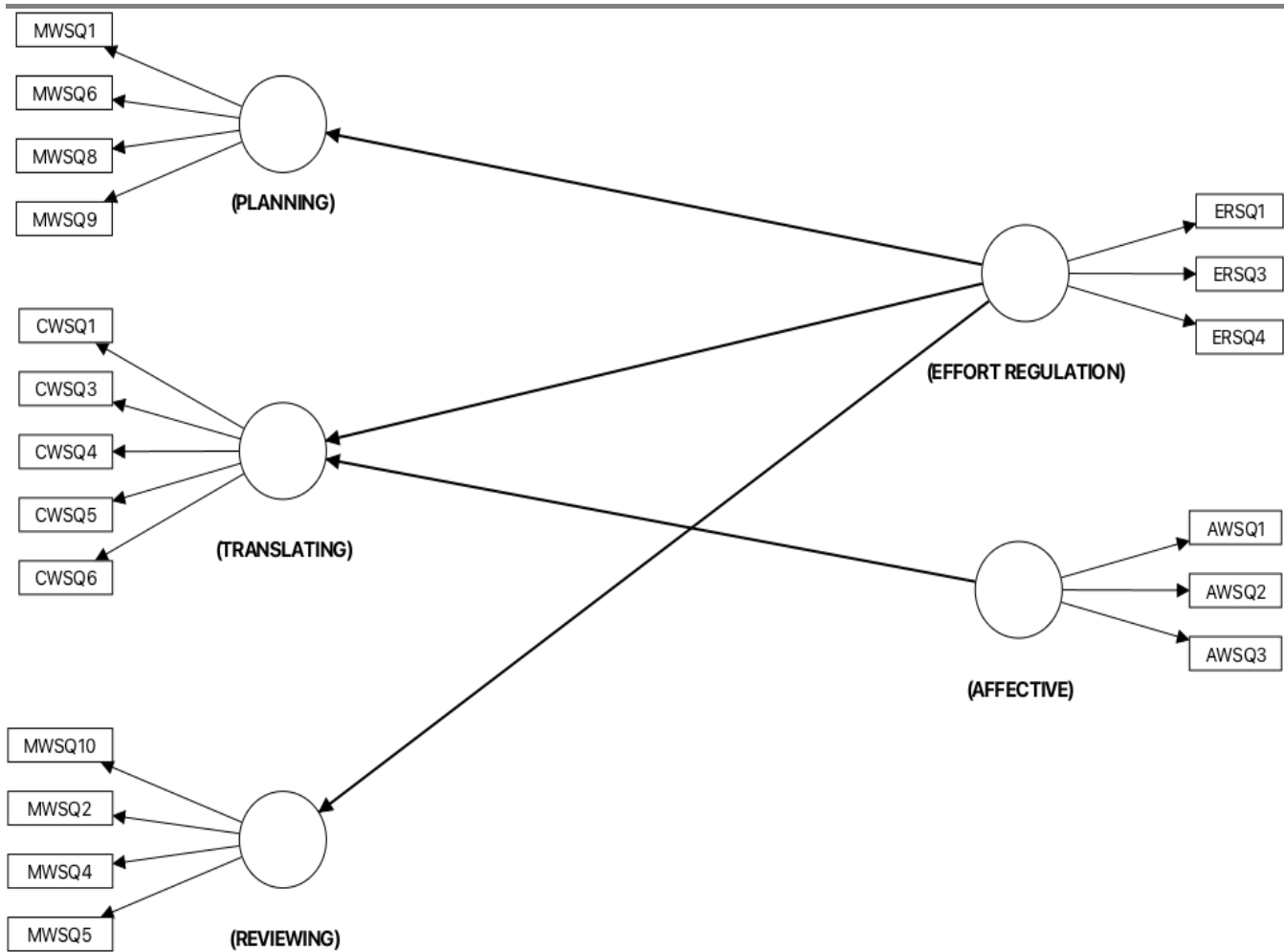


Figure 6- Revised Model

The Influence of Effort Regulation and Affective Components on the Writing Process

The Influence of Effort Regulation on the Writing Process

Effort regulation plays an important role in supporting the writing process, particularly during planning, translating, and reviewing. Writing is a complex task that requires careful planning and continuous revision, and the interaction between cognitive and behavioural strategies helps students produce effective written work (Alahdad et al., 2025). Effort regulation, as part of broader writing strategies, works together with metacognitive and cognitive strategies to support the development of coherent writing and overall writing performance (Alahdad et al., 2025). Similarly, motivational beliefs and self-regulation influence how much effort students invest in writing tasks and the cognitive resources they apply, which can ultimately affect the quality of their writing (Skar et al., 2023). Studies also show that ESL learners frequently use a combination of writing strategies, including metacognitive, cognitive, and self-regulation strategies, and that these strategies are strongly related to one another in supporting academic writing (Baharuddin et al., 2024). Furthermore, self-regulatory writing strategies, such as planning, monitoring, and evaluation, have been found to significantly predict students' writing performance, highlighting the importance of sustained effort and regulation throughout the writing process (Teng et al., 2022). Overall, effort regulation contributes to effective writing by encouraging persistence, supporting strategic planning and monitoring, and facilitating the continuous revision necessary for producing quality written texts.

The Influence of Affective Components on the Writing Process

Affective components play an important role in influencing the writing process, particularly during planning, translating, and reviewing. Writing is a complex activity that requires careful planning and revision, and various writing strategies, including affective strategies, interact with cognitive and behavioural factors to support

effective writing performance (Alahdad et al., 2025). These strategies are interdependent, forming a network that collectively contributes to the development of coherent writing. In addition, motivational beliefs such as writing self-efficacy and attitudes toward writing can influence whether students choose to write, the amount of effort they invest, and the cognitive resources they apply during writing tasks, which ultimately affects the quality of their writing (Skar et al., 2023). Research on ESL learners also indicates that affective strategies are used alongside metacognitive, cognitive, and self-regulation strategies, and that strong relationships exist among these strategies in supporting academic writing (Baharuddin et al., 2024). Furthermore, elements related to emotional control and self-regulation have been shown to significantly predict students' writing performance, highlighting the importance of affective aspects in guiding learners throughout the planning, monitoring, and evaluation stages of the writing process (Teng et al., 2022). Overall, affective components help sustain motivation, guide effort, and support strategic engagement during the different stages of writing.

Implications of the Findings and Suggestions for Future Research

Implications

The findings of this study provide important implications for writing instruction and learning strategies in higher education. The results highlight that effort regulation and affective strategies play meaningful roles in supporting students throughout the writing process, particularly in planning, translating, and reviewing stages. Writing is widely recognized as a complex task that requires careful planning, drafting, and revision, and the interaction between cognitive, behavioural, and environmental factors contributes to the development of effective writing skills (Alahdad et al., 2025). The findings suggest that encouraging students to regulate their effort and remain persistent during challenging writing tasks can enhance their ability to manage the different stages of writing. In addition, motivational beliefs such as writing self-efficacy and attitudes toward writing influence whether students engage in writing tasks, the level of effort they invest, and the cognitive resources they apply during writing (Skar et al., 2023). These findings imply that educators should incorporate instructional strategies that strengthen both cognitive and motivational aspects of writing. Previous research also indicates that ESL learners employ multiple writing strategies, including metacognitive, cognitive, self-regulation, and affective strategies, and that strong relationships exist among these strategies in supporting academic writing (Baharuddin et al., 2024). Furthermore, self-regulatory writing strategies such as goal-oriented monitoring, evaluation, and emotional control have been shown to significantly predict students' writing performance (Teng et al., 2022). Therefore, writing instruction should emphasize strategy-based learning approaches that help students develop persistence, emotional regulation, and effective writing habits throughout the writing process.

Suggestions for Future Research

Future research could further explore the complex relationships between effort regulation, affective strategies, and other writing strategies in different learning contexts. Previous studies have shown that writing strategies operate as an interconnected system in which metacognitive, cognitive, effort regulation, social, and affective strategies collectively support the development of coherent writing (Alahdad et al., 2025). Therefore, future studies could examine how these strategies interact simultaneously within the writing process to provide a more comprehensive understanding of students' writing development. In addition, motivational beliefs such as self-efficacy and attitudes toward writing have been shown to influence students' engagement in writing tasks and contribute to writing quality (Skar et al., 2023). Future research may expand the model by examining additional motivational or psychological variables that influence writing behaviour. Research involving ESL learners also indicates that various writing strategies are closely related and frequently used together in academic writing (Baharuddin et al., 2024), suggesting that future investigations could examine these strategies across different educational levels, disciplines, or cultural contexts. Furthermore, evidence from studies on self-regulatory writing strategies shows that factors such as emotional control, goal-oriented monitoring, and evaluation significantly predict students' writing performance (Teng et al., 2022). Future research could therefore employ longitudinal or experimental designs to examine how these strategies develop over time and how instructional interventions can enhance students' writing abilities. Such investigations would provide deeper insights into how strategic regulation and emotional engagement support effective writing development.

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APPENDIX

SURVEY NO 19

WRITING STRATEGY CATEGORIES

(this instrument is adapted from Raoofi,et.al, 2017)

Raoofi,S. Miri,A., Gharibi,J. & Malaki, B. (2017) Assessing and Validating a Writing Strategy Scale for Undergraduate Students. Journal of Language Teaching and Research, Vol 8(3), pp 624-633. Retrieved from <http://www.academypublication.com/issues2/jltr/vol08/03/23.pdf>

Adapted from Raoofi, et.al (2017)

Frequency

1	Never
2	rarely
3	Sometimes
4	Often
5	Always

SECTION	WRITING STRATEGY	NO OF ITEMS
B	Metacognitive	10
C	Effort Regulation	5
D	Cognitive	6
E	Social	4
F	Affective	3
		26

PART 2-MTEACOGNITIVE (MWS)

NO	
1	MWSQ1 I organize my ideas prior to writing.
2	MWSQ 2I revise my writing to make sure that it includes everything I want to discuss in my writing.
3	MWSQ 3I check my spelling.

4	MWSQ 4I check my writing to make sure it is grammatically correct.
5	MWSQ 5I evaluate and re-evaluate the ideas in my essay.
6	MWSQ 6I monitor and evaluate my progress in writing.
7	MWSQ 7I revise and edit an essay two or more times before I hand it in to my teacher.
8	MWSQ8 I go through the planning stages in my writing.
9	MWSQ9 I go through the drafting stages in my writing.
10	MWSQ10 I go through the revising and editing stages in my writing.

PART 3-EFFORT REGULATION (ERS)

NO	
1	ERSQ 1I write a lot to develop my writing skills.
2	ERSQ 2I often work hard to do well in my writing even if I don't like English writing tasks.
3	ERSQ 3Even if the writing activities are difficult, I don't give up but try to engage in them.
4	ERSQ 4I concentrate as hard as I can when doing a writing task.
5	ERSQ I spend a lot of time and energy on writing good English assignments.

PART 4-COGNITIVE (CWS)

NO	
1	CWSQ1 I use memorized grammatical elements such as singular and plural forms, verb tenses, prefixes and suffixes, etc, in my writing
2	CWSQ 2I put newly memorized vocabulary in my sentences.
3	CWSQ 3In order to generate ideas for my writing, I usually engage myself in brainstorming.
4	CWSQ 4I use different words that have the same meaning.
5	CWSQ 5I use my experiences and knowledge in my writing.
6	CWSQ 6I try to use effective linking words to ensure clear and logical relationship between sentences or paragraphs

PART 5-SOCIAL (SWS)

NO	
1	SWSQ1 In order to generate ideas for my writing, I usually discuss the writing topic with a friend or classmate.
2	SWSQ 2After revising and editing my essay thoroughly, I ask a friend or my classmate to read and comment on it.
3	SWSQ 3I try to identify friends or classmates whom I can ask for help in my writing.
4	SWSQ 4When I have trouble writing my essay, I try to do it with my classmates or friends.

PART 6-AFFECTIVE (AWS)

NO	
1	AWSQ1I try to write an essay in class with confidence and ease..
2	AWSQ2I try to relax whenever I feel afraid of writing.
3	AWSQ3I encourage myself to write even when I am afraid of making mistakes