

Empowering Students: How Teachers' Autonomy Support Shapes Self-Efficacy for Self-Regulated Learning

Jahju Hartanti^{a,1,*}, Lucky Nindi Riandika Marfu'i^{b,2}, Ana Musdalifah^{a,3}, Erasmos Charamba^{c,4}


^a PGRI Adi Buana University, Jl. Dukuh Menanggal XII, Dukuh Menanggal, Surabaya, 60234 Indonesia

^b Universitas Negeri Jakarta, Jl. R.Mangun Muka Raya No.11, Kota Jakarta Timur, 13220 Indonesia

^c University of the Witwatersrand, Johannesburg, 1 Jan Smuts Avenue, 2000, South Africa

¹jahju@unipasby.ac.id*; ²lucky.nindi@unj.ac.id; ³ana.musdalifah1982@gmail.com; ⁴erasmuscharamba@live.com

* corresponding author

ARTICLE INFO	ABSTRACT
<p>Article history Received April 16, 2025 Revised Sept 4, 2025 Accepted Dec 31, 2025</p> <p>Keywords Teacher Autonomy Support Self-Efficacy Self-Regulated Learning Self-Determination Theory</p>	<p>Teacher autonomy support plays a crucial role in fostering students' motivation and learning behaviours. Grounded in Self-Determination Theory (SDT), this study examines the effect of teacher autonomy on students' self-regulated learning, with self-efficacy serving as a mediating variable. A quantitative cross-sectional survey design was employed, involving 409 teachers from elementary, junior high, and senior high schools in East Java, Indonesia. Data were analysed using Structural Equation Modelling (SEM). The findings reveal that teacher autonomy has a significant positive effect on students' self-regulated learning and self-efficacy. Furthermore, self-efficacy significantly predicts students' self-regulated learning and partially mediates the relationship between teacher autonomy and self-regulated learning. These results indicate that autonomy-supportive teaching practices enhance students' confidence in their learning abilities, which in turn strengthens their capacity to regulate learning processes independently. The study underscores the importance of empowering teachers with professional autonomy to cultivate autonomy-supportive learning environments that promote student motivation, self-efficacy, and effective self-regulated learning. The findings offer important implications for educational policy, teacher professional development, and instructional practice aimed at improving student learning outcomes.</p> <p style="text-align: right;">This is an open access article under the CC-BY license.</p> 

I. Introduction

Over the past decade, scholarly attention has increased substantially due to its substantial impact on educational systems, influencing instructional practices and the broader learning environment. As a core component of teacher quality (Çolak, 2024), teacher autonomy has been linked to enhanced job satisfaction and improved teacher retention factors critical to the overall effectiveness of educational institutions (Worth & Van den Brande, 2020). Drawing upon Self-Determination Theory (SDT), the construct of teacher support is operationalized through three primary dimensions: autonomy support, structure, and engagement. The present investigation aims to identify strategies that cultivate active learning behaviors among students across various educational levels, with the dual objective of promoting greater student engagement and offering innovative responses to ongoing pedagogical challenges (Lietaert et al., 2015).

Humanistic motivation theory posits that student motivation increases significantly when educators satisfy core psychological needs related to autonomy,

competence, and relevance (Marshik et al., 2017). The development of meaningful teacher-student relationships has been recognized as essential for promoting deeper levels of student involvement in learning activities (Lavidas et al., 2023). Existing literature emphasizes the interconnected roles of psychological needs, motivation, engagement, and academic achievement in fostering positive educational outcomes (Reeve, 2012; Ryan & Deci, 2017). From an SDT framework, contextual variables are central in shaping the quality of students' learning experiences (Deci & Ryan, 2000). Research findings further underscore the importance of self-directed learning as a key indicator of student autonomy (Benita et al., 2014; Lavidas et al., 2022). According to data from the 2022 Programme for International Student Assessment (PISA), educators' capacity to employ innovative pedagogical methods is closely related to the degree of professional autonomy permitted across various educational contexts (OECD, 2024). Moreover, empirical evidence highlights the role of instructional autonomy in curriculum planning and implementation as a significant

contributor to student academic achievement (OECD, 2021).

The current study investigates the extent to which the relationship between teacher autonomy support and students' self-directed learning and engagement may be accounted for by two intermediary constructs: self-efficacy and self-regulated learning (SRL). Self-efficacy, often identified as a fundamental factor in successful learning, contributes significantly to student autonomy and independence in learning. Previous research has consistently demonstrated the importance of self-efficacy in enhancing outcomes in online learning environments (Prior et al., 2016), particularly within higher education settings and English language instruction. Despite these findings, the specific pathways through which self-efficacy and SRL contribute to learning engagement remain poorly understood.

Although previous studies have confirmed a positive influence of teacher autonomy support on student engagement in learning (Niehaus et al., 2012), ambiguities persist concerning the mediating mechanisms that might elucidate this relationship and the dynamic interactions between relevant constructs. Some research suggests that both self-efficacy and SRL exert significant positive effects on learning engagement, while the association between teacher autonomy support and these psychological constructs is well established (Chemers et al., 2001; Ng, 2018). Nonetheless, further empirical investigation is required to determine whether self-efficacy mediates the relationship between teacher autonomy support and SRL. In response to this research gap, four hypotheses are proposed and conceptually illustrated in Figure 1.

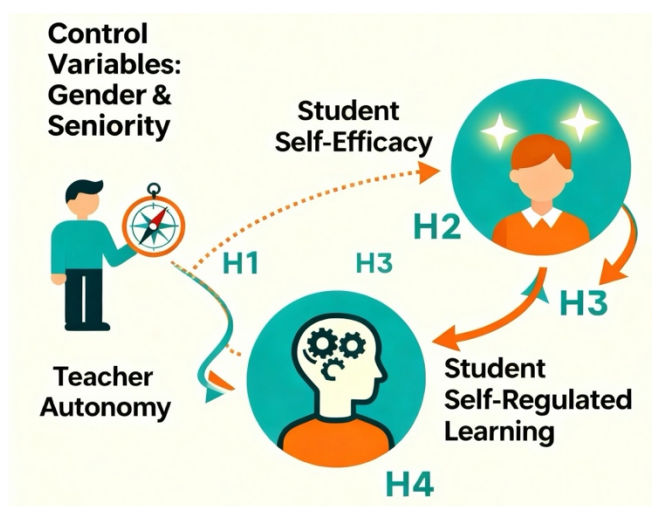


Fig. 1. Proposed mediation model for the research variable

H1. Teacher autonomy positively predicts students' self-regulated learning

H2. Teacher autonomy positively predicts students' self-efficacy

H3. Students' self-efficacy positively predicts self-regulated learning

H4. The connection between teacher autonomy and self-regulated learning is mediated by self-efficacy.

A. Self-Determination Theory

Self-Determination Theory (SDT), rooted in a humanistic perspective on motivation, posits that autonomy, competence, and relatedness constitute three fundamental psychological needs essential for optimal human functioning (Ryan & Deci, 2017). Autonomy reflects the intrinsic drive and volition that enable individuals to act in alignment with their personal values, interests, and self-awareness. Competence refers to the perceived ability to master tasks, demonstrate effectiveness, and apply skills proficiently in diverse contexts. Relatedness captures the experience of meaningful social connections and a sense of belonging within interpersonal relationships, reinforcing the individual's integration into broader social systems. When social environments nurture these psychological needs, individuals are more likely to exhibit autonomous behavior, intrinsic motivation, and self-directed decision-making. Conversely, environments that thwart these needs can undermine motivation and hinder personal growth. Importantly, SDT acknowledges that individuals differ in the degree to which they internalize and enact autonomous regulation, thereby shaping the quality of their motivation and engagement. This theoretical framework provides a robust lens for understanding how contextual factors influence human agency, learning, and well-being, highlighting the critical role of supportive social conditions in fostering sustained motivation and self-regulation.

B. Teacher autonomy

Teacher autonomy is widely acknowledged as a critical determinant of teaching quality (Çolak, 2024). It is generally defined as the extent of control and independence that educators exercise over various aspects of their professional responsibilities, including student assessment, curriculum modification, lesson planning, and the selection of instructional materials (Ingersoll & May 2012). Conceptually, teacher autonomy comprises two fundamental components: professional freedom and internal capacity (Choi & Mao, 2021). Although its definition has evolved over time, scholars largely concur that teacher autonomy represents a multidimensional construct (Guo & Wang, 2021; Liu et al., 2021). For instance, Çolak and Altinkurt (2017) categorize teacher autonomy into four domains: teaching, curriculum, professional development, and communication. Similarly, Pearson and Hall (1993) distinguish between curriculum autonomy and teaching autonomy, while Friedman (1999) identifies four dimensions: classroom instruction, school operational systems, curriculum development, and staff development. Collectively, these perspectives highlight

the complexity of teacher autonomy and its central role in shaping instructional quality and professional practice.

The significance of teacher autonomy has been extensively examined, given its influence on both educators and the broader education system. Research highlights several advantages of teacher autonomy, including enhanced educational quality, improved student performance, and increased teacher creativity (Gewirtz et al., 2009; Nguyen et al., 2021; Rudolph, 2006), collectively driving sustained scholarly interest in this field. Parker (2015) underscores its importance, asserting that autonomy constitutes a fundamental component of the teaching profession. Accordingly, educators' ability to perform their roles effectively is intrinsically linked to the degree of autonomy they are afforded. A high-quality education system, therefore, requires teachers who can leverage their expertise to shape instructional practices and the learning process (Gewirtz et al., 2009). The literature further identifies multiple connections between teacher autonomy and organizational and educational variables. Empirical findings demonstrate that teacher autonomy positively influences student achievement (Rudolph, 2006), job satisfaction (Kengatharan, 2020), creativity (Nguyen et al., 2021), and teaching self-efficacy (Choi & Mao, 2021). Moreover, studies suggest that teacher autonomy indirectly fosters student autonomy, which in turn contributes to improved academic performance (Little, 2007; Vieira, 2020). Collectively, these insights affirm teacher autonomy as a multidimensional construct that is central to advancing both instructional quality and student learning outcomes

C. Self-Regulated Learning

Self-regulated learning (SRL) strategies are widely recognized as critical predictors of academic success across diverse educational contexts and modalities (Pintrich, 2000). Zimmerman (2008) defines self-regulation as "a series of thoughts, emotions, and behaviours that are autonomously generated to attain a specific goal" (p. 166), emphasizing its dynamic and goal-oriented nature. Scholars have further conceptualized SRL as a multidimensional construct that integrates motivational, cognitive, and behavioural domains (Uleanya & Alex, 2022; Wolters et al., 2005). Motivational regulation strategies include self-management, environmental structuring, self-directed dialogue, and cultivating personal interest, all of which sustain learners' engagement and persistence. Cognitive strategies such as repetition, organization, elaboration, and self-monitoring are employed to strengthen knowledge acquisition, comprehension, and retention. Additionally, adaptive behavioural approaches such as adjusting study schedules, seeking external support, and exercising self-control help students optimize their learning. Collectively, these strategies highlight the importance of SRL as a comprehensive framework for fostering academic achievement and lifelong learning.

The adoption of self-regulated learning (SRL) plays a vital role in fostering active engagement, which in turn contributes to more favourable educational outcomes. Without sufficient self-discipline, students often struggle to sustain consistent participation, particularly in digital or remote learning environments. Consequently, self-discipline emerges as a foundational component of instructional and learning frameworks. A broad consensus among researchers suggests that students can enhance their educational experiences by employing self-regulatory practices, making adaptive adjustments, and effectively managing interactions with various aspects of the learning environment (Lai & Hwang, 2016). In line with this perspective, Ng (2018) reported that learners' use of self-regulation strategies positively influenced both engagement and performance in online educational contexts. Similarly, Lai and Hwang (2016) identified several key elements, such as goal setting, time management, task planning, help-seeking behaviours, and environmental structuring, as significant predictors of emotional engagement, behavioural participation, and overall academic achievement. Collectively, these findings underscore the importance of SRL as a multidimensional construct that integrates motivational, cognitive, and behavioural dimensions to optimize learning outcomes.

D. Mediating Role of Self-Efficacy

Self-efficacy is widely regarded as one of the primary psychological determinants of student academic performance. Rooted in social cognitive theory, it is defined as an individual's belief in their capacity to perform successfully within a particular domain or to complete a task effectively (Bandura, 1997). As a critical psychological mechanism, self-efficacy influences behavioural engagement, the intensity of effort directed toward goal attainment, and the resilience displayed when facing obstacles and adversity (Bandura, 1993, 1997). Through evaluative judgments of academic experiences, students develop confidence in their ability to meet educational demands (Bandura, 1997). Moreover, self-efficacy supports essential cognitive and metacognitive processes, including planning, monitoring, and regulating learning (Boekaerts & Corno, 2005; Pintrich, 1999; Zimmerman & Schunk, 2011). Empirical evidence has consistently demonstrated a strong association between elevated self-efficacy and student perceptions of autonomy-supportive instructional practices, such as opportunities for independent decision-making (Alivernini & Lucidi, 2011; Sierens et al., 2009; Wang et al., 2016). Building on this foundation, the present study investigates the hypothesis that teacher autonomy support fosters the development of assessment literacy through the mediating role of self-efficacy.

The interaction between self-efficacy and critical reflection may serve as an important mediating mechanism in the relationship between teacher autonomy

support and students' assessment literacy. While both constructs have been recognized as potential mediators, the precise nature of their interrelationship warrants further clarification. Self-efficacy, defined as an individual's belief in their capacity to perform effectively, often fosters deeper introspection and more critical evaluation of cognitive processes and behaviours. Learners with higher levels of self-efficacy are typically more inclined to acknowledge personal limitations and actively pursue improvement. Prior research has substantiated the positive influence of self-efficacy on metacognitive and reflective practices, consistent with Bandura's theoretical propositions regarding human agency and self-regulation (Bandura, 1997, 2001). In educational contexts, these dynamic underscores the relevance of self-efficacy as a catalyst for critical reflection. Recent experimental studies further support this perspective, demonstrating that self-efficacy mediates reflective practices among learners, thereby reinforcing its role in shaping assessment literacy (Kocak et al., 2021; Tong et al., 2023).

The conceptual framework of self-efficacy positions the construct as a critical response to the motivational significance of learning (Lin & Tsai, 2013). Within the domain of self-regulation, self-efficacy interacts with multiple components, including strategic learning behaviours, sustained effort, persistence, goal setting, self-monitoring, and self-evaluation. Learners with strong self-efficacy often demonstrate greater intrinsic motivation, pursue more ambitious goals, and exhibit higher levels of commitment to academic tasks. As Schunk and Greene (2017) argue, students with elevated self-efficacy are more likely to engage actively in learning activities, persevere through challenges, and apply effective self-regulated learning strategies. Empirical evidence further highlights the connection between self-efficacy and the implementation of self-control strategies, reinforcing its role in sustaining motivation and adaptive learning behaviours (Kingir et al., 2013). Collectively, these findings underscore self-efficacy as a foundational element, mediating mechanism, and essential driver of self-regulated learning processes (Schunk & Greene, 2017)

Beyond its established role in predicting academic procrastination, self-efficacy also shapes the deployment of metacognitive strategies that facilitate effective learning (Sungur, 2007). Self-regulation is characterized by dynamic interactions among cognitive, behavioural, and environmental variables, with self-efficacy emerging as a critical determinant of learning outcomes, particularly in digital higher education environments. Within self-regulated learning frameworks, self-efficacy functions as a core personal predictor, influencing students' capacity to sustain effort, monitor progress, and adapt strategies to achieve academic goals. Prior research has consistently demonstrated strong associations among teacher autonomy support, self-efficacy, self-regulated learning,

and learner engagement, underscoring the interconnectedness of these constructs in shaping educational experiences. Moreover, empirical findings suggest that emotional well-being and active engagement mediate the relationship between autonomy-supportive instruction and academic involvement (Vollet et al., 2017). Despite these insights, scholarly debate persists regarding whether self-efficacy and self-regulated learning operate as distinct mediators in the relationship between autonomy-supportive teaching practices and student engagement in online tertiary education. This ongoing discussion highlights the need for further empirical investigation to disentangle the unique and overlapping contributions of these constructs to student learning and engagement.

II. Method

This study used a cross-sectional survey design and quantitative methods to investigate relationships among variables.

A. Participants and Procedures

The target population for this study included 13,557 teachers working in elementary, junior high, and senior high schools across East Java Province, Indonesia, during the 2023–2024 academic year. A disproportionate cluster sampling method was used to select the sample. Following the guidelines of Kotrlík and Higgins (2001), a minimum sample size of 398 was established to ensure adequate representation at the 95% confidence level. Data collection involved visits to the selected schools, where questionnaires were distributed to teachers who voluntarily agreed to participate. A total of 420 teachers responded, however, before analysis, data from eleven respondents were identified as extreme values and excluded. The final dataset comprised 409 valid responses, sufficient to represent the study population. Of these 409 teachers, 58.2% ($n = 238$) were female, and 41.8% ($n = 171$) were male. Regarding teaching roles, most were subject teachers (69.5%, $n = 284$), while 30.5% ($n = 125$) served as classroom teachers. In terms of teaching experience, 20.0% ($n = 82$) had nine years or less, 39.8% ($n = 163$) had between 10 and 19 years, and 40.2% ($n = 164$) had 20 or more years of experience. Concerning educational qualifications, 78.0% ($n = 319$) held a bachelor's degree, while 22.0% ($n = 90$) completed postgraduate studies. These demographic details offer a comprehensive overview of the sample and confirm its adequacy for representing the broader teacher population in East Java Province.

B. Measurement Instruments

In the data collection process, this study uses the Teacher Autonomy Scale, Self-Efficacy Scale, and Self-Regulated Learning Scale as measurement instruments.

C. Teacher Autonomy Scale

The Teacher Autonomy Scale, developed by Çolak & Altınkurt (2017), comprises 17 statements measured on a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). This scale assesses four key dimensions of teacher autonomy: teaching autonomy, curriculum autonomy, professional development autonomy, and communicative autonomy. The initial reliability analysis of Cronbach's alpha coefficients ranged from 0.78 to 0.89 for the four dimensions and the overall scale. Higher scores on this scale indicate greater levels of teacher autonomy in professional practice. The reliability analysis of each dimension within the Teacher Autonomy Scale revealed that teaching autonomy had a Cronbach's alpha of 0.76, indicating moderate reliability. Curriculum autonomy demonstrated strong internal consistency, with a reliability coefficient of 0.85. Communicative autonomy, with a reliability value of 0.65, was acceptable, though it falls just below the recommended lower threshold. Professional development autonomy exhibited good reliability, with a Cronbach's alpha of 0.81. Overall, the total scale achieved a Cronbach's alpha of 0.91, indicating excellent internal consistency in measuring teacher autonomy comprehensively.

D. Student Self-Efficacy

Schwarzer (1997) developed initially a self-efficacy scale that comprises ten statement items, including "I have the competence to handle unexpected situations efficiently," and is measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The average score for each item is computed, with higher scores reflecting greater self-efficacy. In the present study, the critical reflection questionnaire demonstrated a Cronbach's Alpha reliability coefficient of 0.84.

E. Student Self-Regulated Learning

Self-regulated learning strategies are evaluated using a 14-item scale developed by Zimmerman & Pons (1986), which assesses 11 sub-dimensions: self-evaluation, organization and transformation, goal setting and planning, information retrieval, record-keeping and monitoring, environmental structuring, self-consequences, practice, memorization, seeking social assistance, reviewing records, and other strategies. Example items from this scale include statements such as, "I double-checked my work to ensure its accuracy" and "I began studying two weeks before the exam and created a study schedule." Participants responded using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale demonstrated strong reliability, with a Cronbach's alpha coefficient of 0.88.

F. Control variables

The study incorporated the individual characteristics of respondents, specifically teacher gender and seniority, as control variables, given their potential influence on teacher

autonomy. Prior studies on teacher autonomy have yielded mixed findings regarding gender differences. Yorulmaz et al., (2018) found that male teachers exhibited higher levels of communicative autonomy, whereas other studies reported no significant gender-based differences (Çolak & Altınkurt, 2017; Pearson & Hall, 1993). Similarly, regarding seniority or teaching experience, previous research suggests that more experienced teachers demonstrate greater autonomy in their professional practice (Şakar, 2013; Sparks, 2012). Gender (coded as 1 = female, 2 = male) and seniority were included as control variables in this study, as both may influence teacher autonomy.

G. Analytic techniques

Data analysis was conducted using descriptive statistics (mean and standard deviation), correlation analysis, and Structural Equation Modeling (SEM). Correlation coefficients were interpreted following the guidelines of Schober et al. (2018), with relationships categorized as very weak ($r < .10$), weak ($.10 \leq r < .40$), moderate ($.40 \leq r < .70$), strong ($.70 \leq r < .90$), and very strong ($r \geq .90$). Hypothesis testing was performed using IBM AMOS version 22. A two-stage SEM approach was employed, beginning with the development and evaluation of measurement models that incorporated all research variables, followed by testing the structural model. The analysis examined both the direct effects of teacher autonomy on students' self-efficacy and self-regulated learning, as well as the indirect effects of self-efficacy on self-regulated learning.

Prior to hypothesis testing, the dataset was assessed for compliance with multivariate assumptions, including the identification of outliers, normality, and multicollinearity. Eleven extreme values were identified and excluded, resulting in a final dataset of 398 valid cases. Normality was evaluated using skewness and kurtosis values, which ranged between -1 and +1, indicating that the data were normally distributed (Hair, 2011). These preliminary checks confirmed that the dataset met the assumptions required for SEM, thereby ensuring the robustness of subsequent analyses.

Multicollinearity was assessed by examining tolerance values and variance inflation factors (VIFs). As noted by Kline (2023), VIFs greater than 10 and tolerance values below 0.10 indicate potential multicollinearity concerns. In this study, the tolerance value was 0.85 and the VIF was 1.35, thereby confirming the absence of multicollinearity issues. The structural model's fit was subsequently evaluated using multiple goodness-of-fit indices, including χ^2/df , GFI, RMSEA, CFI, and SRMR. Prior research suggests that a model is considered a good fit when $\chi^2/df < 3$ and $RMSEA \leq 0.08$ (Hoe, 2008; Kahn, 2006). Furthermore, CFI and GFI values exceeding 0.90 indicate an acceptable model fit (Hair, 2011), while an SRMR value ≤ 0.08 reflects strong alignment between the structural model and the observed data (Hu & Bentler,

1999). Collectively, these results demonstrate that the proposed structural model adequately represents the data and meets established criteria for model fit.

III. Results and Discussion

A. Descriptive Statistics and Intervariable Correlation

Table 1 provides an overview of the descriptive statistics and correlations among the study variables. According to the teachers' perspectives, the mean score for

teacher autonomy is relatively high ($M = 4.02$, $SD = 0.62$), as are the mean scores for students' self-regulated learning ($M = 3.89$, $SD = 0.71$) and students' self-efficacy ($M = 3.92$, $SD = 0.68$). The correlation analysis revealed a moderate and statistically significant positive relationship between teacher autonomy and students' self-regulated learning ($r = 0.43$, $p < 0.01$), teacher autonomy and students' self-efficacy ($r = 0.47$, $p < 0.01$), and students' self-efficacy and students' self-regulated learning ($r = 0.49$, $p < 0.01$).

Table 1. Descriptive Results

Variables	M	SD	α	1	2.	3
1. Teacher Autonomy	4.02	0.62	0.89	1		
2. Students' Self-Efficacy	3.92	0.68	0.83	0.47**	1	
3. Students' Self-Regulated Learning	3.89	0.71	0.96	0.43**	0.49**	1
Skewness				-0.27	-0.24	-0.76
Kurtosis				-0.29	0.14	0.8
Tolerance Index (TI)				0.71	0.65	0.63
Variance Inflation Factor (VIF)				1.41	1.54	1.59

^a Abbreviations: α , Cronbach's alpha coefficient; M, mean; SD, standard deviation; TI, tolerance index; VIF, variance inflation factor. ** $p < 0.01$

B. Measurement Model

Before testing the research hypotheses, a comprehensive measurement model encompassing all latent variables in the structural framework was developed and rigorously evaluated. The analysis yielded a chi-square statistic of $\chi^2 = 88.74$ with 30 degrees of freedom, resulting in a χ^2/df ratio of 2.96. This ratio, together with additional fit indices, demonstrates that the model provides an adequate representation of the data. Specifically, the goodness-of-fit index ($GFI = 0.95$), root mean square error of approximation ($RMSEA = 0.06$), standardized root mean square residual ($SRMR = 0.04$), and comparative fit index ($CFI = 0.95$) all fall within acceptable thresholds, collectively confirming the model's suitability. Furthermore, all standardized factor loadings for the latent constructs were statistically significant ($p < 0.001$), underscoring the robustness of the measurement model. The loadings ranged from 0.48 to 0.91 for teacher autonomy, 0.50 to 0.80 for students' self-regulated learning, and 0.55 to 0.82 for students' self-efficacy, indicating that the observed variables reliably capture the underlying constructs. Taken together, these results provide strong empirical support for the measurement model's validity and establish a solid foundation for subsequent hypothesis testing within the structural model.

C. Structural Model

A structural model was developed to examine the relationships among the latent variables, with teacher autonomy specified as the independent variable, students' self-efficacy as the mediating variable, and students' self-regulated learning as the dependent variable. The hypothetical model demonstrated a relatively good fit with the data, as indicated by the following indices: $\chi^2/df = 2.81$, $RMSEA = 0.07$, $GFI = 0.93$, $SRMR = 0.04$, and $CFI = 0.94$. Collectively, these values suggest that the model

adequately represents the observed data and meets established criteria for model fit.

The analysis revealed that teacher autonomy positively and directly predicted students' self-regulated learning ($\beta = 0.42$, $p < .001$), thereby supporting Hypothesis 1 (H1). Teacher autonomy also exerted a significant positive effect on students' self-efficacy ($\beta = 0.45$, $p < .001$), confirming Hypothesis 2 (H2). Furthermore, students' self-efficacy positively and directly predicted self-regulated learning ($\beta = 0.46$, $p < .001$), supporting Hypothesis 3 (H3). Taken together, these findings underscore the mediating role of self-efficacy in the relationship between teacher autonomy and students' self-regulated learning, highlighting the importance of autonomy-supportive instructional practices in fostering student motivation, confidence, and effective learning behaviors.

D. Mediation Analysis

Hypothesis 4 (H4) proposed that students' self-efficacy mediates the relationship between teacher autonomy and students' self-regulated learning. The mediation analysis confirmed this hypothesis, demonstrating that teacher autonomy indirectly influenced students' self-regulated learning through self-efficacy ($\beta = 0.21$, $p < .001$). This finding highlights the pivotal role of self-efficacy as a mediating mechanism, reinforcing its importance in linking autonomy-supportive teaching practices to enhanced student learning outcomes. In addition to the mediation effects, control variables such as gender and academic level were examined within the model. The results indicated that gender significantly predicted students' self-regulated learning ($\beta = 0.13$, $p < .01$), with female students reporting higher levels of self-regulation compared to their male counterparts. Conversely,

academic level was not a significant predictor ($\beta = 0.06$, $p > .01$), suggesting that grade level did not substantially influence students' capacity for self-regulated learning. These findings, summarized in Table 2, underscore the

nuanced role of demographic factors and affirm the central mediating role of self-efficacy in the relationship between teacher autonomy and student self-regulation.

Table 1 Results for standardized effects, standard errors, and confidence intervals.

Pathways	β	SE	95% Bootstrap CI		p-value
			Lower	Upper	
Standardized Direct Effects					
Teacher Autonomy → Students' Self-Efficacy	0.45	0.05	0.35	0.55	***
Students Self-Efficacy → Students' Self-Regulated Learning	0.46	0.048	0.36	0.56	***
Gender → Students' Self-Regulated Learning	0.13	0.039	0.04	0.22	***
Student Academic Level → Students' Self-Regulated Learning	0.06	0.041	-0.02	0.14	***
Standardized Indirect Effects					
Teacher Autonomy → Students' Self-Regulated Learning (via Students' Self-Efficacy)	0.21	0.044	0.13	0.29	***
Standardized Total Effects					
Teacher Autonomy → Students' Self-Regulated Learning	0.57	0.046	0.47	0.67	***
R ²	0.558				

This study explores the role of teacher autonomy as a key factor influencing students' self-regulated learning and self-efficacy. It examines the mediating effect of self-efficacy on self-regulated learning. Using a questionnaire-based approach, the findings demonstrate that teacher autonomy significantly positively affects both students' self-regulated learning and self-efficacy. The correlations among these three core variables reveal a strong association: higher levels of teacher autonomy are associated with greater student confidence and more self-regulatory learning behaviors. These findings align with prior research grounded in Self-Determination Theory (SDT), which has identified partial relationships between various dimensions of autonomy support and students' behavioral engagement in learning (Roorda et al., 2017). Teachers who foster autonomy establish conditions conducive to optimal learning by employing effective strategies that fulfill students' basic psychological needs, enhance their independence, and facilitate adaptive motivational patterns, engagement, and deep involvement in learning activities (Hall & Webb, 2014). These results underscore the critical role of teacher autonomy in fostering student motivation and independence in managing their learning processes.

Structural analysis indicates that teacher autonomy directly contributes to students' self-regulated learning and self-efficacy, which, in turn, enhances their ability to manage their learning autonomously. Within academic contexts, teacher-provided autonomy support is a key determinant of positive educational outcomes. In autonomous learning environments, teachers demonstrate empathy, provide motivation, address student inquiries, and allow sufficient time for independent task completion (Reeve & Cheon, 2021; Uleanya & Alex, 2022). Teachers create a supportive and enriching educational atmosphere by equipping students with the capacity for self-directed learning. Research further suggests that students in autonomy-supportive classrooms exhibit higher levels of

psychological well-being (Alivernini et al., 2019). Additionally, students' self-efficacy has been found to significantly influence their self-regulated learning, reinforcing the notion that confidence in one's abilities is fundamental to the development of self-regulatory skills. These findings support the theoretical perspective that students with greater self-confidence in their academic competencies are more adept at managing learning strategies, regulating motivation, and setting practical learning goals.

The results indicate that students' self-efficacy directly enhances their self-regulated learning. This suggests that students actively participating in their learning process are better equipped to organize, adapt, and evaluate their learning progress. According to Zimmerman (2008), self-regulated learning is a process through which individuals transform cognitive abilities into concrete learning skills. Students approach learning positively through this process, guided by personal goals and tasks. The study also finds that self-efficacy significantly influences SRL strategies, where students' confidence in their linguistic abilities, self-regulation, and expressiveness enhances cognitive engagement, metacognitive control, and motivational regulation in online learning settings (Teng & Zhang, 2020).

The mediation analysis further reveals that self-efficacy mediates the relationship between teacher autonomy and students' self-regulated learning. This indicates that the impact of teacher autonomy on SRL is not solely direct but also occurs through an increase in students' self-efficacy. These findings are consistent with previous research demonstrating that teacher autonomy support is positively associated with self-efficacy and with subsequent research on influencing learning engagement in online environments (Hagger et al., 2015; Lazarides et al., 2019; Tao et al., 2022). As hypothesized, SDT posits that teachers can enhance student engagement in learning

by fostering intrinsic motivators, such as self-efficacy, alongside personal interests, values, preferences, and goals (Reeve, 2016). Additionally, findings indicate that teacher gender influences students' self-regulated learning, with female teachers exhibiting higher levels of autonomy than their male counterparts. However, teachers' academic qualifications do not significantly affect students' self-efficacy or self-regulated learning, suggesting that other factors, such as teacher support and the learning environment, may substantially influence students' self-regulatory capabilities. The higher levels of intrinsic motivation observed among female teachers, along with their greater self-confidence (Klassen & Chiu, 2010), may explain their greater engagement in autonomous teaching practices. These findings provide valuable insights for educators and policymakers, highlighting the importance of strategies to enhance student self-efficacy to foster more effective self-regulated learning.

IV. Conclusion

This study develops a mediation model that clarifies how teacher autonomy support influences students' self-regulated learning through the role of self-efficacy. The findings reveal that when students perceive greater autonomy support from teachers, their self-efficacy improves, enabling them to engage more effectively in self-regulated learning. These insights underscore the importance of fostering autonomy in instructional practices by enhancing communication, collaboration, and student choice in learning activities. At the institutional level, empowering teachers through decision-making authority, professional growth opportunities, and supportive school climates can strengthen their autonomy and creativity in instructional design. From a policy perspective, providing high-quality professional development programs that build teacher self-efficacy and pedagogical expertise is essential to cultivating academic optimism and improving student outcomes. Overall, the study highlights that strengthening both teacher and student autonomy creates a dynamic learning environment that promotes engagement, innovation, and effective self-regulation.

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