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Assessing the impact of creative leadership on learning outcomes: A mediated-moderated model of self-efficacy and teacher–student relationships

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ABSTRACT

This study examines the impact of creative leadership (CL) on learning outcomes (LO) among students in Beijing, China, focusing on the mediating role of self-efficacy (SE) and the moderating influence of teacher–student relationships. The research aims to deepen understanding of how leadership practices influence student achievement through psychological mechanisms and relational contexts, especially within vocational education. A quantitative approach was used, involving 231 students from vocational institutions in Beijing. Data collection employed validated scales measuring CL, SE, teacher–student relationships, and LO. Structural equation modeling (SEM) with SmartPLS tested the hypothesized direct, mediated, and moderated relationships. The analysis included assessments of reliability and validity, along with bootstrapping techniques to verify statistical significance. Results show that CL significantly improves LO both directly and indirectly by enhancing students' SE. Additionally, teacher–student relationships positively moderate the relationship between CL and SE, amplifying its effect. The mediated-moderated model indicates that the indirect influence of CL on LO is stronger when teacher–student relationships are high. This research contributes to leadership and educational psychology literature by integrating CL, SE, and relational dynamics into a comprehensive framework. Practically, the findings emphasize the importance for educators and policymakers to promote leadership practices that foster creativity and supportive teacher–student relationships, leading to sustainable improvements in academic performance.

Contribution/Originality: This study is among the first to test a moderated mediation model linking creative leadership to student learning outcomes through self-efficacy, explicitly modeling teacher–student relationships as a boundary condition. It validates this integrated mechanism within Chinese vocational education, a context largely absent from previous empirical leadership research.

1. INTRODUCTION

The learning culture now recognizes the crucial role of leadership in shaping student achievement and improving education quality. Innovative leadership, characterized by adaptability, empowerment, and innovation, is the primary driver in fostering a learning-conducive environment and promoting self-improvement among students and educators alike (Baba, Haq, Dawood, & Aashish, 2023). Such leadership motivates teachers to stimulate students' creativity, focusing on problem-solving, critical thinking, and self-directed learning (Lewaherilla, Rahayu, & Limpo, 2024). Whereas conventional leadership models focus mainly on managerial and administrative duties, innovative leadership

emphasizes dynamic learning environments where teachers are seen not only as instructors but also as facilitators who actively involve students in the learning process (Darawsheh et al., 2023). The teacher-student relationship is a crucial factor influencing student motivation, engagement, and academic success, emphasizing its importance in educational outcomes and overall student development (Afzal, Rafiq, & Kanwal, 2023). A supportive teacher-student relationship enhances students' psychological and emotional well-being, positively influencing their SE and confidence (Akram & Li, 2024). Since SE, or the self-perception of one's ability to accomplish certain tasks, has been found to directly relate to academic accomplishment (Bandura, 2023), knowing how leadership, SE, and teacher-student relationships are interrelated holds insightful implications for educational reform.

Empirical evidence shows a clear correlation between creative leadership (CL) and improved student academic performance. Experimental studies confirm that schools led by leaders emphasizing creativity and innovation experience higher staff motivation and better student outcomes, (Gelaidan, Al-Swidi, & Al-Hakimi, 2024). Creative leadership enables teachers to be independent, fostering an environment where teachers and students can experiment, innovate, and explore new ideas (Devi, 2024). When educators have significant autonomy and receive constructive support from leadership, they are more likely to develop active, student-centered classrooms that promote critical thinking and problem-solving skills, enhancing overall teaching effectiveness and student engagement (Islam & Asad, 2024). Additional research indicates that CL enhances teacher satisfaction and performance, positively impacting student outcomes (Hagenauer, Muehlbacher, & Ivanova, 2023).

Educational psychologists have highlighted the importance of self-efficacy (SE) in learning. Bandura (2023) defines SE as individuals' beliefs about their capabilities in specific situations. In education, students with higher self-efficacy tend to be more persistent, utilize effective learning strategies, and achieve higher grades (Zimmerman, 2002). Other research has illustrated that when students feel they can do well, they will perform more actively in their learning, resulting in better academic performance (Chen, Lin, Lin, & Lo, 2023). In addition, teacher-student relationships significantly contribute to the development of SE. Positive, supportive relationships are associated with greater levels of self-esteem and self-perception among students, which enhances their academic achievement and overall personal growth (Kasperski & Blau, 2023). Creating a supportive, caring environment where students feel appreciated can significantly enhance their SE, fostering a positive learning atmosphere and encouraging student engagement and success (Emiru & Gedifew, 2024). There is also correspondence between SE and CL, where research indicates that leaders can encourage imaginative thinking and autonomy to help students develop greater confidence in their abilities and accomplishments in their studies (Baba et al., 2023).

Teacher-student relationships are a vital aspect of students' academic experiences. These relationships are linked to positive outcomes such as increased motivation, engagement, and improved performance, significantly contributing to academic success and overall student development (Hagenauer et al., 2023). Positive teacher-student relationships are linked to better student behavior, increased school satisfaction, and higher academic achievement (Li, 2023). Studies also showed that teacher-student relationships can be used as a buffer against unfavorable academic influences such as stress and anxiety during demanding learning challenges (Lei, Wang, Chiu, Du, & Xie, 2023). Teacher-student relationships were seen to be impacted by the style of leadership that the teacher displays, where inspirational leadership fostered positive, caring, and individualized teacher-student relationships (Zhou, Zhong, & Zhang, 2024). Therefore, examining the teacher-student relationship's role as a mediator for the relationship between SE and CL is of crucial importance for gaining insight into how leadership translates to learning achievement.

Although the studies mentioned have contributed significantly to understanding CL, SE, and teacher-student relationships, notable gaps remain in the empirical literature. Most research on CL focuses on its direct impact on teacher performance and school climate, with limited exploration of how it affects student outcomes through psychological factors like SE (Emiru & Gedifew, 2024). In addition, although some research has examined the link between student achievement and teacher leadership, the mediating role of SE in this relationship has not been adequately studied (Gunawan & Shieh, 2023). The mediating role of SE is particularly important because it offers a

psychological mechanism through which leadership influences LO. However, empirical research on this mediation within schools remains limited. Additionally, there is a gap in examining teacher-student relationships as a moderating factor in this context (Hong & Tai, 2025). Despite studies confirming that teacher-student relationships are key to student success, there have been few investigations into how these interactions mediate the impact of leadership on students' SE. Research conducted by Iqbal, Ahmad, and Nazir (2023) and others has centered on the independent effect of teacher-student relationships and leadership but has not adequately covered their interactional effects.

Additionally, while SE has been extensively studied in relation to academic achievement, its connection with CL and how CL can contribute to SE development remains an underexplored area of research (Zada, Khan, Zada, Saeed, & Jun, 2023). Most research on SE has only addressed individual differences or certain teaching strategies and ignored the overall leadership context through which these beliefs are formed (Yang & Bentein, 2023). The combination of CL and SE is, therefore, an underdeveloped research area that needs more work. In addition, the conditional effect of teacher-student relationships, as they moderate the association between CL and SE, remains unknown (Peng, Liang, Fatima, Wang, & Rasheed, 2024). Understanding how these relationship types influence CL effectiveness is valuable for teachers and policymakers aiming to improve school leadership. While previous research mainly focuses on Western educational settings, limited studies exist in non-Western contexts like China regarding CL, SE, and student-teacher relationships. This gap highlights the need for cross-cultural research to enhance our understanding of these concepts globally, informing better educational practices worldwide.

This study aims to address existing gaps by examining the interconnected influence of CL, self-efficacy (SE), and teacher-student relationships on student performance. Its main goal is to develop a conceptual model that integrates these variables to explain how CL impacts student achievement. The research seeks to answer several questions: (1) Does CL significantly contribute to learning outcomes (LO)? (2) How does CL influence students' SE? (3) Does SE mediate the relationship between CL and LO? (4) How do teacher-student relationships moderate the link between CL and SE? (5) Is the indirect effect of CL on LO through SE dependent on the quality of teacher-student relationships? This research will enhance understanding of CL's role in influencing LO and explore how teacher-student relationships can strengthen the impact of CL on SE.

The research advances the literature on educational leadership in several important ways. It is the first conceptual model to integrate literature on creative leadership (CL), teacher self-efficacy (SE), and teacher-student relationships. This integration enhances understanding of how leadership influences students on interpersonal and psychological levels. The findings are also relevant for educational leaders seeking to improve their leadership effectiveness. Specifically, the study emphasizes strengthening teacher-student relationships and boosting teacher SE through effective leadership practices. These insights can inform policies on teacher development and stimulate policy discussions about leadership in schools. Additionally, the paper addresses a gap in the literature by examining these dynamics within a non-Western school context. The cross-cultural findings can be applied by educators worldwide, especially in multicultural settings, highlighting that innovative leadership can improve student outcomes. Overall, the study contributes to the global discourse on educational leadership, demonstrating its relevance across diverse cultural environments and emphasizing its role in enhancing educational effectiveness.

2. LITERATURE REVIEW

2.1. CL and LO

CL includes styles that promote innovation, problem-solving, and flexibility in educational environments (Baba et al., 2023). It promotes creative thinking and collaboration among students and teachers, fostering an open-ended approach to problem-solving and encouraging innovative solutions (Lewaherilla et al., 2024). The focus in education is on developing critical thinking, active learning, and creating an encouraging environment that fosters student engagement and academic growth (Islam & Asad, 2024). The LO represents the quantifiable performance and

personal improvement of learners regarding their knowledge acquisition, skill development, and overall academic achievement, emphasizing measurable progress and growth (Harefa et al., 2023). A variety of studies validate the significant role of leadership in the educational experience and learners' performance (Khan, Li, Chughtai, Mushtaq, & Zeng, 2023).

Empirical evidence demonstrates a link between CL and improved learning outcomes. Research indicates that motivated teachers through CL initiatives tend to create interactive, student-centered environments, which significantly contribute to higher student achievement (Rød & Calafato, 2023). CL develops a platform that supports and encourages educators to develop creative solutions, positively influencing their teaching effectiveness and student engagement directly (Khan et al., 2023). This, in turn, has a positive impact on students' academic performance. According to a study conducted by Devi (2024), schools with effective, innovative leadership experienced improved teacher motivation and student LO. Furthermore, studies indicate that leadership emphasizing creativity and flexibility positively impacts students' academic achievement, enhancing their learning outcomes and overall performance (Ren & Shen, 2024). In light of these findings, it is hypothesized that.

H_1: CL has a significant impact on LO

2.2. CL and SE

Self-efficacy (SE) is a person's perception of their ability to perform specific tasks and achieve goals. In educational settings, SE refers to students' belief in their academic abilities and confidence to succeed in challenging learning environments (A'yun, Handayani, Sujiwo, Maula, & Rahma, 2023). CL, as previously defined, focuses on creating an environment that encourages creativity, autonomy, and ownership in learning (Islam & Asad, 2024). Creative leaders motivate students through risk-taking, self-expression, and personal responsibility, factors that can promote highly enhanced SE in students (Jaan, Maria, & Mia, 2024). Through offering students the chance to approach problems creatively and giving them ownership of their learning journey, CL instills confidence in students' academic abilities (Peng et al., 2024).

Various studies have shown a positive correlation between self-efficacy (SE) and innovative leadership behaviors. For example, Bandura (2023) provided evidence that social influence, such as support and encouragement from teachers, plays a role in developing SE, a key component of innovative leadership. When students perceive their leaders as supportive and innovative, they develop greater self-confidence and belief in their academic abilities.

Moreover, one of the studies by Darawsheh et al. (2023) demonstrated that CL improves the intrinsic motivation of students that is rooted in self-efficacy.

Past studies show that creative leaders provide personalized feedback, thereby strengthening students' confidence and self-efficacy, which enhances their overall capabilities and motivation for learning (Fryer & Leenknecht, 2023). The hypotheses are assumed based on these results.

H_2: CL has a significant impact on SE

2.3. SE and LO

Self-efficacy is a psychological construct reflecting an individual's perceived ability to perform tasks or achieve goals. It influences learning activities, time management, and students' reactions to learning materials (Chen et al., 2023). Empirically, it has been shown that self-efficacy predicts persistence, greater endurance to failure, and overall improved academic achievement among students (Umniyyati, Ellianawati, & Sumartiningsih, 2025). Classical works by Rakib, Azis, Azis, and Sanusi (2023) emphasized the central position of self-efficacy in academic performance and stated that students with high self-efficacy have higher chances to succeed due to their high motivation level and persistence. Similarly, investigations by Nurhikmah, Saman, and Mawarni (2023) have shown that the SE beliefs of students are good predictors of academic performance. SE has an effect on academic behavior, self-regulation and goal setting.

There is empirical evidence that shows that SE predicts learning outcomes. As an illustration, Khan et al. (2023) found that academically gifted high SE students learn better due to the ability to synchronize their learning processes with assurance and a greater sense of agency. On the same note, Iqbal et al. (2023) described that SE beliefs had a close association with writing and reading skills, which direct the impact of LO. Rakib et al. (2023) conducted a meta-analysis confirming that self-efficacy (SE) consistently correlates with improved performance across various fields. This finding indicates that fostering SE among students can be an effective strategy to enhance learning outcomes. Teachers can motivate students to believe in their abilities, thereby supporting better academic results. Based on these established links, the following hypothesis is proposed:

H_3: SE has a significant impact on LO

2.4. SE as Mediator

SE bridges the gap between CL and learning performance, gaining significant interest in educational research due to its impact on student outcomes and instructional strategies (A'yun et al., 2023). CL fosters an environment where independence, creativity, and innovation flourish, boosting student confidence in their strengths and enhancing academic achievement through supportive, engaging learning experiences (Chen et al., 2023). SE is a fact in this chain that shows how students perceive that they can perform in the innovative culture that the leadership creates (Emiru & Gedifew, 2024). Constructive feedback, risk-taking, and problem-solving behaviors linked with CL are believed to enhance students' SE, which subsequently improves learning outcomes (LO) (Hong & Tai, 2025). Therefore, self-efficacy likely mediates the relationship between CL and academic success, explaining how CL influences students' academic achievement.

This mediating nature can be empirically supported by references in the research looking at the relationship between school leadership and student SE. To cite an example, Gunawan and Shieh (2023) have discovered that teacher SE is directly influenced by school leadership and, in turn, leads to the achievement of students. Similarly, (Islam & Asad, 2024) demonstrated that active student involvement and empowerment through leadership styles enhance SE, leading to improved academic performance. Social cognitive theory (SCT) relates to leadership practices that boost student confidence via support and encouragement, mediating leadership's impact on achievement. Based on these findings, it is hypothesized that.

H_4: SE mediates the relationship between CL and LO.

2.5. Teacher–Student Relationship as Moderator

The relationship between teachers and students is a crucial factor in the learning process. A positive relationship is characterized by harmony, trust, and open communication, creating an environment conducive to students' learning and growth (Afzal et al., 2023). Such relationships enhance engagement and foster a supportive educational atmosphere. Studies indicate that positive teacher-student relationships promote a sense of belonging, increase motivation, and provide emotional comfort, all linked to improved academic performance and better student outcomes (Akram & Li, 2024). For example, Gehlbach, Mascio, and McIntyre (2023) found that students are more willing to participate in learning activities, stay motivated, and trust their abilities when teachers are supportive and caring. These relationships also help reduce academic stress and build resilience, increasing the likelihood of academic success (Hagenauer et al., 2023). Furthermore, these relationships are vital in shaping students' responses to leadership, especially within collaborative learning systems where autonomy and empowerment are essential for effective development and engagement.

Many studies have established the relationship between SE and CL, emphasizing the importance of student-teacher relationships. As highlighted by Kasperski and Blau (2023), these relationships significantly influence students' perceptions and reactions toward leadership, especially in environments fostering creativity and innovation. When teachers build positive relationships, they boost students' confidence and belief in their abilities, encouraging

them to achieve their potential (Lei et al., 2023). This implies that teacher-student relationships can affect the way students internalize and gain from CL practices. In addition, research by Li (2023) indicated that the influence of leadership on student achievement is more robust if the teacher fosters a supportive and positive relationship with students, through which students' SE can be developed. Hence, it is hypothesized that.

H_5: Teacher-student relationships moderate the relationship between CL and SE.

2.6. Moderated-Mediation Path

The hypothetical influence of indirect CL on learning performance through self-efficacy (SE) is based on the idea that teacher-student relationships strengthen how leadership impacts achievement. SE acts as a key mediator, reflecting students' perceptions of their ability to succeed within the learning environment created by CL (Khan et al., 2023). Positive teacher-student relationships foster a supportive environment, making students feel valued, which enhances their SE and academic results (Wang, 2023). Conversely, negative relationships can make students feel unsupported or isolated, reducing their self-confidence and performance, thus neutralizing potential positive effects on academic success (Zou, Yao, Zhang, & Huang, 2024). This indicates that the effectiveness of CL in improving SE and academic achievement depends on the quality of teacher-student relationships, where positive interactions amplify the beneficial impact of leadership on student outcomes.

Empirical data indicate that teacher-student relationships mediate the indirect link between leadership and learning outcomes. For instance, Zappe, Huang-Saad, Duval-Couetil, and Simmons (2023) demonstrate that positive relationships enhance communication and trust, which boost self-efficacy and improve student learning. Furthermore, studies by Zhou et al. (2024) have established that teacher support impacts self-efficacy more when teacher-student relations are positive. In CL, this means that students who feel supported by teachers are more likely to adopt leadership styles that encourage autonomy and creativity, thereby developing their self-efficacy and, ultimately, their learning outcomes (Umniyyati et al., 2025). The hypothesis suggests that CL's indirect influence on learning outcomes via self-efficacy depends on the quality of teacher-student relationships, with a stronger effect when these relationships are positive.

H_6: The indirect effect of CL on LO through SE depends on teacher–student relationship levels, being more pronounced when these relationships are strong.

2.7. Theoretical Framework Supporting the Research

To explain the relationships and model in this research, a theoretical framework informed by Social Cognitive Theory (SCT), Transformational Leadership Theory (TLT), and Self-Determination Theory (SDT) provides a comprehensive perspective. SCT, proposed by Bandura (2023), is a theory that helps understand human behavior, emphasizing how thoughts influence actions. It highlights the interaction between personal attitudes, behaviors, and the environment, which affects Learning Outcomes (LO), particularly through Self-Efficacy (SE), impacting motivation and achievement. In this study, SE acts as a mediating variable between LO and CL, aligning with Bandura's view that confidence in one's capabilities influences academic performance. TLT illustrates how leaders can motivate and inspire followers, enhancing performance, and relates to CL through factors such as creative thinking, autonomy, and support (Lewaherilla et al., 2024). Effective use of transformational leadership by school leaders can boost student motivation, interest, and overall performance. SDT, supported by (Ryan & Deci, 2024), further reinforces this model by emphasizing intrinsic motivation derived from supportive relationships and autonomy-focused environments, both integral to CL. SDT posits that when students perceive high levels of competence, autonomy, and relatedness within their learning environment, their intrinsic motivation and SE increase, leading to improved LO. In this research, teacher-student relationships serve as a moderating variable, influencing how CL impacts SE and, consequently, LO. Figure 1 depicts these interactions graphically, illustrating how CL affects SE and how the student-teacher relationship moderates this effect, ultimately influencing students' academic achievement.

This model integrates key variables from the theoretical frameworks to provide a comprehensive understanding of how leadership and interpersonal relationships contribute to academic success.

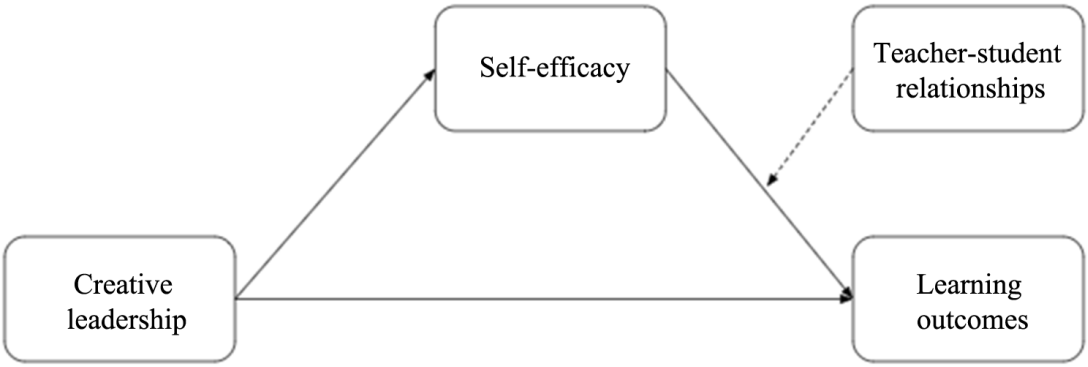

Figure 1. Conceptual framework.

3. METHODOLOGY

This study employed a quantitative design aimed at examining the relationships among CL, SE, and LO. A total of 231 vocational school students in Beijing participated, selected through stratified random sampling to ensure representation across various levels and fields. The sample size was adequate for structural equation modeling (SEM), which tests complex relationships between latent variables. Participants completed a standard questionnaire assessing CL, SE, teacher-student relationships, and LO. A survey method was chosen because it effectively gathers self-reported data from a large respondent group.

The use of established measurement instruments in research, Ye, Liu, and Tan (2022) scale assessed CL leadership styles that foster creativity, innovation, and autonomy within the classroom. Nurhikmah et al. (2023) developed a validated scale to measure self-efficacy in academic tasks. Additionally, a scale evaluating teacher-student emotional and interpersonal relationships was employed to analyze their interaction. The assessment of learning outcomes (LO) was based on a modified version of scales proposed by Hayat, Emad, Sharafi, and Keshavarzi (2022) and Ye et al. (2022), focusing on academic performance and overall learning effectiveness. All scales were adapted for vocational education settings and tailored to be culturally appropriate for China.

The data was analyzed using SmartPLS and partial least squares structural equation modeling (PLS-SEM). PLS-SEM was selected for its ability to handle complex relationships among multiple constructs and to operate effectively with small sample sizes. The analysis proceeded in two phases: first, the measurement model was assessed, and second, the structural model was evaluated. The initial step involved testing the validity and reliability of the constructs through factor loadings, composite reliability (CR), and average variance extracted (AVE). Next, the structural model was tested to examine the relationships between constructs such as CL, SE, teacher-student relationships, and learning outcomes. Bootstrapping procedures were employed to determine the significance levels of path coefficients, including t-values and confidence intervals. Finally, the model's goodness of fit was assessed, confirming that all constructs demonstrated adequate validity and reliability, thereby supporting the robustness of the findings.

4. RESULTS

Table 1 and Figure 2 provided analysis that discusses the construct validity and reliability of four key variables in a study: teacher-student relationships, LO, SE, and CL. The outer loadings for each item exceed the acceptable threshold of 0.7, indicating that the items are effective measures of their respective constructs. For example, CL items (CL1–CL5) have loadings ranging from 0.809 to 0.895, all above the limit. Similarly, LO (LO2–LO8), SE (SE1–SE4), and teacher-student relationships (TSR1–TSR6) also demonstrate high loadings, reflecting strong measurement quality. Cronbach's Alpha values for each factor are above 0.7, confirming internal consistency reliability; CL has a

high reliability of 0.913, while SE has a slightly lower but acceptable value of 0.817. The Composite Reliability (CR) scores for all constructs surpass 0.7, further supporting their reliability. Regarding convergent validity, the Average Variance Extracted (AVE) values exceed 0.5, with CL at 0.742 and SE at 0.643, indicating that each construct explains a significant portion of variance in its indicators, confirming the measures' validity and reliability.

Table 1. Construct reliability and validity.

Variables	Items	Outer Loading	Cronbach's Alpha	CR	AVE
Creative leadership	CL1	0.877	0.913	0.935	0.742
	CL2	0.846			
	CL3	0.895			
	CL4	0.809			
	CL5	0.876			
Learning outcomes	LO2	0.811	0.928	0.942	0.698
	LO3	0.831			
	LO4	0.868			
	LO5	0.859			
	LO6	0.856			
	LO7	0.766			
	LO8	0.853			
Self-efficacy	SE1	0.791	0.817	0.878	0.643
	SE2	0.798			
	SE3	0.788			
	SE4	0.831			
Teacher-student relationships	TSR1	0.797	0.900	0.923	0.667
	TSR2	0.802			
	TSR3	0.836			
	TSR4	0.807			
	TSR5	0.837			
	TSR6	0.820			

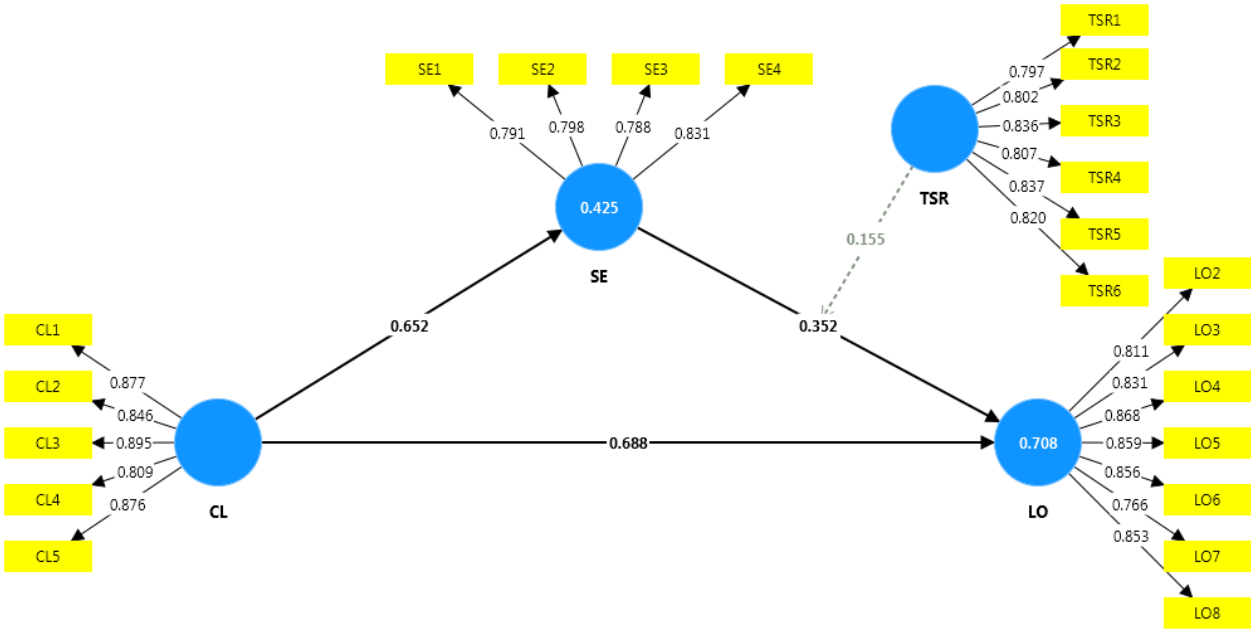

Figure 2. Measurement model.

Table 2 presents the discriminant validity results using the Heterotrait-Monotrait Ratio (HTMT). All HTMT values between construct pairs are below 0.90, indicating good discriminant validity. For example, the HTMT value between creative leadership (CL) and learning outcomes (LO) is 0.825, while between self-efficacy (SE) and teacher-student relationships (TSR), it is 0.814. These values are significantly below the threshold, confirming that the

constructs are sufficiently distinct. Lower HTMT values suggest that each construct measures a unique, non-overlapping concept, supporting the validity of the measurement model. This indicates that multicollinearity is not a concern, and the constructs are not overly correlated. Overall, these results confirm the robustness of the measurement scale employed in this study.

Table 2. Discriminant validity (HTMT).

Variables	CL	LO	SE	TSR
Creative leadership				
Learning outcomes	0.825			
Self-efficacy	0.737	0.709		
Teacher-student relationships	0.742	0.724	0.814	

Table 3 presents key model fit measures, including R-square, adjusted R-square, Q^2, and SRMR. The R-square for LO is 0.708, indicating that 70.8% of the variation in LO is explained by the independent variables, reflecting strong explanatory power. The adjusted R-square of 0.706 accounts for the number of predictors, preventing overfitting. For SE, the R-square is 0.425, meaning 42.5% of the variance is predicted by the model. The positive Q^2 values for LO (0.688) and SE (0.411) suggest the model has predictive relevance for both dependent variables. The SRMR value of 0.075 is below the threshold of 0.08, indicating a satisfactory model fit. Overall, these results demonstrate that the model fits the data well and possesses good explanatory and predictive capabilities for learning achievements and self-efficacy.

Table 3. R-square and model fit indicators.

Variables	R-square	R-square adjusted	Q2	SRMR
Learning outcomes	0.708	0.706	0.688	0.075
Self-efficacy	0.425	0.423	0.411	

Table 4 and Figure 3 show the outcome of the path analysis, i.e., the standardized path coefficients (β), t-values, and p-values of each of the hypothesized relations. The initial hypothesis, which posits that CL influences LO, is supported by a path coefficient of 0.688, a t-value of 6.346, and a p-value of 0.000, indicating a strong and statistically significant relationship. Similarly, the second hypothesis, suggesting that CL significantly affects SE, is confirmed with a path coefficient of 0.652, a t-value of 11.119, and a p-value of 0.000, highlighting the positive impact of leadership on student motivation and confidence.

The third hypothesis, asserting that SE significantly impacts learning performance, is validated with a path coefficient of 0.352, a t-value of 4.039, and a p-value of 0.000, demonstrating a moderate yet significant correlation between academic performance and SE. The fourth hypothesis examines the mediating role of SE, with a path coefficient of 0.200, a t-value of 4.000, and a p-value of 0.000, confirming that SE partially mediates the effect of CL on LO. The fifth hypothesis, which tests whether the teacher-student relationship mediates between CL and SE, is supported by a path coefficient of 0.155, a t-value of 5.855, and a p-value of 0.000, indicating that a positive teacher-student relationship enhances the effect of CL on SE.

Lastly, the sixth hypothesis, proposing that the indirect effect of CL on LO via SE is moderated by the strength of teacher-student relationships, is confirmed with a path coefficient of 0.250, a t-value of 4.170, and a p-value of 0.000. This suggests that the magnitude of this indirect effect increases when teacher-student relationships are stronger. Overall, all hypotheses are supported, illustrating the complex interactions among teacher-student relationships, SE, and leadership in influencing LO.

Table 4. Path analysis.

	β	T value	P values
CL has a significant impact on LO	0.688	6.346	0.000
CL has a significant impact on SE	0.652	11.119	0.000
SE has a significant impact on LO	0.352	4.039	0.000
SE mediates the relationship between CL and LO	0.200	4.000	0.000
Teacher–student relationships moderate the relationship between CL and SE	0.155	5.855	0.000
The indirect effect of CL on LO through SE depends on the level of teacher–student relationships	0.250	4.170	0.000

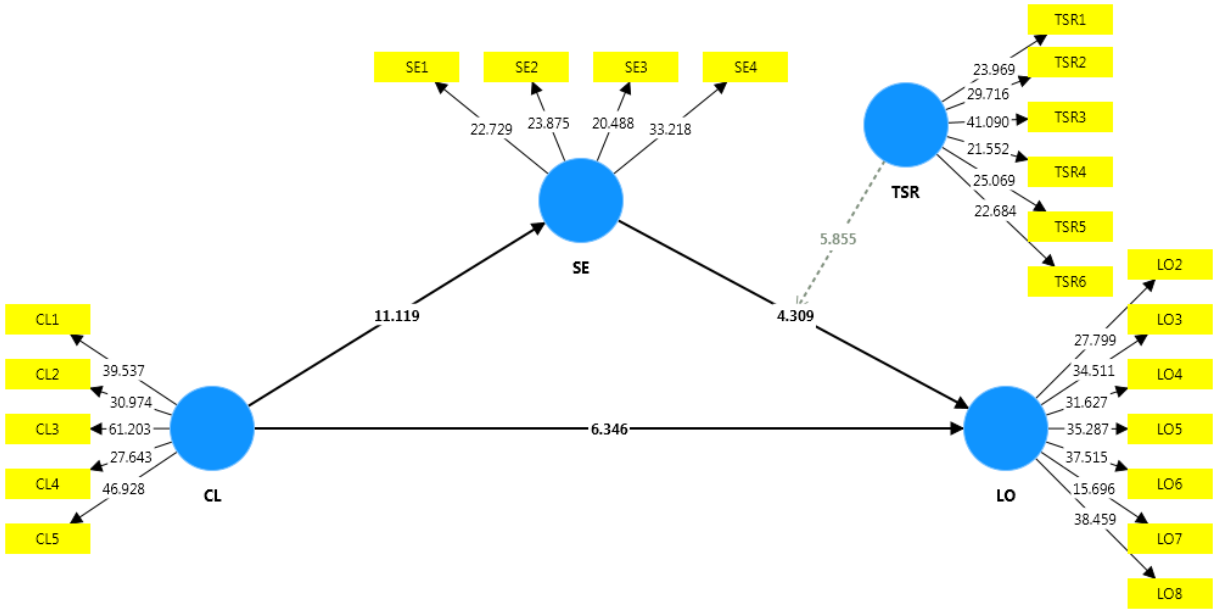

Figure 3. Structural model.

5. DISCUSSION

The article examines the relationship between CL, SE, and LO, highlighting their effects on student achievement. It presents evidence supporting the hypotheses that these variables significantly influence performance. The findings reveal that CL impacts students both psychologically and relationally, generally enhancing academic achievement. SE, characterized by creativity, self-management, and the ability to foster a positive learning environment, serves as a predictor of motivation and success. Literature suggests that SE mediates the effect of CL; higher personal confidence facilitates easier learning. The teacher-student relationship plays a crucial role in strengthening this connection and emphasizing the importance of social processes within the learning environment. Overall, the results imply that educational leadership should focus on building trust-based relationships rather than solely emphasizing creativity, thereby enabling students to thrive.

The study convincingly demonstrates that innovative leadership enhances learning and student engagement. Consistent with the first hypothesis, CL positively impacts learning outcomes (LO), supported by empirical evidence. Recent research highlights how innovation, creativity, and student empowerment-driven leadership strategies can help students attain higher grades (Lewaherilla et al., 2024). The TLT model suggests that innovative leaders foster environments that promote active learning, critical thinking, and problem-solving, leading to improved results (Darawsheh et al., 2023). Motivation and stimulation of students are rooted in transformational practices, such as encouraging student autonomy, increasing student-directed learning, and creating caring, stimulating classrooms. These practices boost motivation within schools and help students develop essential skills for academic success. Additionally, the study indicates that CL is positively associated with improved individual and group academic performance, contributing to a better learning environment. This aligns with previous research showing that leadership influences school culture and student motivation (Akram & Li, 2024). The findings underscore the

importance of developing leadership approaches focused on creativity and innovation to enhance learning outcomes for students.

The second hypothesis, which examined whether CL positively impacts self-efficacy (SE), was supported by the findings. SE, as described by Bandura (2023), is one of the most significant psychological constructs influencing students' motivation and performance. The results confirm that CL positively affects students' SE by fostering an independent, collaborative, and critical-thinking learning community. CL styles enable students to take ownership of their learning process, which enhances their confidence in their ability to succeed academically. This aligns with prior research validating a positive relationship between CL and students' self-assessment of their abilities (Islam & Asad, 2024). Creative leaders who facilitate autonomous projects and problem-solving activities help learners feel competent and in control of their learning. This, in turn, increases their SE. Additionally, students tend to feel more confident when they have greater freedom to innovate and experiment, attributing their achievements to their own actions. These findings support the hypothesis that innovative leadership fosters SE in students and suggest that a positive, active learning climate can influence students' attitudes toward themselves as learners, promoting growth and confidence.

The third hypothesis examined whether self-efficacy (SE) acts as an intervening variable between learning outcomes and CL. The findings supported this hypothesis, demonstrating that SE significantly influences how CL impacts academic performance. This aligns with Social Cognitive Theory (SCT), which emphasizes that SE is crucial for motivation and behavior. The study highlights that CL indirectly improves learning outcomes by boosting students' SE, which in turn enhances their academic results. When students believe in their potential to succeed, they are more likely to engage actively in learning activities, employ effective study strategies, and overcome obstacles, all contributing to improved learning outcomes (Rød & Calafato, 2023). The mediating role of SE underscores the importance of fostering a strong sense of self-efficacy, especially in environments emphasizing creativity and innovation. Additionally, the results suggest that leadership practices aimed at enhancing students' SE can significantly improve academic achievement, as SE functions as a psychological mechanism translating leadership influence into tangible academic success (Emiru & Gedifew, 2024). Overall, these findings indicate that the effect of CL on student achievement is not direct but is mediated by increased belief in their academic competence, which positively impacts their performance.

The results of this study strongly support the fourth hypothesis, which proposed that CL's impact on learning is mediated by SE. The research confirms that SE, a psychological process, plays a significant role in how CL influences student performance. A'yun et al. (2023) found that SE significantly affects motivation, effort, and persistence. Additionally, students with higher levels of SE tend to perform better academically. CL fosters increased self-confidence by creating a culture of autonomy, innovation, and student-centered learning. This boost in confidence encourages greater engagement, productive study habits, and perseverance through learning challenges. Consequently, CL indirectly enhances learning outcomes by strengthening students' confidence in their academic abilities. These findings align with previous research indicating that SE is a key determinant of academic achievement and support the idea that leadership focused on SE development can improve learning outcomes (Zimmerman, 2002). Moreover, SE acts as a mediating factor, elucidating how leadership influences academic performance and providing insight into the mechanisms behind educational success.

In addition to the mediation effect, the study tested whether teacher-student relationships mediate the link between CL and self-efficacy (SE). The findings support this hypothesis, as the quality of teacher-student relationships indicates that positive leadership can enhance self-efficacy. The results demonstrate that positive correlations between teachers and students reinforce the beneficial impact of leadership on self-efficacy (Akram & Li, 2024). A supportive emotional environment, characterized by trust, support, and effective communication, contributes to improved self-esteem and academic motivation among students (Zou et al., 2024). The research suggests that students who view their teachers as warm role models are more likely to seize opportunities for autonomy and innovation offered by

effective leadership. Such positive interactions foster feelings of competence and appreciation, enhancing students' self-perception as learners and increasing their SE over time. Literature, including Gehlbach et al. (2023), emphasizes the importance of strong teacher-student relationships in boosting academic performance and motivation. This moderating effect indicates that leadership is not solely a personal endeavor but relies heavily on interpersonal relationships within the classroom. Consequently, educational leaders should focus not only on fostering creativity and innovation but also on establishing supportive relationships with teachers to maximize leadership benefits.

The sixth hypothesis examined the indirect effect of CL on students' learning outcomes through self-efficacy (SE), considering whether this effect is moderated by the strength of teacher-student relationships. The hypothesis posited that the mediating role of SE would be more pronounced in environments with strong teacher-student bonds, supporting the idea that interpersonal relationship quality significantly influences the effectiveness of CL in enhancing student achievement. Empirical evidence indicates that the process through which leadership influences self-efficacy is more effective when positive relationships exist between teachers and students, leading to higher levels of learning. This observation aligns with Self-Determination Theory (SDT) and Social Cognitive Theory (SCT), both emphasizing the importance of relationship dynamics in fostering intrinsic motivation and self-image development. The relationship between leadership, self-efficacy, and teacher-student relational quality suggests that leadership effects are context-dependent, relying heavily on the quality of relational interactions within the learning environment. This conditional impact implies that schools and administrators should focus not only on leadership styles but also on cultivating positive teacher-student relationships to create an optimal environment for student achievement (Wang, 2023). The research contributes to the literature by demonstrating that leadership, self-efficacy, and learning outcomes are enhanced through strong teacher-student relationships. Therefore, an analytical approach to educational leadership should consider both leadership style and the relational dynamics within classrooms. The findings offer valuable practical insights for vocational institutions in China and globally. Vocational education involves developing leadership qualities among teachers, which can boost students' self-efficacy and positively influence their academic performance, especially when a strong teacher-student relationship exists. Consequently, teacher training programs in administration and classroom management should be implemented in vocational colleges to foster positive classroom dynamics, ensuring students are both challenged and supported. This study also broadens the global discussion on educational leadership by illustrating that collaborative leadership is not merely a cultural or situational choice but a strategic approach that can be systematically integrated into educational systems to improve student performance. By promoting creativity, independence, and trust, vocational schools worldwide can prepare students with skills essential for the evolving job market, which demands adaptability, problem-solving abilities, and confidence. The findings contribute to the existing literature and offer practical recommendations for policymakers and institutional leaders worldwide. These include balancing pedagogical practices with effective leadership strategies to meet the demands of the 21st-century workforce, ultimately fostering environments conducive to student success and workforce readiness.

6. CONCLUSION

The paper emphasizes that collaborative learning should be employed to improve student achievement. It demonstrates that leadership fosters innovation and empowers students within schools. A key aspect of leadership's impact on performance is self-efficacy; students who perceive themselves as skilled tend to achieve better results. Positive teacher-student relationships amplify leadership's influence on self-efficacy, creating a motivating environment. The study links leadership and motivation by connecting psychological and relational factors. It underscores the importance of integrating innovation and collaborative learning strategies, which are implemented through teacher training to develop leadership and relational skills. Overall, the research offers a comprehensive view of how leadership contributes to academic excellence.

6.1. Implications

The implications of the study are broad, especially for professionals in educational administration, teaching, and policymaking who aim to improve student performance in fast-paced, challenging environments. The results suggest that innovation through new leadership practices focused on creativity, independence, and student empowerment is essential. Creating a creative classroom culture can be achieved by teachers stimulating critical thinking, problem-solving, and independent study, which directly enhances academic achievement. Additionally, school leaders should foster positive relationships with teachers and students, promoting the development of SE and CL skills among students. Trust, openness, and emotional support from leaders strengthen the connection between leadership and learning outcomes.

A positive learning environment motivates students, builds confidence, and improves performance. Furthermore, research indicates that professional development programs should encompass not only leadership techniques but also relationship-building strategies to encourage healthy teacher-student interactions. Policymakers can utilize these findings to design curricula that incorporate innovative leadership and well-being strategies within relational dynamics. By integrating these elements into educational programs and policies, schools can better support students' success across various contexts.

The value of the research is theoretical. It enriches our knowledge of the effects of the SE, CL and teacher-student relationships on achievement. The extension of the study to encompass leadership concepts and theories of motivation, like SCT and SDT, can demonstrate the SE intermediate effect between CL and academic performance. The study highlights SE as a psychological process that is influenced by CL, and leadership impacts are both direct and indirect in the form of perceived abilities among students. The results on the teacher-student relationship as a moderating factor offer new findings on the influence of the relationship variables on the school leadership effectiveness based on the communication and emotional-support theories. The research demands an overarching perspective on the leadership theories, as the effects on the achievement are not solely of a cognitive or task-related nature but are deeply embedded in the factors of affect and relationship. It promotes the development of the studies of the relationships between leadership and SE and relational processes and accentuates the necessity to learn more about the mental and emotional aspects of educational leadership.

6.2. Limitations and Future Directions

Despite the substantial information provided to understand the relationships between CL, SE, and LO in this study, several limitations are evident. Firstly, the cross-sectional design captures only a snapshot at a specific point in time, making it impossible to establish causality. Future research could employ longitudinal designs to observe how these relationships evolve over time and whether sustained engagement with CL influences student outcomes. Additionally, the study was conducted within a specific cultural and educational context in Beijing, China, which may limit the applicability of the findings to other countries or regions with different educational systems and cultural norms. Replicating the study across diverse educational settings and nations would help determine the universality of the results.

Furthermore, while the research identified SE and teacher-student relationships as key mediators and moderators, other factors such as emotional intelligence, collaborative learning, and school climate could further deepen understanding of how leadership impacts student achievement. Future investigations might also explore how the effectiveness of CL varies across different educational levels primary, secondary, or tertiary or disciplines. Lastly, the influence of digital technologies and virtual learning environments on the interaction between leadership, SE, and LO warrants examination, especially given the increasing prevalence of online education. Addressing these limitations and expanding the current model can provide more comprehensive insights into the complex dynamics that underpin educational success.

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Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
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REFERENCES

A'yun, Q., Handayani, L., Sujiwo, D. A. C., Maula, I., & Rahma, R. A. (2023). The effect of reciprocal learning and self-efficacy on students learning outcomes at the University of Muhammadiyah Jember. *International Journal of Trends in Mathematics Education Research, 6*(2), 96-101. https://doi.org/10.33122/ijtmer.v6i2.220

Afzal, A., Rafiq, S., & Kanwal, A. (2023). The influence of teacher-student relationships on students'academic achievement at university level. *Gomal University Journal of Research, 39*(1), 55-68.

Akram, H., & Li, S. (2024). Understanding the role of teacher-student relationships in students' online learning engagement: Mediating role of academic motivation. *Perceptual and Motor Skills, 131*(4), 1415-1438. https://doi.org/10.1177/00315125241248709

Baba, M. A., Haq, Z. u., Dawood, M., & Aashish, K. (2023). FinTech adoption of financial services industry: Exploring the impact of creative and innovative leadership. *Journal of Risk and Financial Management, 16*(10), 453. https://doi.org/10.3390/jrfm16100453

Bandura, A. (2023). *Social cognitive theory: An agentic perspective on human nature.* United States: John Wiley & Sons.

Chen, P.-L., Lin, C.-H., Lin, I.-H., & Lo, C. O. (2023). The mediating effects of psychological capital and academic self-efficacy on learning outcomes of college freshmen. *Psychological Reports, 126*(5), 2489-2510. https://doi.org/10.1177/00332941221077026

Darawsheh, S. R., Al-Shaar, A. S., Alshurideh, M., Alomari, N. A., Elsayed, A. M., Abdallah, A. K., & Alkhasawneh, T. (2023). The relation between creative leadership and crisis management among faculty members at Imam Abdulrahman Bin Faisal University in light of the corona pandemic from the perspective of department heads. In M. Alshurideh, B. H. Al Kurdi, R. E. Masa'deh, H. M. Alzoubi, & S. Salloum (Eds.), The effect of information technology on business and marketing intelligence systems. In (pp. 1503–1514). Switzerland: Springer International Publishing.

Devi, N. C. (2024). Paradoxical leadership and employee creativity: knowledge sharing and hiding as mediators. *Journal of Knowledge Management, 28*(2), 312-340. https://doi.org/10.1108/JKM-10-2022-0779

Emiru, E. K., & Gedifew, M. T. (2024). The effect of teacher self-efficacy on learning engagement of secondary school students. *Cogent Education, 11*(1), 2308432. https://doi.org/10.1080/2331186X.2024.2308432

Fryer, L. K., & Leenknecht, M. J. (2023). Toward an organising theoretical model for teacher clarity, feedback and self-efficacy in the classroom. *Educational Psychology Review, 35*(3), 68. https://doi.org/10.1007/s10648-023-09787-5

Gehlbach, H., Mascio, B., & McIntyre, J. (2023). Social perspective taking: A professional development induction to improve teacher–student relationships and student learning. *Journal of Educational Psychology, 115*(2), 330–348. https://doi.org/10.1037/edu0000762

Gelaidan, H. M., Al-Swidi, A. K., & Al-Hakimi, M. A. (2024). Servant and authentic leadership as drivers of innovative work behaviour: the moderating role of creative self-efficacy. *European Journal of Innovation Management, 27(6)*, 1938–1966.

Gunawan, S., & Shieh, C.-J. (2023). Enhancing business students' self-efficacy and learning outcomes: A multiple intelligences and technology approach. *Contemporary Educational Technology, 15*(4), ep470. https://doi.org/10.30935/cedtech/13647

Hagenauer, G., Muehlbacher, F., & Ivanova, M. (2023). It's where learning and teaching begins–is this relationship"—insights on the teacher-student relationship at university from the teachers' perspective. *Higher Education*, *85*(4), 819-835. https://doi.org/10.1007/s10734-022-00867-z

Harefa, D., Sarumaha, M., Telaumbanua, K., Telaumbanua, T., Laia, B., & Hulu, F. (2023). Relationship student learning interest to the learning outcomes of natural sciences. *International Journal of Educational Research & Social Sciences*, *4*(2), 240-246. https://doi.org/10.51601/ijersc.v4i2.614

Hayat, A. A., Emad, N., Sharafi, N., & Keshavarzi, M. H. (2022). A comparative study of students' academic optimism and hope, and their relationships with academic achievement. *Shiraz E-Medical Journal*, *23*(11), e121136. https://doi.org/10.5812/semj-121136

Hong, J. C., & Tai, T. Y. (2025). Exploring the role of internet self-efficacy, perceived enjoyment, and anxiety on learning outcome in intelligent personal assistant-based EFL learning. *Innovation in Language Learning and Teaching*, *19*(2), 136-154. https://doi.org/10.1080/17501229.2024.2347884

Iqbal, A., Ahmad, M. S., & Nazir, T. (2023). Does servant leadership predict innovative behaviour above and beyond transformational leadership? Examining the role of affective commitment and creative self-efficacy. *Leadership & Organization Development Journal*, *44*(1), 34-51. https://doi.org/10.1108/LODJ-01-2022-0016

Islam, T., & Asad, M. (2024). Enhancing employees' creativity through entrepreneurial leadership: can knowledge sharing and creative self-efficacy matter? *VINE Journal of Information and Knowledge Management Systems*, *54*(1), 59-73. https://doi.org/10.1108/VJIKMS-07-2021-0121

Jaan, Maria, I., & Mia. (2024). Unlocking success: Human resource management for startupreneur. *Startupreneur Business Digital*, *3*(1), 89-97. https://doi.org/10.33050/sabda.v3i1.505

Kasperski, R., & Blau, I. (2023). Social capital in high-schools: Teacher-student relationships within an online social network and their association with in-class interactions and learning. *Interactive Learning Environments*, *31*(2), 955-971. https://doi.org/10.1080/10494820.2020.1815220

Khan, H. S. U. D., Li, P., Chughtai, M. S., Mushtaq, M. T., & Zeng, X. (2023). The role of knowledge sharing and creative self-efficacy on the self-leadership and innovative work behavior relationship. *Journal of Innovation & Knowledge*, *8*(4), 100441. https://doi.org/10.1016/j.jik.2023.100441

Lei, H., Wang, X., Chiu, M. M., Du, M., & Xie, T. (2023). Teacher-student relationship and academic achievement in China: Evidence from a three-level meta-analysis. *School Psychology International*, *44*(1), 68-101. https://doi.org/10.1177/01430343221122453

Lewaherilla, N. C., Rahayu, M., & Limpo, L. (2024). Exploration of transformational leadership style in improving employee performance in the creative industries. *Journal of Management*, *3*(1), 281-295.

Li, H. (2023). Perceived teacher-student relationship and growth mindset as predictors of student engagement in foreign student engagement in foreign language learning: the mediating role of foreign language enjoyment. *Frontiers in Psychology*, *14*, 1177223. https://doi.org/10.3389/fpsyg.2023.1177223

Nurhikmah, H., Saman, A., & Mawarni, S. (2023). *Blended learning and computers self-efficacy towards students learning outcomes*. Paper presented at the The Unima International Conference on Social Sciences and Humanities (UNICSSH 2022).

Peng, M. Y. P., Liang, Z., Fatima, I., Wang, Q., & Rasheed, M. I. (2024). The nexus between empowering leadership, job engagement and employee creativity: role of creative self-efficacy in the hospitality industry. *Kybernetes*, *53*(10), 3189-3210. https://doi.org/10.1108/K-10-2022-1425

Rakib, M., Azis, M., Azis, F., & Sanusi, D. A. (2023). The effect of self-leadership and self-efficacy on entrepreneurship creativity: An empirical study on online business students. *Pegem Journal of Education and Instruction*, *13*(3), 209-214. https://doi.org/10.47750/pegegog.13.03.22

Ren, L., & Shen, H. (2024). The relationship between servant leadership and team innovation performance: Mediating effect of self-efficacy. *Heliyon*, *10*(6), e27723. https://doi.org/10.1016/j.heliyon.2024.e27723

Rød, A. J., & Calafato, R. (2023). Exploring the relationship between extramural English, self-efficacy, gender, and learning outcomes: A mixed-methods study in a Norwegian upper-secondary school. *Studies in Educational Evaluation*, *79*, 101302. https://doi.org/10.1016/j.stueduc.2023.101302

Ryan, R. M., & Deci, E. L. (2024). Self-determination theory. In F. Maggino (Ed.), Encyclopedia of Quality of Life and Well-Being Research. In (pp. 6229–6235). Cham: Springer. https://doi.org/10.1007/978-3-031-17299-1_2630.

Umniyyati, F., Ellianawati, E., & Sumartiningsih, S. (2025). The influence of emotional intelligence, self-efficacy, and independence in learning with moderating variables teacher's leadership to improve mathematics learning outcomes. *Jurnal Penelitian Pendidikan*, *42*(1), 8-18. https://doi.org/10.15294/m6crps18

Wang, X. (2023). Exploring positive teacher-student relationships: The synergy of teacher mindfulness and emotional intelligence. *Frontiers in Psychology*, *14*, 1301786. https://doi.org/10.3389/fpsyg.2023.1301786

Yang, J., & Bentein, K. (2023). Entrepreneurial leadership and employee creativity: A multilevel mediation model of entrepreneurial self-efficacy. *Management Decision*, *61*(9), 2645-2669. https://doi.org/10.1108/MD-04-2022-0449

Ye, P., Liu, L., & Tan, J. (2022). Creative leadership, innovation climate and innovation behaviour: the moderating role of knowledge sharing in management. *European Journal of Innovation Management*, *25*(4), 1092-1114.

Zada, S., Khan, J., Zada, M., Saeed, I., & Jun, Z. Y. (2023). Does servant leadership enhance employee creativity and performance?: Mediating role of knowledge sharing and moderating the role of self-efficacy. *Journal of Organizational and End User Computing*, *35*(1), 1-24. https://doi.org/10.4018/JOEUC.321656

Zappe, S. E., Huang-Saad, A. Y., Duval-Couetil, N., & Simmons, D. R. (2023). Teaching for creativity, entrepreneurship, and leadership in engineering. In A. Johri (Ed.), International handbook of engineering education research. In (pp. 433–456). New York: Routledge.

Zhou, X., Zhong, J., & Zhang, L. (2024). Action speaks louder: The role of proactive behavior between creative leadership and employees' creativity. *Behavioral Sciences*, *14*(3), 257. https://doi.org/10.3390/bs14030257

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice*, *41*(2), 64-70. https://doi.org/10.1207/s15430421tip4102_2

Zou, H., Yao, J., Zhang, Y., & Huang, X. (2024). The influence of teachers' intrinsic motivation on students' intrinsic motivation: The mediating role of teachers' motivating style and teacher-student relationships. *Psychology in the Schools*, *61*(1), 272-286. https://doi.org/10.1002/pits.23050