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Examining the Impact of Leadership Styles on Teacher Effectiveness: A Structural Equation Modeling and Multiple Regression

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Abstract

This study examines the influence of transformational and transactional leadership on teacher effectiveness among young teachers in private universities in Shandong Province, China. Motivated by the demand for high-quality education, this study seeks to address a research gap in leadership's role in the professional development of early-career teachers in Chinese private universities. Using a quantitative research method, data was collected from 416 teachers and analyzed through structural equation modeling (SEM) and multiple regression analysis. The findings indicate that both leadership styles significantly impact teacher effectiveness, with transactional leadership (β=0.582) exhibiting a slightly stronger effect than transformational leadership (β=0.487). Among transformational leadership dimensions, Intellectual Stimulation (IS) had the most significant influence, whereas Contingent Reward (CR) was the strongest predictor within transactional leadership. However, Idealized Influence (II) and Individualized Consideration (IC) had no significant impact on assessment and learning environment within teacher effectiveness, respectively. This study contributes to the existing literature by offering empirical insights into the relationship between leadership and teacher effectiveness in the context of Chinese private universities. It also provides practical implications for educational management, advocating for a balanced integration of both leadership styles to optimize teacher performance. Future research should explore cultural factors that may impact these relationships.

Keywords: Transformational Leadership, Transactional Leadership, Teacher Effectiveness, Structural Equation Modeling, Multiple Regression

Introduction

In the field of education, the impact of leadership style on teacher effectiveness has always been a focus of researchers' attention (Dong, 2023). Among them, transformational leadership and transactional leadership, as the two main leadership styles, have different impacts on teachers' job performance, effectiveness, and organizational commitment (Fathi, Ahmadinejad, & Salehi, 2021).

Problem Statement

Transformational leadership is characterized by leaders who inspire and motivate their followers to exceed expectations by focusing on higher-order intrinsic needs and personal development. This leadership style fosters an environment of intellectual stimulation, individualized consideration, and the articulation of a compelling vision, leading to enhanced commitment and performance among followers (Kasımoğlu & Ammari, 2020). In educational contexts, transformational leadership in universities may have been associated with positive outcomes such as increased teacher satisfaction, commitment, and perceived effectiveness (Lili & Man, 2020). For instance, a study by Kaya (2024) found that transformational leadership positively influences teachers' creativity and organizational commitment (Metaferia, Baraki, & Mebratu, 2023). Said, Sharif, and Abdullah (2023) highlighted that transformational leadership enhances teacher motivation and engagement by fostering a shared vision and intellectual stimulation.

Transactional leadership, on the other hand, is based on a system of rewards and penalties contingent upon performance. Transactional leaders focus on clear structures, expectations, and task-oriented goals, providing rewards for compliance and corrective actions for deviations (Algahtany & Bardai, 2019). While this approach can lead to satisfactory performance levels, it may not encourage innovation or personal development to the same extent as transformational leadership (Breevaart & Bakker, 2018). A study by Judge and Piccolo (2004) found that while transactional leadership is effective in achieving specific performance outcomes, it may not foster the same level of intrinsic motivation among teachers as transformational leadership.

Teacher effectiveness refers to the ability of educators to positively affect student learning and achievement (Sarwar, Tariq, & Yong, 2022). Effective teachers not only possess strong subject matter knowledge but also demonstrate pedagogical skills, classroom management abilities, and the capacity to engage and motivate students. Leadership within educational institutions can significantly impact these facets of teacher effectiveness by shaping the school climate, providing professional development opportunities, and setting expectations for instructional quality (Liu & Hallinger, 2018). Day, Gu, and Sammons (2016) emphasized that leadership that promotes and participates in teacher learning and development has a substantial impact on student outcomes.

Despite extensive research on leadership styles and their general impact on organizational outcomes, there is a paucity of studies focusing on how these leadership styles specifically affect teacher effectiveness among young teachers in Chinese private universities. These young teachers often face unique challenges, including adapting to institutional cultures, managing diverse student needs, and establishing their professional identities (Wu & Tique, 2021). Understanding how leadership styles influence their effectiveness is crucial for developing targeted support mechanisms and leadership development programs within these institutions.

This study will focus on the young teacher group in private universities in Shandong Province, China, and explore the impact of transformational leadership and transactional leadership on teacher effectiveness. Through quantitative research methods, the aim is to

provide empirical evidence for educational managers to optimize leadership strategies and enhance teacher effectiveness.

Research Objectives

The objectives of this study are as follows:

i. To assess the level of leadership and teacher effectiveness among young teachers of private universities in Shandong province, China.
ii. To determine the relationship between leadership style and teacher effectiveness.
iii. To determine the influence of leadership style on teacher effectiveness.

Leadership style in this study specifically includes transformational leadership and transactional leadership.

Research Questions

Based on the research objectives, the study aims to answer the following research questions:

i. What are the levels of transformational and transactional leadership and teacher effectiveness among young teachers in private universities in Shandong Province, China?
ii. What is the relationship between transformational and transactional leadership and teacher effectiveness?
iii. How do transformational and transactional leadership styles influence teacher effectiveness among young teachers in private universities?

Research Hypothesis

To address the research questions, the following hypotheses are formulated:

H1: Relationship Between Leadership Style and Teacher Effectiveness

H1a: There is a significant correlation between transformational leadership and teacher effectiveness.

H1b: There is a significant correlation between transactional leadership and teacher effectiveness.

H2: Influence of Leadership Style on Teacher Effectiveness

H2a: Transformational leadership has a significant influence on teacher effectiveness.

H2b: Transactional leadership has a significant influence on teacher effectiveness.

Literature Review

Teacher Effectiveness

Teacher effectiveness is pivotal in enhancing student learning and development. It encompasses the ability to create engaging and supportive learning environments, deliver effective instruction, assess student progress, and foster academic growth (Akram, 2018). This multifaceted construct involves various aspects of teaching performance (Sabharwal & Miah, 2024). In this study, teacher effectiveness is operationalized through three dimensions: teaching plans and strategies, learning environment, and assessment.

Teaching Plans and Strategies

Effective teaching begins with meticulous planning and the implementation of diverse instructional strategies. Research by Marzano, Pickering, and Pollock (2001) emphasizes the significance of employing high-yield teaching strategies that enhance student achievement across various grade levels and subjects. These strategies include identifying similarities and differences, summarizing, note-taking, reinforcing effort, providing recognition, homework,

and practice, non-linguistic representations, cooperative learning, setting objectives, providing feedback, generating and testing hypotheses, and using cues, questions, and advance organizers (Burt, 2022; Marzano, 2009). Such structured approaches ensure that teaching aligns with learning objectives and actively engages students.

Learning Environment

A positive learning environment is characterized by a supportive atmosphere that fosters creativity, collaboration, and critical thinking among students (Gage, Scott, Hirn, & MacSuga-Gage, 2018). Teachers play a crucial role in establishing and maintaining such environments (Zoromski, Evans, Owens, Holdaway, & Royo Romero, 2021). Martin and Collie (2019) identified several factors that significantly impact student achievement, including teacher-student relationships and classroom behavioral interventions. These findings underscore the importance of nurturing positive interactions and implementing effective classroom management strategies to create conducive learning environments.

Assessment

Effective assessment practices involve utilizing various methods to measure student learning and providing meaningful feedback to promote growth and improvement (Black & Wiliam, 2018). Providing formative evaluation and feedback are among the top influences on student achievement (Wiliam & Leahy, 2024). These practices enable teachers to monitor student progress accurately and tailor instruction to meet individual learning needs.

Leadership Style

Leadership significantly influences educational settings, impacting both teacher performance and student outcomes. Transformational leadership and transactional leadership are two primary leadership styles that have been extensively studied for their effects on teacher effectiveness (Jensen et al., 2019).

Transformational leadership

The concept of transformational leadership was first proposed by Burns (1978), who believed that when "leaders and subordinates elevate morality and motivation to a higher level through mutual motivation," this type of leadership can be seen as both leaders and subordinates change in the process. Bass (1995) argues that identifying common interests between leaders and followers is crucial for effective leadership, which also promotes subordinates' values, attitudes, and motivations to be elevated to higher levels of arousal and maturity. Leithwood (1994) defined transformational leadership as leadership behavior that enhances individual and collective problem-solving abilities during school change processes. They believe that in the field of education, the establishment of organizational and member capabilities is an important aspect of transformational leadership research.

Based on this, we define transformational leadership as a systematic leadership style that defines the mission and vision of teachers, makes them aware of their responsibilities and obligations, and inspires their high-level needs to jointly focus on organizational interests and achieve goals. This is specifically reflected in the four dimensions: Idealized Influence(II), Inspirational Motivation(IM), Intellectual Stimulation(IS), and Individualized Consideration(IC) (Bass & Avolio, 1996).

Transactional leadership

Transactional leadership is characterized by clear structures, expectations, and a system of rewards and penalties based on performance. While this approach ensures organizational stability and task completion, it may not encourage innovation or personal development to the same extent as transformational leadership. It involves three dimensions: Contingent Reward(CR), Management-by-Exception(MBE), and Laissez-faire(LF) (Eagly, Johannesen-Schmidt, & Van Engen, 2003).

Influence on Teacher Effectiveness

The impact of leadership styles on teacher effectiveness is multifaceted. Transformational leadership fosters a supportive organizational climate, enhancing teachers' job performance and organizational commitment, which in turn promotes professional development and teaching effectiveness (Hadijah, 2024). Conversely, transactional leadership, through its emphasis on clear expectations and reward systems, ensures task completion but may not sufficiently stimulate teachers' creativity and initiative. Therefore, educational leaders should balance both leadership styles, adapting to specific contexts and teacher needs, to achieve optimal educational outcomes (Chunhui, Azar, & Ahmad, 2024).

Methodology

Research Design

This study adopts a quantitative research approach utilizing a survey-based methodology to examine the relationship between leadership styles and teacher effectiveness. Data is collected through a structured questionnaire distributed among young teachers in private universities in Shandong Province, ensuring a systematic assessment of the research variables.

Data Collection

This study focuses on young teachers in private universities in Shandong Province, China, as the target population. Shandong is one of the top three most populous provinces in China and a significant center for higher education. Selecting young teachers from private universities in this province allows for a better understanding of their professional experiences and effectiveness in teaching. Young teachers in this study are defined according to the Chinese Ministry of Education, which categorizes them as individuals under 40 years old, with less than ten years of teaching experience, and holding at least a master’s degree.

Data collection was conducted through a structured questionnaire. The sample size was determined using an alternative formula proposed by Krejcie and Morgan (1970). To achieve a fair representation of young teachers across different private universities, the study selected a sample size of 416 using a combination of cluster sampling and random sampling techniques. Before data collection, ethical approval was obtained from four private universities in Shandong Province. To ensure ethical compliance, all participants were informed of the purpose of the study and provided informed consent before participating. Participants were assured of confidentiality and anonymity, and their responses were used solely for academic research purposes.

Instrument

The questionnaire in this study is adopted and adapted from the Multifactor Leadership Questionnaire (MLQ) (Bass & Avolio, 2004) and the School Teacher Effectiveness

Questionnaire (STEQ) (Akram, 2018). The questionnaire shown in Table 1 consisted of a total of 56 items, of which five items were demographic detail description questions and 51 questions measuring the variables.

Table 1
Distribution of items

Variables	Dimensions	Items
Transformational Leadership	• Idealized Influence (II) • Inspirational Motivation (IM) • Intellectual Stimulation (IS) • Individualized Consideration (IC)	21 items
Transactional Leadership	• Contingent Reward (CR) • Management-by-Exception (MBE) • Laissez-faire (LF)	13 items
Teacher Effectiveness	• Instructional Planning and Strategies • Assessment • Learning environment	17 items

The questionnaire used in this study consists of three sections, designed to collect comprehensive data on demographic details, leadership style, and teacher effectiveness：

Section A: Demographic Information
This section includes five items that collect demographic details such as gender, age, teaching experience, qualification, and subject area. Respondents select their answers by ticking the appropriate boxes.

Section B: Leadership Style
This section assesses leadership styles using items adapted from the Multifactor Leadership Questionnaire (MLQ) developed by Bass and Avolio (2004). It contains 34 items rated on a five-point Likert scale and is divided into two subsections: Transformational leadership (21 items) and Transactional leadership (13 items).

Section C: Teacher Effectiveness
Teacher effectiveness is examined based on Akram (2018), focusing on instructional planning and strategies, assessment, and the learning environment. This section evaluates teachers' abilities in delivering instruction, managing classrooms, applying pedagogical approaches, and engaging students effectively.

Data Analysis
The collected data were analyzed using SPSS and AMOS to ensure comprehensive statistical interpretation. Descriptive statistics were used to summarize demographic data, while Cronbach's Alpha assessed reliability and Confirmatory Factor Analysis (CFA) validated the constructs. Pearson's correlation analysis identified relationships between leadership styles and teacher effectiveness, while multiple regression analysis determined the influence of transformational and transactional leadership on teacher effectiveness. Finally, Structural Equation Modeling (SEM) was conducted to test the overall model fit and assess the direct and indirect effects of leadership styles on teacher effectiveness, ensuring robust and reliable results.

Findings

Demographic Profile of Respondents

Table 2
Demographic Characteristics (n = 416)

Demographic Profile	Frequency (*f*)	Percentage (%)
Gender		
Male	176	42.3
Female	240	57.7
Age		
25 and below	72	17.3
25-30 years	164	39.4
30-35 years	107	25.7
35-40 years	73	17.5
Teaching Experience		
1 year and below	31	7.5
1-5 years	229	55
5-10 years	76	18.3
more than 10 years	80	19.2
Qualification		
Master's Degree	326	78.4
Doctoral Degree	90	21.6
Subject Area		
Academic Subjects (e.g., Chinese, English, Mathematics)	79	19
Computing and Science	92	22.1
Arts, Social Sciences, and Humanities	124	29.8
Medicine and Pharmacy	35	8.4
Engineering and Technology	75	18
Others	11	2.6

Table 2 shows that the sample consists mainly of young teachers (25-35 years old) with 1-5 years of teaching experience. Most participants have a master's degree and are from diverse academic backgrounds, with the Arts and Social Sciences field being the most common. This demographic profile suggests that the study is well-represented among early-career teachers in Chinese private universities.

Reliability Analysis

By examining the reliability of each section of the scale separately, the internal consistency of the questionnaire was assessed. If Cronbach's α values for all dimensions and scales are above 0.7, indicating a high level of internal consistency. Then, the questionnaire could be considered a valid research instrument for this study.

Table 3
Reliability Analysis

Scale	Dimension	Cronbach's α of dimension	Cronbach's α of Scale	Item Number
LS1	Idealized Influence	0.932	0.949	8
	Inspirational Motivation	0.854		4
	Intellectual Stimulation	0.918		4
	Individualized Consideration	0.916		5
LS2	Contingent Reward	0.838	0.899	4
	Management-by-exception	0.882		6
	Laissez-faire	0.869		3
TE	Instructional Planning and Strategies	0.928	0.932	6
	Assessment	0.870		5
	Learning environment	0.892		6

The reliability analysis in Table 3 demonstrates strong internal consistency across all scales, with Cronbach's α values exceeding 0.8 for all dimensions. Transformational Leadership (LS1) achieved the highest reliability (α=0.949), followed by Teacher Effectiveness (TE) (α=0.932) and Transactional Leadership (LS2) (α=0.899). The sub-dimensions also show consistently high reliability, ranging from 0.838 to 0.932, confirming the robustness of the measurement tool. These results indicate that the questionnaire is highly reliable and suitable for assessing leadership styles and teacher effectiveness in this study.

Exploratory Factor Analysis (EFA)
Table 4
Tests of KMO and Bartlett for Variables

Variables	KMO	Bartlett's test of Sphericity		
		Chi-Squared	df	sig
Transformational Leadership	0.949	6453.087	210	0.000
Transactional Leadership	0.898	2757.867	78	0.000
Teacher Effectiveness	0.935	4544.688	136	0.000

Table 4 shows that the KMO values for all variables (Transformational Leadership: 0.949, Transactional Leadership: 0.898, Teacher Effectiveness: 0.935) are above 0.8, indicating that the data is highly suitable for factor analysis. Bartlett's Chi-Squared tests are significant ($p < 0.001$), confirming that factor analysis is appropriate.

Table 5
Variance Explained

Variables	Initial Eigenvalue	Variance %	Cumulative %
Transformational Leadership	10.424	25.448	72.661
Transactional Leadership	5.928	28.651	68.293
Teacher Effectiveness	8.178	25.498	68.61

The results of the exploratory factor analysis (EFA) in Table 5 show that Transformational Leadership explains 72.66% of the variance. Transactional Leadership explains 68.29% of the variance. Teacher Effectiveness explains 68.61% of the variance. These values indicate that a substantial proportion of the variance in the data is accounted for by the extracted components, suggesting a strong factor structure.

Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) was conducted using AMOS to validate the measurement model in this study, as shown in Figure 1, Figure 2, and Figure 3. The process involved specifying the factor structure, estimating parameters using Maximum Likelihood Estimation (MLE), and assessing model fit through indices like CFI, TLI, RMSEA, and Chi-square/df. Additionally, Composite Reliability (CR) and Average Variance Extracted (AVE) were used to confirm convergent validity. The results showed acceptable model fit, significant factor loadings, and strong reliability, ensuring that the constructs were valid and suitable for further structural analysis.

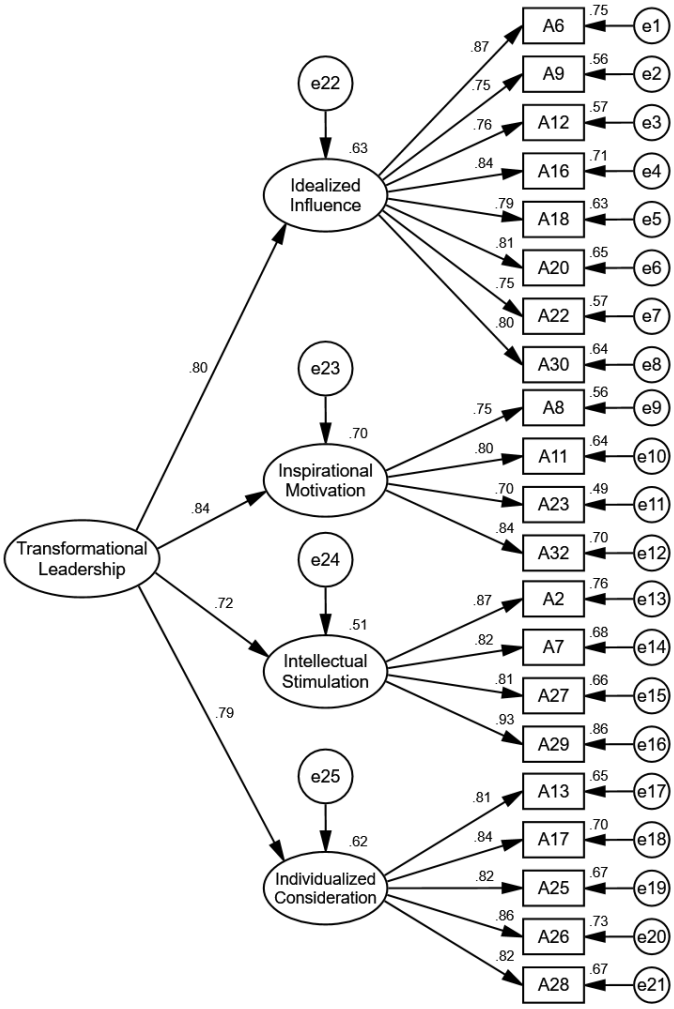

Figure 1: Confirmatory Factor Model (Transformational Leadership)

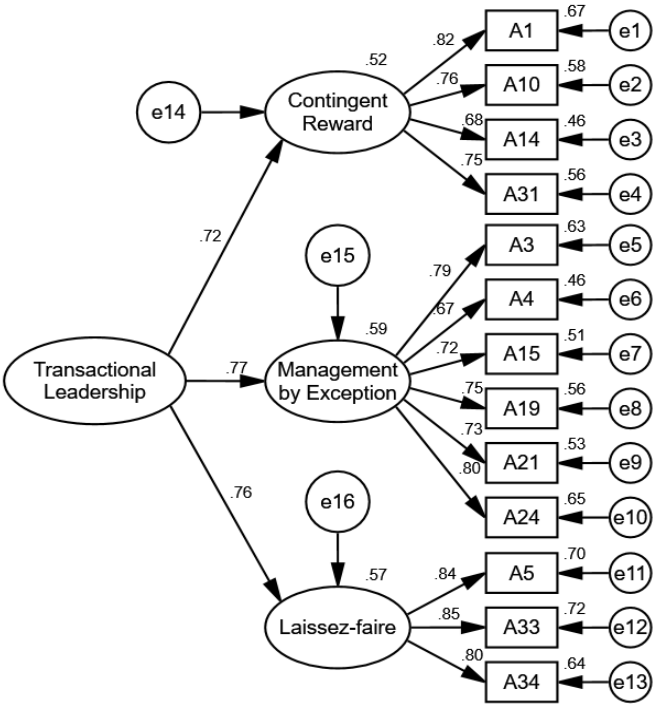

Figure 2: *Confirmatory Factor Model (Transactional Leadership)*

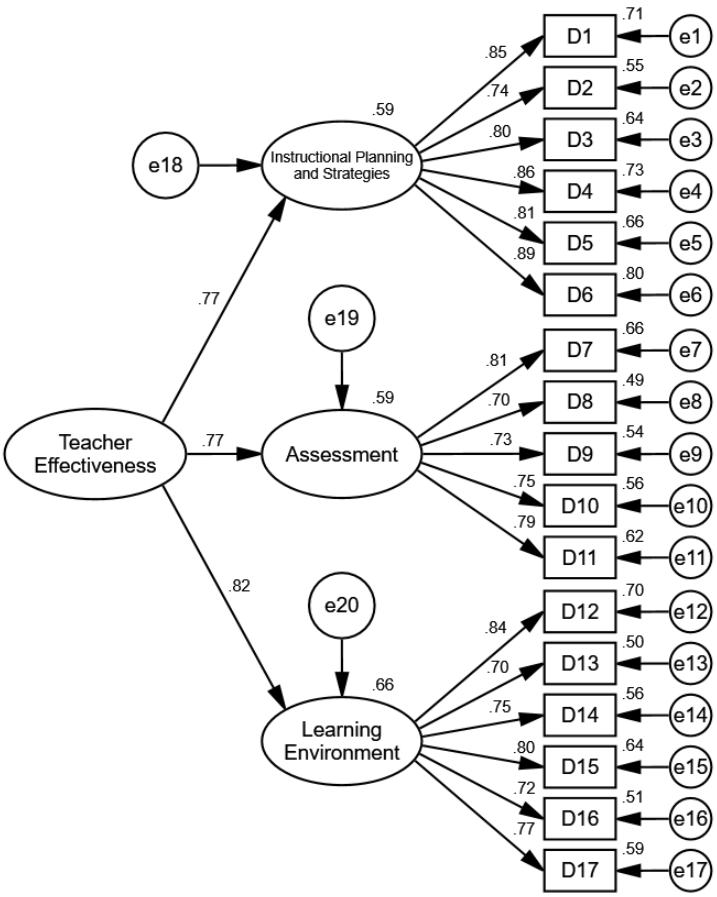

Figure 3: *Confirmatory Factor Model (Teacher Effectiveness)*

Table 6
Model Fit Indices

Evaluating indicator	X^2/df	GFI	AGFI	NFI	TLI	CFI	RMSEA
Transformational leadership	2.017	0.921	0.902	0.943	0.971	0.966	0.050
Transactional leadership	1.969	0.960	0.942	0.956	0.972	0.978	0.048
Teacher effectiveness	2.104	0.939	0.920	0.947	0.966	0.971	0.052
Adaptation standard	<3	>0.8	>0.8	>0.9	>0.9	>0.9	<0.08
Compliance with standards	achieved	achieved	achieved	achieved	achieved	achieved	achieved

All model fit indicators in Table 6 meet or exceed the recommended thresholds, indicating a well-fitting model. X^2/df values (< 3), GFI (> 0.9), AGFI (> 0.9), NFI (> 0.9), TLI (> 0.9), and CFI (> 0.9) all confirm good model fit. RMSEA values are below 0.08, suggesting acceptable error levels in model approximation.

Table 7
Convergent Validity

Variables	CR (Composite Reliability)	AVE (Average Variance Extracted)
Transformational Leadership	0.933	0.634
Transactional Leadership	0.839	0.567
Teacher Effectiveness	0.928	0.684

Table 7 shows that Composite Reliability (CR) values for all constructs are above 0.7, confirming strong internal consistency. In addition, Average Variance Extracted (AVE) values are above 0.5, ensuring sufficient convergent validity.

Common Method Bias (CMB) Test

Common method bias (CMB) arises when variations in responses are artificially inflated due to factors such as a common data source, identical respondents, the same measurement environment, item context, or the intrinsic characteristics of the items (Podsakoff, Podsakoff, Williams, Huang, & Yang, 2024). Measurement errors in questionnaires can be categorized into systematic and random errors. CMB, resulting from the use of a single data source, introduces systematic errors that can significantly distort statistical analysis results.

To ensure the accuracy of statistical results, this study employed Harman's single-factor test, one of the most widely used methods for detecting CMB (Kock, 2020). An exploratory factor analysis (EFA) using principal component analysis (PCA) was conducted on all questionnaire items, extracting factors with eigenvalues greater than 1. The results, presented in the table, show that the cumulative variance explained was 68.928%, with the first factor accounting for 36.230%, which is below the 40% threshold. This indicates that no single factor explains the majority of the variance, suggesting that CMB is not a serious issue in this study, allowing for further empirical analysis.

Multicollinearity Test

Multicollinearity refers to the high correlation between independent variables in regression models, which can lead to unreliable estimates of regression coefficients (Salmerón, García, & García, 2020). To assess multicollinearity, this study examined the variance inflation factor (VIF) and tolerance values.

Table 8
The Tolerance and VIF Value

Components	Tolerance	VIF
Idealized Influence	0.416	2.405
Inspirational Motivation	0.429	2.332
Intellectual Stimulation	0.426	2.345
Individualized Consideration	0.444	2.250
Contingent Reward	0.516	1.939
Management-by-exception	0.460	2.174
Laissez-faire	0.552	1.811
Instructional Planning and Strategies	0.397	2.522
Assessment	0.369	2.708
Learning environment	0.334	2.991

The results in Table 8 show that all VIF values are below 10 and Tolerance values are above 0.1, indicating no severe multicollinearity issue among the independent variables.

Descriptive Analysis

Descriptive analysis was performed to summarize the central tendency, dispersion, and distribution of the variables through SPSS. The average score of each variable was computed to determine the overall perception of respondents. Standard Deviation (SD) was calculated to assess the variability of responses, indicating how much individual responses deviated from the mean. Skewness was examined to determine the symmetry of data distribution. Negative skewness values indicate that most responses are above the mean. Kurtosis was analyzed to assess the flatness of the distribution. Values close to zero suggest a normal distribution (Bulanov et al., 2021).

Table 9
Descriptive Statistics Result

Variable	Number of Items	M (Mean)	SD (Standard Deviation)	Skewness	Kurtosis
Transformational Leadership	21	3.537	0.792	-0.96	0.216
Transactional Leadership	13	3.353	0.754	-0.605	0.045
Teacher Effectiveness	17	3.375	0.785	-0.7	-0.106

The descriptive analysis in Table 9 reveals that transformational leadership (M=3.537) has the highest average score, indicating that participants perceive it more positively compared to transactional leadership (M=3.353). Meanwhile, transformational leadership (SD=0.792) has the highest variability, meaning responses were more spread out compared to transactional leadership (SD=0.754). The data distribution for all three variables is approximately normal, with Transformational Leadership receiving the highest mean scores, indicating that it is

perceived as the dominant leadership style among respondents. The moderate standard deviation and skewness suggest a fairly balanced distribution of responses, making the data suitable for further statistical analysis.

Correlation Analysis

This section explored the relationship between leadership styles and teacher effectiveness through Pearson correlation analysis. This method measures the strength and direction of linear relationships between variables. A significance level of 0.01 (two-tailed) was set to determine statistical significance.

Table 10

Relationship between Leadership Styles and Teacher Effectiveness

Leadership Styles	Instructional Planning and Strategies	Assessment	Learning Environment	Overall
Transformational Leadership	0.558**	0.598**	0.526**	0.794**
Transactional Leadership	0.514**	0.404**	0.510**	0.690**

** Correlation is significant at the 0.01 level (2-tailed)

The result in Table 10 indicated a statistically significant association between leadership styles and teacher effectiveness. Transformational leadership has a strong positive correlation with teacher effectiveness (r=0.794, p<0.01), indicating that higher transformational leadership is associated with greater teacher effectiveness. Transactional Leadership also has a positive but slightly weaker correlation with teacher effectiveness (r=0.690, p<0.01).

Structural Equation Model (SEM) Fit Test

Before performing regression analysis, Structural Equation Modeling (SEM) fit testing is necessary. Unlike regression, which only examines unidirectional linear relationships, SEM can analyze multiple variable interactions simultaneously (Kline, 2023). Thus, this study applies SEM to assess model fit and uses path analysis to verify causal relationships, providing a foundation for regression analysis (Hair, Babin, Anderson, & Black, 2022). AMOS 26.0 was used for SEM path analysis, with the main results shown in Figure 4.

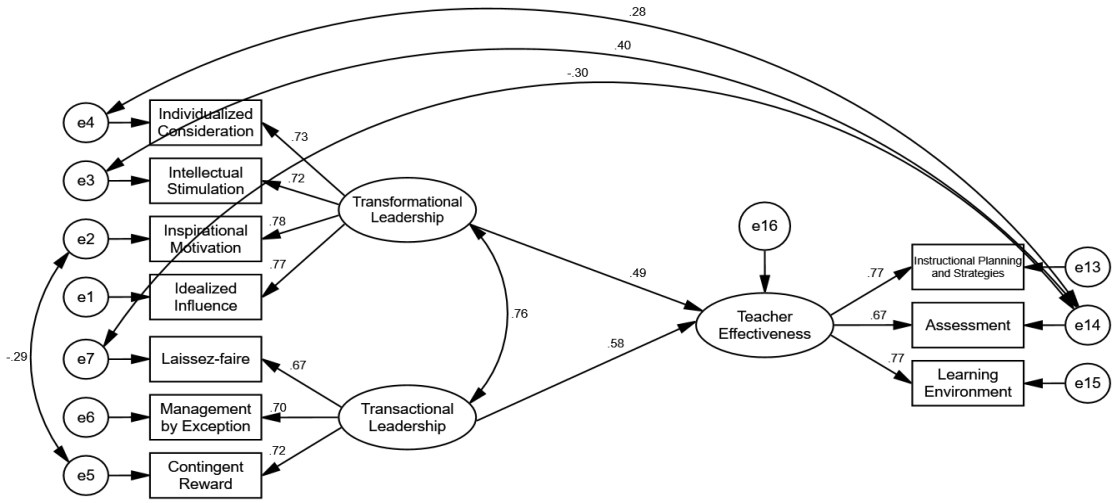

Figure 4: *Structural Equation Model (SEM)*

Table 11
Model Fit Indices

Indicator	X^2/df	RMR	GFI	AGFI	NFI	CFI	RMSEA
Statistical Value	3.083	0.031	0.961	0.923	0.96	0.972	0.071
Adaptation standard	<3	< 0.05	>0.8	>0.8	>0.9	>0.9	<0.08
Compliance with standards	achieved	achieved	achieved	achieved	achieved	achieved	achieved

All model fit indicators in Table 11 meet or exceed the recommended thresholds, indicating a well-fitting model. The X^2/df ratio (3.083) is acceptable (below 5). The fit indices (GFI=0.961, AGFI=0.923, NFI=0.96, CFI=0.972, RMSEA=0.071) suggest a reasonable fit to the data.

Table 12
Path Coefficient Analysis of the SEM

Path Hypothesis Relationship	Standardized Path Coefficient	Standard Error (S.E.)	Critical Ratio (C.R.)	p-value
Teacher Effectiveness ← Transformational Leadership	0.487	0.081	6.396	<0.001
Teacher Effectiveness ← Transactional Leadership	0.582	0.087	7.036	<0.001

Table 12 shows that Transformational Leadership → Teacher Effectiveness (β=0.487, p<0.001) and Transactional Leadership → Teacher Effectiveness (β=0.582, p<0.001). It means both leadership styles significantly influence teacher effectiveness, with transactional leadership having a slightly stronger effect.

Multiple Linear Regression

Regression analysis at the dimensional level helps pinpoint key influencing factors, providing a deeper understanding of their relationships. Therefore, this study conducts dimensional regression analysis to evaluate the predictive power of each dimension, ensuring both the theoretical soundness and statistical robustness of the model (Kline, 2023; Schumacker & Lomax, 2004).

Table 13
Multiple Linear Regression Model (Transformational Leadership)

	Instructional Planning and Strategies		Assessment		Learning Environment	
	β	t	β	t	β	t
Gender	0.091	2.458*	0.028	0.808	0.072	1.918
Age	0.042	0.967	0.045	1.133	0.068	1.565
Teaching Experience	0.103	2.344*	0.102	2.498*	0.109	2.462*
Qualification	-0.006	-0.166	-0.018	-0.516	0.055	1.452
Subject Area	0.048	1.321	0.067	1.995*	0.044	1.2
II	0.184	3.628***	-0.013	-0.272	0.305	5.983***
IM	0.204	3.920***	0.103	2.140*	0.144	2.751**
IS	0.232	4.809***	0.405	9.064***	0.187	3.865***
IC	0.128	2.549*	0.309	6.660***	0.086	1.703
R^2	0.462		0.538		0.458	
Adjusted R^2	0.45		0.528		0.446	
F	38.778***		52.575***		38.093***	

* indicates P < 0.05, ** indicates P < 0.01, *** indicates P < 0.001

The results in Table 13 indicate that Intellectual Stimulation (IS) has the strongest effect across all dimensions (β=0.232, p<0.001 for Instructional Planning and Strategies; β=0.405, p<0.001 for Assessment; β=0.187, p<0.001 for Learning Environment). However, Idealized Influence (II) (β=-0.013, p>0.05) for assessment, and Individualized Consideration (IC) (β=0.086, p>0.05) for Learning Environment, indicating no significant positive impact. The R^2 values (0.462-0.538) indicate a moderate to strong explanatory power, confirming the importance of transformational leadership dimensions in enhancing teacher effectiveness.

Table 14
Multiple Linear Regression Model (Transactional Leadership)

	Instructional Planning and Strategies		Assessment		Learning Environment	
	β	t	β	t	β	t
Gender	0.119	3.248**	0.069	1.602	0.108	2.938**
Age	-0.003	-0.058	0.033	0.655	0.016	0.360
Teaching Experience	0.146	3.365**	0.170	3.355**	0.145	3.317**
Qualification	-0.070	-1.831	-0.029	-0.655	-0.003	-0.071
Subject Area	0.008	0.229	0.021	0.485	0.002	0.043
CR	0.315	7.096***	0.220	4.256***	0.376	8.432***
MBE	0.184	4.095***	0.263	5.023***	0.228	5.053***
LF	0.265	5.885***	0.029	0.546	0.129	2.860**
R^2	0.463		0.272		0.459	
Adjusted R^2	0.453		0.257		0.448	
F	43.934***		18.963***		43.080***	

* indicates P < 0.05, ** indicates P < 0.01, *** indicates P < 0.001

The regression analysis in Table 14 indicates that Contingent Reward (CR) has the strongest impact on all aspects of Teacher Effectiveness, while Management-by-Exception (MBE) also plays a significant role, particularly in Assessment. Laissez-faire (LF) shows a positive effect on Instructional Planning and Learning Environment, but its impact on Assessment is not significant (β= 0.029, p>0.05). With R^2 values ranging from 0.272 to 0.463, the model suggests Transactional Leadership contributes to teacher effectiveness, though its impact varies across different dimensions.

Discussion

Levels of Transformational and Transactional Leadership and Teacher Effectiveness

The descriptive analysis revealed that transformational leadership had the highest mean score (M=3.537, SD=0.792), followed by teacher effectiveness (M=3.375, SD=0.785) and transactional leadership (M=3.353, SD=0.754). This suggests that young teachers in private universities perceive transformational leadership as more prevalent compared to transactional leadership. The results further indicate that both leadership styles are moderately implemented, and teacher effectiveness is at a satisfactory level, with Intellectual Stimulation (IS) and Contingent Reward (CR) emerging as the most influential dimensions.

Relationship Between Transformational and Transactional Leadership and Teacher Effectiveness

The correlation analysis confirmed significant positive relationships between leadership styles and teacher effectiveness. Transformational leadership demonstrated a stronger correlation (r=0.794, p<0.01) compared to transactional leadership (r=0.690, p<0.01), indicating that teachers are more influenced by leaders who inspire, intellectually stimulate, and provide individualized support rather than those who rely on contingent rewards or corrective

supervision. Additionally, all leadership dimensions, except Idealized Influence (II) and Laissez-faire (LF), showed significant positive correlations with teacher effectiveness dimensions, emphasizing the need for active leadership engagement.

Influence of Transformational Leadership on Teacher Effectiveness

Transformational leadership has a positive impact on teacher effectiveness. The regression analysis supports H1, as transformational leadership significantly influences teacher effectiveness ($\beta=0.487$, $p<0.001$). The dimension-wise analysis shows:

i. Idealized Influence (II) positively affects teacher effectiveness. This hypothesis was not supported, as II had no significant effect on assessment ($\beta=-0.013$, $p>0.05$), indicating that being a role model alone does not directly enhance teacher effectiveness.

ii. Inspirational Motivation (IM) positively affects teacher effectiveness. Supported ($\beta=0.204$, $p<0.001$), demonstrating that visionary and motivational leadership contributes to improved teaching effectiveness.

iii. Intellectual Stimulation (IS) positively affects teacher effectiveness. Strongly supported ($\beta=0.405$, $p<0.001$), confirming that encouraging teachers to think critically enhances their effectiveness.

iv. Individualized Consideration (IC) positively affects teacher effectiveness. Partially supported, as IC had a significant effect on assessment ($\beta=0.309$, $p<0.001$) but no significant impact on the learning environment ($\beta=0.086$, $p > 0.05$).

Influence of Transactional Leadership on Teacher Effectiveness

Transactional leadership has a positive impact on teacher effectiveness. The results support H2, as transactional leadership significantly predicts teacher effectiveness ($\beta=0.582$, $p<0.001$). The dimension-wise analysis indicates:

i. Contingent Reward (CR) positively affects teacher effectiveness. Strongly supported ($\beta=0.376$, $p<0.001$), confirming that rewarding teachers for their performance enhances effectiveness.

ii. Management-by-exception (MBE) positively affects teacher effectiveness. Supported ($\beta=0.263$, $p<0.001$), indicating that corrective supervision contributes to instructional and assessment quality.

iii. Laissez-faire (LF) negatively affects teacher effectiveness. Partially supported, as LF positively influenced instructional planning and the learning environment but had no significant impact on assessment ($\beta=0.029$, $p>0.05$).

Comparison of Leadership Styles

Transactional leadership has a stronger effect than transformational leadership on teacher effectiveness. Transactional leadership ($\beta=0.582$) had a slightly stronger impact than transformational leadership ($\beta=0.487$). This suggests that in private university settings, structured, reward-based leadership approaches are more effective in improving teacher

performance compared to visionary or motivational leadership styles. This result is similar to Hadijah (2024) who suggested that transformational leadership enhances teachers' motivation and commitment, while transactional leadership promotes efficiency and adherence to structure.

Implications for Educational Management

These findings underscore the importance of integrating both leadership styles for optimal teacher effectiveness. University administrators should adopt a hybrid leadership model that leverages transformational leadership to motivate and intellectually engage teachers while using transactional leadership to reinforce structure and accountability.

Professional development programs should emphasize intellectual stimulation and contingent rewards, as they are the strongest predictors of teacher effectiveness. Institutional policies should be tailored to the needs of private university teachers, ensuring that leadership strategies align with the unique challenges faced in these institutions.

Conclusion

This study contributes to the existing literature by validating key leadership theories in the context of Chinese private universities. Future research should explore the moderating effects of institutional policies, faculty experience, and cultural factors to further refine leadership strategies for enhancing teacher effectiveness.

Ethics Approval and Consent to Participate

This study was conducted in full compliance with ethical guidelines for research involving human participants. Informed consent was obtained from all respondents, who were assured of their anonymity and the confidentiality of their responses. Participants were also informed that the study posed minimal risk and that they had the right to withdraw at any time without any consequences.

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Conflict of Interest

The authors reported no conflicts of interest for this work and declare that there is no potential conflict of interest concerning the research, authorship, or publication of this article.

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