Journal Website

Article history:
Received 08 October 2025
Revised 04 February 2026
Accepted 14 February 2026
Initial Publication 18 February 2026
Final Publication 01 September 2026

International Journal of Education and Cognitive Sciences

Volume 7, Issue 3, pp 1-15

E-ISSN: 3041-8828

Effectiveness of Self-Regulatory Strategies Training on Achievement Motivation and Academic Self-Concept among Bilingual Male Middle School Students

Keivan. Seyyedi[1*]

[1] Department of Foreign Languages, Mah.C., Islamic Azad University, Mahabad, Iran

*** Corresponding author email address**: keivan1357@iau.ac.ir

A r t i c l e I n f o

Article type:
Original Research

How to cite this article:
Seyyedi, K. (2026). Effectiveness of Self-Regulatory Strategies Training on Achievement Motivation and Academic Self-Concept among Bilingual Male Middle School Students. *International Journal of Education and Cognitive Sciences, 7*(3), 1-15.
https://doi.org/10.61838/kman.ijecs.345

A B S T R A C T

Purpose: The present study aimed to determine the effectiveness of self-regulatory strategies training on achievement motivation and academic self-concept among bilingual male first-grade middle school students.

Methods and Materials: This study employed a quasi-experimental design with a pre-test, post-test, and follow-up structure, including an experimental group and a control group. The statistical population consisted of bilingual male middle school students in Mahabad City during the 2024–2025 academic year. A total of 30 students were selected using purposive sampling and randomly assigned to an experimental group (n = 15) and a control group (n = 15). The experimental group received self-regulatory strategies training based on Zimmerman's self-regulated learning model in eight weekly sessions, each lasting 90 minutes, while the control group did not receive any intervention. Data were collected using the Hermans Achievement Motivation Questionnaire and the Academic Self-Concept Questionnaire. Measurements were conducted at three stages: pre-test, post-test, and two-month follow-up. Data were analyzed using mixed-design analysis of variance with repeated measures and Bonferroni post hoc tests in SPSS software.

Findings: The results of mixed-design analysis of variance indicated a significant effect of self-regulatory strategies training on achievement motivation components, including self-confidence, perseverance, foresight, and hard work, as evidenced by significant within-group, between-group, and interaction effects ($p < 0.05$). Similarly, significant effects were observed for academic self-concept components, including general self-concept, school self-concept, and non-academic self-concept, with statistically significant improvements in the experimental group compared to the control group ($p < 0.05$). Bonferroni post hoc comparisons confirmed that the experimental group demonstrated significantly higher scores than the control group in all achievement motivation and academic self-concept components at post-test and follow-up stages ($p < 0.05$), indicating both immediate and sustained intervention effects.

Conclusion: Self-regulatory strategies training was effective in significantly improving achievement motivation and academic self-concept among bilingual middle school students.

Keywords: *Self-regulated learning, achievement motivation, academic self-concept, bilingual students, educational intervention, middle school students*

1. Introduction

Bilingualism is a pervasive educational reality in many multilingual societies, and it becomes especially salient at the point where schooling is delivered in a language other than the child's mother tongue. In such contexts, the learner is expected to process subject matter content, classroom discourse, assessment demands, and peer–teacher interactions through a second language, while still relying on the cognitive-linguistic resources of the first language. This dual-language demand can shape students' academic trajectories through multiple pathways, including changes in academic self-efficacy, self-concept, motivation, engagement, and self-regulatory competence. Contemporary educational psychology increasingly treats these pathways as dynamic and reciprocal rather than linear, emphasizing that motivational and self-belief variables interact over time with achievement-related behaviors and contextual supports. For example, longitudinal and meta-analytic evidence has shown meaningful reciprocal relations between academic self-concept and achievement, indicating that self-concept is both an antecedent and a consequence of performance, and that this feedback loop may intensify across developmental periods and schooling transitions (Marsh et al., 2024; Wu et al., 2021). In bilingual settings, these reciprocal processes may be further complicated by language-related stressors, differential feedback, and perceived competence gaps, which can push students toward maladaptive cycles of avoidance, anxiety, procrastination, and disengagement unless protective learning skills are cultivated.

Within this broader landscape, achievement motivation remains one of the most robust psychological predictors of students' persistence, effort investment, and long-term academic functioning. Classic and contemporary work suggests that achievement motivation is not merely a stable trait; it is sensitive to instructional climate, perceived quality of teaching, social support, and students' own strategic capacity to manage learning demands. Empirical studies have shown that teacher support and parental monitoring are linked to students' motivational and efficacy trajectories over time, highlighting the developmental importance of sustained external scaffolding during early adolescence (Affuso et al., 2023). At the same time, research focused on dropout risk and academic persistence emphasizes that difficulties in self-regulation are often intertwined with reduced achievement motivation, particularly when students perceive instructional quality as low or learning demands as uncontrollable (Wild & Grassinger, 2023). These findings align with the argument that motivation is partly an outcome of students' ability to regulate attention, effort, and emotional reactions under academic pressure. When these skills are underdeveloped, students may become vulnerable to motivational decline even when external resources are present.

A closely related construct with extensive relevance for bilingual learners is academic self-concept, defined as students' self-perceptions regarding their academic competence and their standing in school-related tasks. Academic self-concept is strongly associated with achievement behaviors, resilience in the face of setbacks, and willingness to engage in challenging tasks. Meta-analytic work demonstrates that academic self-concept and academic achievement show longitudinal coupling, such that improvements in one domain can stimulate improvements in the other across time (Wu et al., 2021). More recent modeling approaches further clarify the "chicken-and-egg" problem by juxtaposing contemporaneous and lagged reciprocal effects, suggesting that the directionality of influence may differ by age, subject domain, and measurement interval (Marsh et al., 2024). These insights matter for bilingual students because language-related academic challenges may generate performance fluctuations that feed directly into self-concept, and diminished self-concept can, in turn, reduce persistence and engagement—especially in the early years of formal schooling transitions where identity-related self-evaluations are particularly sensitive.

In parallel, educational research has moved decisively toward understanding the role of self-regulated learning as an enabling mechanism that links instructional experiences to motivational and performance outcomes. Self-regulated learning refers to learners' active, goal-directed control over cognition, metacognition, motivation, and behavior across learning episodes. It includes processes such as goal setting, strategic planning, self-monitoring, help-seeking, time management, self-evaluation, and adaptive strategy revision. Syntheses of intervention research indicate that self-regulated learning training programs can yield meaningful improvements in academic performance, self-regulation strategy use, and motivational outcomes across educational levels (Theobald, 2021). In addition, domain-specific self-regulated learning interventions have shown promise even among younger learners, suggesting that targeted strategy instruction can be adapted developmentally and still produce measurable gains in learning outcomes (Lee et al., 2023). These findings are especially relevant in bilingual contexts

E-ISSN: 3041-8828

because self-regulation can compensate for language-related cognitive load by helping students plan study time, monitor comprehension, regulate anxiety, and persist through tasks that may feel linguistically effortful.

The expanding literature also emphasizes that self-regulated learning is not a purely intrapersonal competence; it is shaped by contextual affordances, instructional design, and technology-enabled learning environments. Students' preferences for learning technologies and their perceived impacts on academic self-efficacy, for instance, highlight how the learning ecosystem can support or hinder strategic engagement (Sutherland et al., 2023). During periods of heightened online learning, research has documented how learners use self-regulated learning strategies to sustain progress amid reduced in-person structure, underscoring the centrality of self-regulation under conditions of uncertainty and autonomy demands (Mahmud & German, 2021). Related work on online basic science learning during the COVID-19 pandemic further demonstrates that self-regulated learning is associated with problem-solving skill development, suggesting that regulation processes and cognitive performance outcomes can co-develop when instructional design explicitly elicits strategic engagement (Abtokhi et al., 2021). Although these studies span different populations and domains, together they establish that self-regulation functions as a flexible competency that can be harnessed under diverse instructional constraints—an argument that strongly motivates its use for bilingual students navigating additional linguistic demands.

A second body of evidence linking self-regulation to academic functioning concerns the motivational and behavioral difficulties that often co-occur with poor regulation, including procrastination, academic stress, and performance avoidance. Longitudinal analyses indicate that academic procrastination is reciprocally related to study satisfaction and dropout intentions, suggesting that dysregulated learning behavior can become self-perpetuating over time (Scheunemann et al., 2021). From a motivational standpoint, research in different student groups shows that achievement motivation varies meaningfully across contexts and is shaped by how students interpret academic demands and their own agency within learning tasks (Sharma et al., 2020). More recent applied studies explicitly connect motivation and self-regulation to procrastination, highlighting that deficits in regulation are not simply outcomes of low motivation but also drivers of future motivational depletion (Fatmala, 2025). In university populations, evidence that academic anxiety may contribute to behavioral addictions via self-regulatory fatigue reinforces the broader point that regulation failures can operate as mediating mechanisms linking stress-related affect to maladaptive outcomes (Kong et al., 2025). For bilingual adolescents, academic stress associated with second-language instruction could plausibly evoke similar pathways, making self-regulation training an attractive preventive and promotive intervention.

Theoretical framing for these relationships is often drawn from social cognitive theory, which posits that learning performance is influenced by reciprocal interactions among personal factors, behaviors, and environmental conditions. In this view, self-efficacy beliefs shape the initiation and persistence of effort, while feedback and contextual supports shape efficacy and strategy selection over time. Empirical work integrating social cognitive theory with learning input factors indicates that problem-solving skills and critical thinking can contribute to sustainable learning performance, particularly when learners are supported in regulating the cognitive processes required by complex tasks (Almulla & Al-Rahmi, 2023). This integrative perspective resonates with bilingual schooling contexts because language demands increase the cognitive complexity of learning tasks, requiring students to coordinate comprehension, reasoning, and output production simultaneously. In such situations, students who can regulate attention, strategy use, and emotion are more likely to sustain motivation and positive self-beliefs.

Problem-solving competence is another critical educational outcome that interlocks with self-regulation, self-efficacy, and motivation. Contemporary instructional research suggests that innovative learning designs—such as problem-based learning (PBL), blended PBL, and culturally responsive realism-based approaches—can enhance problem-solving skills and academic outcomes when they are structured to elicit active engagement. For instance, problem-based learning in live online classes has been associated with learning achievement and problem-solving skill development, highlighting how interactive instructional structures can stimulate strategic learning behavior (Aslan, 2021). Blended problem-based learning approaches implemented in online flipped settings have similarly been shown to improve problem-solving skills and academic achievement, especially for student-teachers, indicating that hybrid designs can promote both cognitive and motivational gains (Pimdee et al., 2024). Furthermore, PBL innovations integrating realism and culture have demonstrated impacts on mathematical problem solving and self-efficacy in

E-ISSN: 3041-8828

younger students, suggesting that contextual relevance and culturally embedded examples can strengthen learners' confidence and engagement (Rahman et al., 2024). Although these instructional approaches are not identical to explicit self-regulation training, they converge on the idea that student outcomes improve when learning environments foster strategic engagement and competence beliefs, both of which are central to self-regulated learning.

In mathematics education research, a particularly rich area of work has examined the interdependence between self-concept, anxiety, and self-regulated learning. Evidence from pandemic-era schooling indicates that students' mathematics self-concept and self-regulated learning are meaningfully related, with anxiety operating as a disruptive factor for both self-beliefs and effective strategy use (Delima & Cahyawati, 2021). Because bilingual learners may experience anxiety not only in mathematics but also in language-mediated instruction, these patterns support the assumption that interventions strengthening regulation and self-beliefs can have cross-domain benefits. Additional studies profiling problem-solving skills using structured heuristics (e.g., Polya's steps) underscore that learners differ substantially in how they approach and monitor problem-solving processes, which implies that teaching explicit regulation strategies could reduce performance variability by improving planning and monitoring skills (Riyadi et al., 2021; Yapatang & Polyiem, 2022). When learners can articulate goals, select appropriate strategies, and evaluate progress, they are better positioned to achieve success experiences that feed back into self-concept and motivation.

Recent work has also explored technology-enhanced pathways to improving self-efficacy and problem-solving ability. For example, hypermedia and augmented reality interventions have been reported to support prospective teachers' self-efficacy and problem-solving development, suggesting that strategic learning can be strengthened through interactive digital scaffolds (Andrini, 2024). Instructional media designed around case methods similarly aims to train students' problem-solving ability by embedding practice in realistic scenarios, implying that effective learning design can indirectly support self-regulation by structuring opportunities for planning, execution, and reflection (Daryanes et al., 2023). In the context of non-traditional students and technology preferences, evidence further suggests that learning technologies may influence self-efficacy beliefs, which then shape learning engagement and persistence (Sutherland et al., 2023). While the present study focuses on direct strategy instruction rather than technology-based delivery, these findings reinforce the broader premise that competence beliefs and strategic processes can be modified through structured educational interventions.

The importance of teachers' roles in promoting self-regulated learning has also received sustained empirical support. Research conceptualizes teachers not only as instructors but also as learners and agents who shape a classroom climate that either supports or undermines metacognitive development. Evidence indicates that different aspects of teacher competence are important for promoting metacognition and self-regulated learning among students, highlighting the systemic nature of self-regulation development (Karlen et al., 2023). This is particularly relevant for early adolescent students, who are still developing executive functions and benefit from explicit modeling of strategies, feedback on process, and structured opportunities to practice monitoring and reflection. In bilingual classrooms, where students may be reluctant to ask for clarification due to language insecurity, a supportive self-regulatory climate can be essential for helping students adopt help-seeking and self-monitoring routines.

Given these conceptual and empirical foundations, intervention research has increasingly focused on explicit training in self-regulation strategies as a direct method for improving students' academic functioning. Meta-analytic evidence indicates that structured self-regulated learning training programs enhance academic performance and motivation, and that the benefits are not limited to one educational level or one subject domain (Theobald, 2021). In second/foreign language contexts, strategy-based writing instruction grounded in self-regulated learning principles has been shown to empower learners, suggesting that explicit strategy instruction can be particularly beneficial when language demands increase task complexity (Teng & Zhang, 2020). This point is central for bilingual students in mainstream schooling, where subject learning is inseparable from the language through which content is delivered.

More recent studies have extended this intervention logic by identifying psychological mechanisms through which self-regulation training operates. For instance, growth mindset has been linked to academic motivation via self-regulated learning as a mediating pathway, suggesting that students' beliefs about malleability of ability may translate into motivation only when students possess strategies for goal pursuit and monitoring (Altikulaç et al., 2025). In writing contexts, the interplay of mindset, feedback perception, and academic emotion regulation has been

E-ISSN: 3041-8828

associated with self-regulated writing ability, highlighting that regulation includes not only cognitive strategy use but also emotion regulation and adaptive interpretation of feedback (Hwang, 2025). These findings indicate that self-regulation is a multi-component system: students must regulate how they think, how they feel, and how they respond to evaluative information. Bilingual learners often encounter feedback that is partially language-focused (e.g., grammar or vocabulary) even when the task is content-focused, which may heighten emotional reactivity and reduce perceived competence unless students can regulate emotions and reframe feedback constructively.

Applied studies in regional contexts further support the relevance of self-regulation instruction for students who are academically vulnerable. For students with low academic performance, teaching self-regulation strategies has been reported as effective for reducing academic stress and increasing resilience, pointing to the value of self-regulation training as a protective resource under adversity (Pourshalchi et al., 2025). Related clinical-educational work suggests that interventions such as Acceptance and Commitment Therapy can improve self-regulation and reduce academic procrastination among students with internet addiction, illustrating that self-regulation is amenable to change even in populations with behavioral dysregulation and attentional difficulties (Vajargahi et al., 2025). Although the present study focuses on a non-clinical school sample, these findings extend the plausibility that self-regulatory capacities can be strengthened through structured interventions and that such strengthening may generalize to multiple academic outcomes.

A further strand of evidence underscores that self-regulation is especially critical for learners with learning difficulties or special educational needs. A comprehensive translational framework for students with learning disabilities argues that self-regulated learning skills can be systematically taught and can function as compensatory mechanisms that support autonomy, monitoring, and strategic persistence (Johnson et al., 2021). This perspective matters for bilingual students because bilingual schooling can create “functional learning difficulty” conditions even for learners without formal diagnoses, simply due to increased linguistic load and reduced access to full comprehension in the instructional language. Thus, the logic of teaching self-regulation—planning, monitoring, adaptive strategy selection—can be applied to bilingual learners as a proactive educational approach.

Achievement motivation and self-concept are not only linked to immediate learning outcomes but also to longer-term developmental cycles of engagement and behavior. Longitudinal evidence suggests that externalizing behaviors and reduced learning motivation can form negative cycles that degrade academic performance over time, emphasizing the importance of early interventions that stabilize motivation and self-regulation before maladaptive patterns consolidate (Palmu, 2024). Similarly, research on self-assessment practices indicates that academic self-concept and perseverance of effort contribute to how students evaluate their own learning, which in turn shapes future learning decisions and effort allocation (Yang et al., 2023). These findings suggest that interventions strengthening self-regulation may have downstream benefits: as students become more strategic and persistent, their self-evaluations become more constructive, and their motivation becomes more stable. In bilingual settings, this may help students break cycles of avoidance associated with linguistic insecurity and build more positive academic identities.

The association between self-regulated learning and academic achievement has also been documented in cross-sectional and applied studies, reinforcing the empirical expectation that strengthening self-regulation should yield measurable improvements in self-beliefs and motivation. For example, research has found that academic self-concept and self-regulated learning are associated with academic achievement among students, supporting the conceptual integration of these constructs as mutually reinforcing contributors to performance (Riaz et al., 2022). At the same time, research in specific student populations has shown that academic motivation can be predicted by personal and contextual variables including academic self-efficacy, social support, and academic alienation, indicating that motivation is embedded within a broader psychosocial ecology (Ahmadi et al., 2023). This strengthens the rationale for interventions that do not solely target content knowledge but also build internal capacities—such as self-regulation—that allow students to respond adaptively to contextual challenges.

A complementary set of findings comes from meta-analytic syntheses of self-regulated learning and learning outcomes in professional and higher education contexts. Evidence from medical education indicates that self-regulated learning relates meaningfully to learning outcomes across undergraduate and graduate levels, suggesting that self-regulation is a robust predictor of achievement even in demanding professional training environments (Zheng &

E-ISSN: 3041-8828

Sun, 2024). Similarly, evidence connecting career development variables with academic self-efficacy and motivation in high school students supports the view that self-beliefs and motivation are developmentally consequential and tied to broader future-oriented outcomes beyond immediate grades (Zhao et al., 2024). For bilingual adolescents, improved motivation and self-concept may therefore support not only current academic functioning but also longer-term educational aspirations and career planning.

Despite the growing body of evidence supporting self-regulation as a key educational lever, significant practical gaps remain in translating these insights into targeted interventions for specific student populations, especially in contexts where bilingualism intersects with early adolescence and public-school instructional constraints. Much of the intervention literature has focused on general student samples, technology-mediated settings, or domain-specific skills such as mathematics or writing. Although these studies demonstrate the general effectiveness of self-regulation training, they do not necessarily address the specific psychological needs of bilingual male middle school students in contexts where the language of instruction is not the home language. Moreover, many studies have examined self-concept or motivation independently rather than treating them as coupled outcomes that may change together when a common mechanism—self-regulated learning—is strengthened. Because academic self-concept and achievement motivation operate as core drivers of engagement, persistence, and willingness to adopt challenging tasks, the integrated evaluation of both outcomes provides a more comprehensive understanding of how self-regulation interventions function in school populations.

In addition, cultural and contextual factors likely shape how self-regulation training is received and enacted. Instructional innovations that incorporate realism and culture have demonstrated benefits for self-efficacy and problem solving, implying that culturally meaningful learning contexts can amplify intervention effects by increasing relevance and engagement (Rahman et al., 2024). Learning media and interactive case methods similarly reflect attempts to build engagement through context-rich tasks (Daryanes et al., 2023). Yet, even in culturally responsive designs, students still require self-regulatory skills to manage effort, persist through difficulty, and interpret feedback constructively. Therefore, explicit self-regulatory strategy training may serve as a foundational approach that complements broader instructional reforms.

Taken together, the literature suggests a coherent explanatory model: bilingual students facing elevated cognitive-linguistic demands may experience fluctuations in achievement motivation and academic self-concept; these fluctuations are shaped by reciprocal processes across time, and they are moderated by students' strategic capacity to regulate learning and emotion. Structured self-regulated learning interventions have demonstrated effectiveness across domains and levels, and recent research points to psychological mechanisms—mindset, feedback perception, emotion regulation, stress resilience, and self-regulatory fatigue—that help explain how these interventions translate into improved educational outcomes (Altikulaç et al., 2025; Hwang, 2025; Kong et al., 2025; Lee et al., 2023; Pourshalchi et al., 2025; Theobald, 2021). Consequently, evaluating self-regulatory strategies training for bilingual male middle school students is both theoretically justified and practically important for informing school-based psychological and educational supports.

The aim of the present study was to examine the effectiveness of self-regulatory strategies training on achievement motivation and academic self-concept among bilingual male first-grade middle school students in Mahabad City.

2. Methods and Materials

2.1. Study Design and Participants

The present study employed a quasi-experimental design using a pre-test, post-test, and follow-up structure with an experimental group and a control group. This design was selected to allow examination of causal effects of self-regulatory strategies training on achievement motivation and academic self-concept while maintaining ecological validity in a natural school environment. The statistical population consisted of all bilingual male students enrolled in the first grade of public middle schools in Mahabad City during the 2024–2025 academic year. These students were characterized by Kurdish as their first language and Persian as their second language, reflecting the bilingual educational context common in this region. From this population, 30 students were selected using purposive sampling based on inclusion criteria including bilingual status, enrollment in regular public schools, absence of diagnosed cognitive or psychiatric disorders, and willingness to participate. Schools with sufficient student populations and administrative

E-ISSN: 3041-8828

cooperation were identified to facilitate participant recruitment.

Following selection, participants were randomly assigned into two groups, including an experimental group and a control group, each consisting of 15 students. Random assignment was conducted to ensure group equivalence and to minimize selection bias. Prior to the intervention, both groups completed baseline assessments using standardized measurement instruments to evaluate achievement motivation and academic self-concept. The experimental group subsequently received structured training in self-regulatory strategies, whereas the control group received no intervention during the study period. After completion of the intervention phase, both groups were reassessed using the same instruments to evaluate post-intervention outcomes. Additionally, a follow-up assessment was conducted two months after completion of the intervention to examine the stability and persistence of the intervention effects over time. This design allowed for analysis of immediate and sustained effects of the training program on the dependent variables.

2.2. *Measures*

Achievement motivation was assessed using the Hermans Achievement Motivation Questionnaire (AMT), originally developed in 1977. This instrument consists of 29 incomplete sentences, each followed by four possible response options that reflect varying levels of achievement motivation. The questionnaire is designed to evaluate motivational tendencies related to perseverance, effort, goal orientation, and achievement-related self-confidence. Prior to administration in the present study, minor structural adaptations were implemented to ensure suitability for the school context and developmental level of the participants. Specifically, four standardized response options were developed for each item to maintain scoring consistency. Responses were scored on an ordinal scale reflecting intensity of achievement motivation, with higher scores indicating stronger achievement motivation. The psychometric properties of this instrument have been previously established, with reported reliability coefficients of approximately 0.84, indicating satisfactory internal consistency. The questionnaire has also demonstrated acceptable construct validity and has been widely used in educational research to assess student motivation.

Academic self-concept was measured using the Academic Self-Concept Questionnaire developed in 2004. This instrument consists of 15 items designed to evaluate students' perceptions of their academic abilities and overall self-evaluation in academic and non-academic contexts. The questionnaire assesses three dimensions, including general self-concept, school self-concept, and non-academic self-concept. Participants responded to each item using a four-point Likert-type scale ranging from strongly disagree to strongly agree. Total scores ranged from 15 to 60, with higher scores reflecting a more positive academic self-concept. The instrument has demonstrated acceptable psychometric characteristics in previous studies, including adequate internal consistency and construct validity. Its multidimensional structure allows for comprehensive assessment of both academic and personal aspects of self-perception, making it appropriate for evaluating psychological constructs related to educational outcomes among adolescent students.

2.3. *Intervention*

The intervention consisted of a structured self-regulatory strategies training program implemented in a group format based on Zimmerman's self-regulated learning model, which emphasizes three cyclical phases including forethought, performance, and self-reflection. The program was delivered to participants in the experimental group over eight sessions, conducted once per week, with each session lasting approximately 90 minutes. The training sessions focused on developing students' cognitive, metacognitive, motivational, and behavioral self-regulation skills. Core components of the training included goal setting, strategic planning, self-monitoring, self-evaluation, time management, problem-solving strategies, emotional regulation, and self-reinforcement. Students were taught how to set realistic academic goals, organize learning tasks, monitor their performance, and evaluate outcomes using reflective techniques. In addition to in-session training activities, participants were assigned practical exercises and real-life tasks to apply learned strategies in their daily academic activities. These assignments reinforced skill acquisition and facilitated transfer of training effects into real educational contexts. The intervention was conducted in a supportive educational environment that encouraged active participation, discussion, and practice of self-regulatory strategies. During the intervention period, the control group did not receive any structured training but continued their regular academic activities. Post-intervention and follow-up assessments were conducted for both groups to evaluate intervention effectiveness and long-term impact.

E-ISSN: 3041-8828

2.4. *Data Analysis*

Data analysis was conducted using SPSS statistical software to evaluate the effectiveness of the intervention. Descriptive statistics including means and standard deviations were calculated to summarize participant performance across pre-test, post-test, and follow-up measurement stages. Inferential statistical analysis was performed using mixed-design analysis of variance (ANOVA) with repeated measures to examine within-group and between-group differences across time points. The Greenhouse–Geisser correction was applied where necessary to adjust for violations of the sphericity assumption. This statistical approach allowed for simultaneous examination of the effects of time, group membership, and interaction between time and group on achievement motivation and academic self-concept variables. In addition, Bonferroni post hoc tests were conducted to identify specific differences between measurement stages and groups while controlling for Type I error. Effect sizes were calculated using eta squared values to determine the magnitude of intervention effects. Statistical significance was evaluated at the conventional alpha level of 0.05. This comprehensive analytical approach allowed for accurate evaluation of both immediate and sustained effects of self-regulatory strategies training on achievement motivation and academic self-concept among bilingual students.

3. Findings and Results

Descriptive statistics were first calculated to examine changes in achievement motivation components across the pre-test, post-test, and follow-up stages in the experimental and control groups. As shown in Table 1, the mean scores of all achievement motivation components, including self-confidence, perseverance, foresight, and hard work, increased from pre-test to post-test and remained relatively stable at follow-up in the self-regulatory training group. In contrast, the control group showed minimal changes across measurement stages. These results indicate that self-regulated learning training was associated with improvements in achievement motivation components.

Table 1

Mean and Standard Deviation of Achievement Motivation Components Across Measurement Stages in Experimental and Control Groups

Group	Variable	Index	Pre-test	Post-test	Follow-up
Self-Regulatory Training	Self-confidence	Mean	14.75	20.50	19.55
		Standard Deviation	3.75	3.72	4.05
Control	Self-confidence	Mean	14.95	14.75	16.25
		Standard Deviation	4.47	6.22	6.45
Self-Regulatory Training	Perseverance	Mean	16.25	19.25	19.25
		Standard Deviation	3.31	3.16	3.80
Control	Perseverance	Mean	15.95	15.15	15.75
		Standard Deviation	3.02	3.99	4.00
Self-Regulatory Training	Foresight	Mean	13.05	19.50	20.25
		Standard Deviation	2.44	3.44	2.36
Control	Foresight	Mean	12.65	11.85	12.50
		Standard Deviation	2.61	3.06	3.22
Self-Regulatory Training	Hard work	Mean	16.50	20.15	20.50
		Standard Deviation	3.40	2.94	3.02
Control	Hard work	Mean	15.95	15.00	16.25
		Standard Deviation	2.63	4.05	4.76

Similarly, descriptive statistics for academic self-concept components showed increases in general self-concept, school self-concept, and non-academic self-concept in the experimental group across measurement stages, whereas the control group exhibited little or no meaningful improvement. These results suggest that self-regulated learning training positively influenced students' academic self-concept.

E-ISSN: 3041-8828

Table 2

Mean and Standard Deviation of Academic Self-Concept Components Across Measurement Stages

Group	Variable	Index	Pre-test	Post-test	Follow-up
Self-Regulatory Training	General self-concept	Mean	8.20	10.70	11.30
		Standard Deviation	2.89	2.92	3.26
Control	General self-concept	Mean	7.70	7.40	8.45
		Standard Deviation	2.77	3.50	3.19
Self-Regulatory Training	School self-concept	Mean	13.60	16.80	17.60
		Standard Deviation	3.50	2.67	2.26
Control	School self-concept	Mean	12.80	11.80	13.10
		Standard Deviation	2.42	3.46	3.08
Self-Regulatory Training	Non-academic self-concept	Mean	5.30	11.20	12.40
		Standard Deviation	2.27	2.71	2.30
Control	Non-academic self-concept	Mean	5.10	4.00	5.50
		Standard Deviation	1.77	2.90	2.82

To examine the effectiveness of the intervention statistically, mixed-design analysis of variance with Greenhouse–Geisser correction was conducted. The results for achievement motivation components are presented in Table 3.

Table 3

Mixed Analysis of Variance Results for Achievement Motivation Components

Variable	Factor	Sum of Squares	df	Mean Square	F	Sig.	Eta Squared
Self-confidence	Within-group	640.53	1.30	493.64	40.87	0.001	0.42
	Interaction	283.47	2.60	109.23	9.04	0.001	0.24
	Between-group	387.10	2.00	193.55	4.12	0.020	0.13
Perseverance	Within-group	134.58	1.84	73.11	13.44	0.001	0.19
	Interaction	113.96	3.68	30.95	5.69	0.001	0.17
	Between-group	267.24	2.00	133.62	5.15	0.010	0.15
Foresight	Within-group	697.50	1.63	429.22	70.22	0.001	0.55
	Interaction	475.67	3.25	146.36	23.94	0.001	0.46
	Between-group	1245.63	2.00	622.82	43.53	0.001	0.60
Hard work	Within-group	246.63	1.36	181.47	27.14	0.001	0.32
	Interaction	157.33	2.72	57.88	8.66	0.001	0.23
	Between-group	519.23	2.00	259.62	10.24	0.001	0.26

The results indicated that the within-group effects of time were statistically significant for all achievement motivation components ($p < 0.05$), indicating meaningful changes across pre-test, post-test, and follow-up stages. The interaction effects between group and time were also significant ($p < 0.05$), demonstrating that the experimental group improved significantly more than the control group. Furthermore, between-group differences were statistically significant, indicating overall superiority of the intervention group.

Bonferroni post hoc comparisons were conducted to identify specific group differences.

Table 4

Bonferroni Post Hoc Comparisons for Achievement Motivation Components

Variable	Group Comparison	Mean Difference	Standard Error	Sig.
Self-confidence	Self-regulatory vs Control	6.35	1.46	0.001
Perseverance	Self-regulatory vs Control	4.20	1.05	0.001
Foresight	Self-regulatory vs Control	8.45	1.01	0.001
Hard work	Self-regulatory vs Control	5.70	1.05	0.001

E-ISSN: 3041-8828

These results confirm that self-regulated learning training significantly improved achievement motivation compared to the control group.

Mixed ANOVA results for academic self-concept components are presented in Table 5.

Table 5

Mixed Analysis of Variance Results for Academic Self-Concept Components

Variable	Factor	Sum of Squares	df	Mean Square	F	Sig.	Eta Squared
General self-concept	Within-group	304.93	1.97	154.80	39.25	0.001	0.41
	Interaction	159.53	3.94	40.49	10.27	0.001	0.27
	Between-group	363.63	2.00	181.82	9.39	0.001	0.25
School self-concept	Within-group	220.84	1.31	168.59	31.32	0.001	0.36
	Interaction	134.62	2.62	51.38	9.55	0.001	0.25
	Between-group	510.98	2.00	255.49	14.12	0.001	0.33
Non-academic self-concept	Within-group	715.60	1.60	446.97	87.33	0.001	0.61
	Interaction	398.67	3.20	124.51	24.33	0.001	0.46
	Between-group	921.73	2.00	460.87	40.53	0.001	0.59

The results demonstrated statistically significant within-group, interaction, and between-group effects for all self-concept components ($p < 0.05$), indicating that the intervention significantly improved academic self-concept.

Table 6

Bonferroni Post Hoc Comparisons for Academic Self-Concept Components

Variable	Group Comparison	Mean Difference	Standard Error	Sig.
General self-concept	Self-regulatory vs Control	5.40	0.96	0.001
School self-concept	Self-regulatory vs Control	5.30	0.93	0.001
Non-academic self-concept	Self-regulatory vs Control	7.30	0.87	0.001

These findings demonstrate that self-regulated learning training had a statistically significant and sustained effect on improving both achievement motivation and academic self-concept among bilingual students.

4. Discussion and Conclusion

The present study aimed to examine the effectiveness of self-regulatory strategies training on achievement motivation and academic self-concept among bilingual male middle school students. The findings demonstrated that self-regulated learning training produced statistically significant improvements in all components of achievement motivation, including self-confidence, perseverance, foresight, and hard work, as well as all dimensions of academic self-concept, including general self-concept, school self-concept, and non-academic self-concept. Furthermore, these improvements were maintained at the follow-up stage, indicating that the effects of the intervention were not only immediate but also relatively stable over time. These findings provide strong empirical support for the theoretical proposition that self-regulation functions as a core psychological mechanism underlying adaptive academic motivation and self-perception in students, particularly in linguistically demanding educational environments.

One of the key findings of the present study was the significant increase in achievement motivation among students who received self-regulatory strategies training. This finding is consistent with contemporary theoretical frameworks that conceptualize achievement motivation as a dynamic construct shaped by students' ability to regulate their cognitive, behavioral, and emotional engagement with learning tasks. Self-regulated learning enables students to set meaningful goals, monitor their progress, and maintain persistence when encountering academic challenges, thereby strengthening motivational processes over time. Empirical evidence indicates that self-regulated learning training programs significantly improve students' motivation and academic performance across educational levels, supporting the interpretation that regulation skills enhance students' willingness to engage actively with learning tasks (Theobald, 2021). Moreover, studies have shown that academic motivation is closely linked to students' self-efficacy beliefs and their perception of control over academic outcomes, suggesting that interventions

E-ISSN: 3041-8828

strengthening strategic learning processes can directly enhance motivational functioning (Ahmadi et al., 2023; Zhao et al., 2024). In bilingual students, who often face additional cognitive demands due to language processing requirements, the development of self-regulation skills may be particularly critical for sustaining motivation and persistence in academic settings.

The present findings also align with recent research demonstrating that growth mindset and academic motivation are mediated by self-regulated learning processes. Students who develop self-regulation skills are more likely to perceive academic challenges as manageable and to adopt adaptive coping strategies, which enhances motivational engagement and reduces avoidance behaviors (Altikulaç et al., 2025). Similarly, evidence suggests that deficits in self-regulation are associated with maladaptive outcomes such as procrastination, reduced motivation, and disengagement, whereas improvements in self-regulation contribute to increased academic persistence and effort (Fatmala, 2025; Scheunemann et al., 2021). The observed increase in perseverance and hard work in the experimental group of the present study reflects this mechanism, as students who acquired regulation strategies were better able to maintain effort and sustain goal-directed behavior even in the face of academic challenges.

Another important finding of the present study was the significant improvement in students' academic self-concept following self-regulatory strategies training. Academic self-concept reflects students' perceptions of their academic competence and plays a critical role in shaping learning behavior, motivation, and achievement. The observed increase in academic self-concept supports the reciprocal effects model proposed in educational psychology, which suggests that improvements in academic functioning can strengthen self-concept, and improvements in self-concept can further enhance academic engagement and achievement (Marsh et al., 2024; Wu et al., 2021). Self-regulation training likely contributed to improved academic self-concept by enabling students to experience greater control over their learning process, achieve meaningful academic success, and develop more positive self-evaluations.

These findings are consistent with previous empirical studies demonstrating that self-regulated learning is strongly associated with academic self-concept and academic achievement. Research has shown that students with higher self-regulation skills tend to have more positive academic self-concepts, as their ability to manage learning tasks effectively leads to increased perceptions of competence and academic success (Riaz et al., 2022). Furthermore, studies examining students' self-assessment practices indicate that self-regulation supports accurate self-evaluation and promotes adaptive academic self-beliefs, reinforcing positive self-concept over time (Yang et al., 2023). The improvement in general, school, and non-academic self-concept observed in the present study suggests that self-regulatory strategies training influenced not only students' academic competence perceptions but also their broader self-perceptions, highlighting the comprehensive psychological benefits of self-regulation interventions.

The stability of the intervention effects at follow-up further supports the long-term effectiveness of self-regulatory strategies training. This finding aligns with longitudinal research demonstrating that self-regulation skills contribute to sustained improvements in motivation, engagement, and academic functioning over time. For example, meta-analytic evidence has shown that self-regulated learning interventions produce durable improvements in academic performance and motivation, suggesting that regulation skills become internalized and continue to influence learning behavior beyond the immediate intervention period (Theobald, 2021). Similarly, longitudinal studies indicate that academic self-concept and motivation operate within self-reinforcing cycles, such that improvements in these constructs can lead to further improvements in academic functioning over time (Palmu, 2024). The maintenance of intervention effects in the present study suggests that students successfully internalized the self-regulation strategies and continued to apply them independently.

The findings of the present study can also be interpreted within the framework of social cognitive theory, which emphasizes the role of self-regulation in mediating the relationship between cognitive, motivational, and behavioral processes. According to this theory, students who develop self-regulation skills are better able to control their learning environment, manage cognitive demands, and maintain emotional stability, which enhances academic functioning and psychological well-being. Empirical evidence supports this interpretation, indicating that self-regulated learning enhances students' problem-solving ability, learning performance, and academic sustainability (Almulla & Al-Rahmi, 2023; Rahman et al., 2024). Furthermore, research suggests that self-regulation training strengthens metacognitive awareness and strategic thinking, enabling students to engage more effectively with academic tasks and

E-ISSN: 3041-8828

achieve higher levels of academic success (Karlen et al., 2023; Lee et al., 2023).

The present findings are also consistent with studies demonstrating the effectiveness of self-regulation interventions across diverse educational contexts. For example, research has shown that self-regulated learning strategies improve students' problem-solving skills, academic achievement, and self-efficacy, indicating that regulation skills play a central role in academic development (Abtokhi et al., 2021; Andrini, 2024). Similarly, studies on problem-based learning and interactive instructional approaches suggest that strategic engagement and self-regulation are critical for promoting academic motivation and performance (Aslan, 2021; Pimdee et al., 2024). These findings support the interpretation that self-regulatory strategies training can enhance students' academic functioning by strengthening their ability to manage learning demands effectively.

In addition, the present findings highlight the importance of self-regulation for bilingual students, who often face additional cognitive and linguistic challenges in academic settings. Research suggests that bilingual learners may experience increased academic stress and cognitive load due to language-related demands, which can negatively affect motivation and self-concept if appropriate coping strategies are not developed. Self-regulated learning provides students with the tools needed to manage these challenges, including planning, monitoring, and evaluating learning processes, thereby enhancing academic functioning and psychological resilience (Johnson et al., 2021; Pourshalchi et al., 2025). Furthermore, studies have shown that self-regulation is associated with improved emotional regulation and reduced academic anxiety, suggesting that regulation skills contribute to psychological stability and adaptive learning behavior (Hwang, 2025; Kong et al., 2025).

Another explanation for the observed findings relates to the role of self-regulation in promoting active engagement and autonomy in learning. Students who develop self-regulation skills become active participants in their own learning process, rather than passive recipients of instruction. This increased autonomy enhances intrinsic motivation and promotes a sense of competence, which strengthens academic self-concept and motivation. Research has shown that students who engage in self-regulated learning demonstrate greater persistence, effort, and engagement, leading to improved academic outcomes and psychological functioning (Mahmud & German, 2021; Sutherland et al., 2023). Similarly, studies indicate that instructional approaches designed to enhance strategic engagement and self-regulation can improve students' problem-solving skills and academic performance (Fitriana & Waswa, 2024; Rahmah et al., 2022; Yapatang & Polyiem, 2022).

Finally, the findings of the present study support the broader theoretical argument that academic self-concept and achievement motivation are interrelated constructs that can be enhanced through targeted psychological interventions. Improvements in self-regulation enable students to experience success, which strengthens self-concept and motivation, creating a positive feedback loop that promotes continued academic growth. This interpretation is consistent with empirical evidence demonstrating reciprocal relationships between self-regulation, motivation, self-concept, and academic achievement (Wild & Grassinger, 2023; Zheng & Sun, 2024). Overall, the results of the present study provide strong evidence that self-regulatory strategies training is an effective intervention for improving achievement motivation and academic self-concept among bilingual students.

Despite the significant findings of the present study, several limitations should be acknowledged. First, the sample size was relatively small and consisted only of bilingual male middle school students from a single city, which may limit the generalizability of the findings to other populations, including female students, students from different age groups, or students from different cultural or educational contexts. Second, the study relied on self-report questionnaires to measure achievement motivation and academic self-concept, which may be influenced by social desirability bias or subjective interpretation. Third, the intervention period was limited to eight sessions, and although follow-up results indicated stable effects, longer-term follow-up assessments would be necessary to determine the durability of the intervention effects over extended periods. Finally, the study did not examine potential moderating variables such as socioeconomic status, parental support, or teacher characteristics, which may influence the effectiveness of self-regulation interventions.

Future research should examine the effectiveness of self-regulatory strategies training using larger and more diverse samples to enhance the generalizability of findings. Studies should include both male and female students and examine different educational levels to determine whether intervention effectiveness varies across developmental stages. In addition, future research should employ longitudinal designs with longer follow-up periods to assess

E-ISSN: 3041-8828

the long-term sustainability of intervention effects. Researchers should also investigate potential moderating and mediating variables, such as academic self-efficacy, anxiety, emotional regulation, and teacher support, to better understand the mechanisms underlying intervention effectiveness. Experimental studies comparing different types of self-regulation interventions, including technology-based and individualized approaches, would also provide valuable insights into optimizing intervention effectiveness.

Educational practitioners should consider incorporating self-regulatory strategies training into school curricula to enhance students' academic motivation and self-concept. Teachers should explicitly teach students how to set goals, monitor their progress, and evaluate their learning outcomes, and should provide opportunities for students to practice these skills in academic tasks. Schools should also provide training programs for teachers to enhance their ability to promote self-regulated learning in the classroom. Parents should be encouraged to support the development of self-regulation skills at home by helping students plan their study schedules and develop effective learning habits. Educational policymakers should recognize the importance of self-regulation for academic success and incorporate self-regulation training into educational programs, particularly for bilingual students who may face additional academic challenges.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

Acknowledgments

We hereby thank all individuals for participating and cooperating us in this study.

Declaration of Interest

The authors report no conflict of interest.

Funding

According to the authors, this article has no financial support.

Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

References

Abtokhi, A., Jatmiko, B., & Wasis, W. (2021). Evaluation of self-regulated learning on problem-solving skills in online basic Physics learning during the COVID-19 pandemic. *Journal of Technology and Science Education*, *11*(2), 541-555. https://doi.org/10.3926/jotse.1205

Affuso, G., Zannone, A., Esposito, C., Pannone, M., Miranda, M. C., De Angelis, G., & Bacchini, D. (2023). The effects of teacher support, parental monitoring, motivation and self-efficacy on academic performance over time. *European Journal of Psychology of Education*, *38*(1), 1-23. https://doi.org/10.1007/s10212-021-00594-6

Ahmadi, A., Ziapour, A., Lebni, J. Y., & Mehedi, N. (2023). Prediction of academic motivation based on variables of personality traits, academic self-efficacy, academic alienation and social support in paramedical students. *Community Health Equity Research & Policy*, *43*(2), 195-201. https://doi.org/10.1177/0272684X211004948

Almulla, M. A., & Al-Rahmi, W. M. (2023). Integrated social cognitive theory with learning input factors: The effects of problem-solving skills and critical thinking skills on learning performance sustainability. *Sustainability*, *15*(5), 3978. https://doi.org/10.3390/su15053978

Altikulaç, A., Yildiz, A., & Demir, E. (2025). Growth mindset and academic motivation: The mediating role of self-regulated learning. *Learning and Motivation*, *81*, 101861. https://doi.org/10.1016/j.lmot.2025.101861

Andrini, V. S. (2024). Improving Self-Efficacy and Problem Solving Ability of Prospective Mathematics Teachers through Hypermedia Augmented Reality. *EDUTEC: Journal of Education And Technology*, *7*(4), 323-331. https://doi.org/10.29062/edu.v7i4.929

Aslan, A. (2021). Problem-based learning in live online classes: Learning achievement, problem-solving skill, communication skill, and interaction. *Computers & Education*, *171*, 104237. https://doi.org/10.1016/j.compedu.2021.104237

Daryanes, F., Darmadi, D., Fikri, K., Sayuti, I., Rusandi, M. A., & Situmorang, D. D. B. (2023). The development of articulate storyline interactive learning media based on case methods to train student's problem-solving ability. *Heliyon*, *9*(4). https://doi.org/10.1016/j.heliyon.2023.e15082

Delima, N., & Cahyawati, D. (2021). Students' mathematics self-concept, mathematics anxiety and mathematics self-regulated learning during the COVID-19 pandemic. *Jurnal Pendidikan Matematika*, *15*(2), 103-114. https://doi.org/10.22342/jpm.15.2.13200.103-114

Fatmala, E. D. (2025). Learning Motivation and Self-Regulation Linked to Academic Procrastination. *Indonesian Journal of Education Methods Development*, *20*(2). https://doi.org/10.21070/ijemd.v20i2.885

E-ISSN: 3041-8828

Fitriana, H., & Waswa, A. N. (2024). The Influence of a Realistic Mathematics Education Approach on Students' Mathematical Problem Solving Ability. *Interval: Indonesian Journal of Mathematical Education*, *2*(1), 29-35. https://doi.org/10.37251/ijome.v2i1.979

Hwang, S. (2025). The Interplay of Mindset, Feedback Perception, and Academic Emotion Regulation in Undergraduates' Self-Regulated Writing Ability. *Education Sciences*, *15*(7), 804. https://doi.org/10.3390/educsci15070804

Johnson, E., Masser, J. S., & Spears, L. (2021). Self-Regulated Learners: A Comprehensive, Translational Framework for Students with Learning Disabilities. *Exceptionality*, 1-17. https://doi.org/10.1080/09362835.2021.1938063

Karlen, Y., Hirt, C. N., Jud, J., Rosenthal, A., & Eberli, T. D. (2023). Teachers as learners and agents of self-regulated learning: The importance of different teachers competence aspects for promoting metacognition. *Teaching and Teacher Education*, *125*, 104055. https://doi.org/10.1016/j.tate.2023.104055

Kong, L., Zhao, M., Huang, W., Zhang, W., & Liu, J. (2025). The Impact of Academic Anxiety on Smartphone Addiction Among College Students: The Mediating Role of Self-Regulatory Fatigue and the Moderating Role of Mindfulness. https://doi.org/10.21203/rs.3.rs-5898815/v1

Lee, M., Lee, S. Y., Kim, J. E., & Lee, H. J. (2023). Domain-specific self-regulated learning interventions for elementary school students. *Learning and Instruction*, *88*, 101810. https://doi.org/10.1016/j.learninstruc.2023.101810

Mahmud, Y. S., & German, E. (2021). Online self-regulated learning strategies amid a global pandemic: Insights from Indonesian university students. *Malaysian Journal of Learning and Instruction*, *18*(2), 45-68. https://doi.org/10.32890/mjli2021.18.2.2

Marsh, H. W., Guo, J., Pekrun, R., Lüdtke, O., & Núñez-Regueiro, F. (2024). Cracking Chicken-Egg Conundrums: Juxtaposing Contemporaneous and Lagged Reciprocal Effects Models of Academic Self-Concept and Achievement's Directional Ordering. *Educational psychology review*, *36*(2), 53. https://doi.org/10.1007/s10648-024-09887-w

Palmu, I. (2024). *The negative cycle: a longitudinal study of externalising behaviours, learning motivation and academic performance in school-age children* JYU Dissertations]. https://jyx.jyu.fi/bitstreams/e3ba5eba-2259-4d9c-b7ff-75ba6045ef6d/download

Pimdee, P., Sukkamart, A., Nantha, C., Kantathanawat, T., & Leekitchwatana, P. (2024). Enhancing Thai student-teacher problem-solving skills and academic achievement through a blended problem-based learning approach in online flipped classrooms. *Heliyon*, *10*(7). https://doi.org/10.1016/j.heliyon.2024.e29172

Pourshalchi, H., Mahdavi, F., Radman, F., & Ostakhri, Z. (2025). The Effectiveness of Teaching Self-Regulation Strategies on Resilience and Academic Stress in Students with Low Academic Performance. *Journal of Child Nursing*, *11*(3), 1-11. https://jpen.ir/browse.php?a_id=813&sid=1&slc_lang=fa

Rahmah, K., Inganah, S., Darmayanti, R., Sugianto, R., Choirudin, C., & Ningsih, E. F. (2022). Analysis of Mathematics Problem-solving Ability of Junior High School Students Based on APOS Theory Viewed from the Type of Learning Styles. *INdoMATH: Indonesia Mathematics Education*, *5*(2), 109-122. https://ojs.umrah.ac.id/index.php/gantang/article/view/4944

Rahman, A. A., Mushlihuddin, R., Refugio, C. N., & Zulnaidi, H. (2024). Problem-based learning innovation through realism and culture: Impact on mathematical problem solving and self-efficacy in primary school students. *Al-Jabar: Jurnal Pendidikan Matematika*, *15*(1). https://doi.org/10.24042/ajpm.v15i1.21932

Riaz, H., Shah, S. A., & Tariq, A. A. (2022). Impact of Academic Self-concept and Self-regulated Learning on Academic Achievement of Students. *Research Journal of Social Sciences and Economics Review*, *2*(2), 18-26. https://www.rjsser.org.pk/ojs/index.php/rjsser/article/view/475

Riyadi, R., Syarifah, T. J., & Nikmaturrohmah, P. (2021). Profile of students' problem-solving skills viewed from Polya's four-steps approach and elementary school students. *European Journal of Educational Research*, *10*(4), 1625-1638. https://doi.org/10.12973/eu-jer.10.4.1625

Scheunemann, A., Schnettler, T., Bobe, J., Fries, S., & Grunschel, C. (2021). A longitudinal analysis of the reciprocal relationship between academic procrastination, study satisfaction, and dropout intentions in higher education. *European Journal of Psychology of Education*, 1-24. https://doi.org/10.1007/s10212-021-00571-z

Sharma, S., Singh, A., & Singla, B. (2020). Achievement Motivation of Students: A Study of Punjab. *International Journal of Advanced Science and Technology*, *29*, 1092-1097. https://www.researchgate.net/profile/Amandeep-Singh-84/publication/342698992_Achievement_Motivation_of_Students_A_Study_of_Punjab/links/5f01b54992851c52d619bd16/Achievement-Motivation-of-Students-A-Study-of-Punjab.pdf

Sutherland, K., Brock, G., de Villiers Scheepers, M. J., Millear, P. M., Norman, S., Strohfeldt, T., & Black, A. L. (2023). Non-traditional students' preferences for learning technologies and impacts on academic self-efficacy. *Journal of Computing in Higher Education*, 1-22. https://doi.org/10.1007/s12528-023-09354-5

Teng, L. S., & Zhang, L. J. (2020). Empowering learners in the second/foreign language classroom: Can self-regulated learning strategies-based writing instruction make a difference? *Journal of Second Language Writing*, *48*, 100701. https://doi.org/10.1016/j.jslw.2019.100701

Theobald, M. (2021). Self-regulated learning training programs enhance university students' academic performance, self-regulated learning strategies, and motivation: A meta-analysis. *Contemporary Educational Psychology*, *66*, 101976. https://doi.org/10.1016/j.cedpsych.2021.101976

Vajargahi, B., Andisheh, A., Akbari, A., & Hamzeh Poor Haghighi, H. (2025). The effectiveness of Acceptance and Commitment Therapy on academic procrastination and self-regulation in female students with internet addiction. *Journal of Developmental Psychology*, *13*(9), 101-110. https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://frooyesh.ir/article-1-5267-fa.html&ved=2ahUKEwje14C87paOAxXfTaQEHT8IOWIQFnoECBcQAQ&usg=AOvVaw3nUTLT1pqhWNa-NxBO8D0w

Wild, S., & Grassinger, R. (2023). The importance of perceived quality of instruction, achievement motivation and difficulties in self-regulation for students who drop out of university. *British Journal of Educational Psychology*. https://doi.org/10.1111/bjep.12590

Wu, H., Guo, Y., Yang, Y., Zhao, L., & Guo, C. (2021). A meta-analysis of the longitudinal relationship between academic self-concept and academic achievement. https://doi.org/10.1007/s10648-021-09600-1

Yang, L., Yan, Z., Zhang, D., Boud, D., & Datu, J. A. (2023). Exploring the roles of academic self-concept and perseverance of effort in self-assessment practices. *Assessment in*

E-ISSN: 3041-8828

Education: Principles, Policy & Practice, *30*(2), 104-129. https://doi.org/10.1080/0969594X.2023.2191161

Yapatang, L., & Polyiem, T. (2022). Development of the Mathematical Problem-Solving Ability Using Applied Cooperative Learning and Polya's Problem-Solving Process for Grade 9 Students. *Journal of Education and Learning*, *11*(3), 40-46. https://doi.org/10.5539/jel.v11n3p40

Zhao, Y., Zeng, H., & Deng, X. (2024). Chinese high school students' career development: Associations with academic self-efficacy and motivation. *Journal of Applied Developmental Psychology*, *91*, 101629. https://doi.org/10.1016/j.appdev.2023.101629

Zheng, B., & Sun, T. (2024). Self-Regulated Learning and Learning Outcomes in Undergraduate and Graduate Medical Education: A Meta-Analysis. *Evaluation & the Health Professions*, 01632787241288849. https://doi.org/10.1177/01632787241288849

E-ISSN: 3041-8828