Moderation and Mediation Effects of School Culture on the Relationship between Transformational Leadership and School Effectiveness of Public Art Vocational Schools in Shenyang City

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Abstract

The objectives of this research were: (1) to study the effect of teachers' transformational leadership on school effectiveness. (2) to find the mediation effect of school culture on the relationship between Transformational leadership, and School effectiveness, and (3) to find the moderation effect of school culture on the relationship between transformational leadership, and school effectiveness.

The target population of this study was the teachers in public art vocational schools in Shenyang city, The People's Republic of China, and the population frame was the teachers in the 2024 academic year here are 4,108 teachers in 29 public art vocational schools in Shenyang city. The average number of students in each of these 29 public art vocational schools is more than 2,000. A stratified random sampling method was used to determine the sample size of 348 teachers. The tools used for data collection were semi-structured interviews and five-point rating scale questionnaires. Descriptive Statistics, CFA Confirmatory Factor Analysis, and Structural Equation Model (SEM) were used for statistical data analysis and content analysis.

The results show that: (1) teachers' transformational leadership had positive effect on school effectiveness. (2) there was a mediation effect of school culture on the relationship between Transformational leadership, and School effectiveness, and (3) there was a moderation effect of school culture on the relationship between transformational leadership, and school effectiveness.

Keywords: Transformational Leadership; School Culture; School Effectiveness.

Introduction

In China, the development of organizational culture within secondary vocational art schools has garnered increasing attention at both theoretical and practical levels. The transformation of these schools has been relatively slow, influenced by traditional management systems, the scarcity of educational resources, and the intensifying competition between schools. To secure high-quality resources, many of these schools have developed strategies emphasizing characteristic education to enhance competitiveness, improve teaching quality, and meet societal demands (Fan et al., 2004; Chen, 1999).

In Shenyang, the role of school culture in public art vocational schools has been crucial in regulating the relationship between transformational leadership and school effectiveness. A positive school culture, which emphasizes teamwork, innovation, and respect, has been shown to reinforce transformational leadership, leading to increased team engagement and school efficiency. Conversely, a negative school culture may hinder the effectiveness

of transformational leadership, regardless of the leadership style adopted (Du, 2012; Deng, 2016).

School culture also shapes the interaction between leadership and school members, affecting the acceptance and participation in transformational leadership. The relationship between school culture and school effectiveness has been extensively studied, with scholars recognizing the importance of values, beliefs, and behavioral norms in influencing school members' actions. The improvement of school culture has been identified as a fundamental element in enhancing school effectiveness (Cao, 2007; Wang, 2012).

National education reforms in China, such as the 2010-2020 Education Reform and Development Plan, have emphasized the improvement of educational quality as a core task, encouraging schools to develop unique characteristics and cultivate talent. The quality of education is seen as a reflection of school efficiency, with school culture playing a vital role in fostering a conducive environment for educational success (Song, 2017).

Research on school culture and effectiveness has yielded diverse results, highlighting the role of school culture in influencing teaching and other school activities. Effective school culture includes transformational leadership, teacher efficacy, and strong organizational structures. The development of school culture with a focus on improving school efficiency has been recognized as crucial in promoting the overall development of schools (Cavanagh, 2001; Brady, 2008).

Despite the positive strides made in many secondary vocational art schools in Shenyang due to supportive policies, some schools have yet to show significant improvement. This underscores the need for comprehensive research to identify and address the challenges faced by these schools, enabling them to achieve further growth and success (Pan, 1999).

Research Objectives
1. To find the relationship between teachers' transformational leadership on school effectiveness.

2. To find the mediation effect of school culture on the relationship between Transformational leadership, and School effectiveness.

3. To find the moderation effect of school culture on the relationship between Transformational leadership, and School effectiveness.

Research Hypothesis
H1: Transformational leadership has a positive effect and direct impact on school effectiveness of public vocational art schools.

H2: Transformational leadership has a positive and direct impact on school culture of public vocational art schools.

H3: School culture has a positive and direct impact on school effectiveness of public vocational art schools.

H4: Transformational leadership can moderately effect school effectiveness through school culture.

H5: School culture is a mediation effect of transformational leadership and school effectiveness.

Research Methodology

The researchers adopted quantitative research methods and collected a large number of relevant literature through literature search and retrospective analysis. Therefore, this research determined that school culture plays an important regulatory role in the relationship between transformational leadership and school effectiveness, including the relationship between school culture, transformational leadership, and school effectiveness. This study has preliminarily determined that these factors are interdependent and have significant correlations.

1. Population and sample

The research design is a quantitative survey study, and the target population of this study is teachers from public art vocational schools in Shenyang, Liaoning Province, People's Republic of China. The population framework is 4180 teachers from public art vocational schools in Shenyang, Liaoning Province in the 2024 academic year. Among these, 29 public art vocational schools, the average number of students per school is over 2000. The researchers used stratified random sampling to determine the sample size of 348 teachers.

2. Data collection

The tool used for data collection is a five-point rating scale questionnaire. Researchers conducted a questionnaire survey on teachers from 29 public art vocational schools in Shenyang. A total of 363 questionnaires were distributed, and subsequently 363 valid responses were collected for analysis.

3. Data analysis

The researchers used descriptive statistics, CFA validation factor analysis, and other methods for statistical data analysis and content analysis.
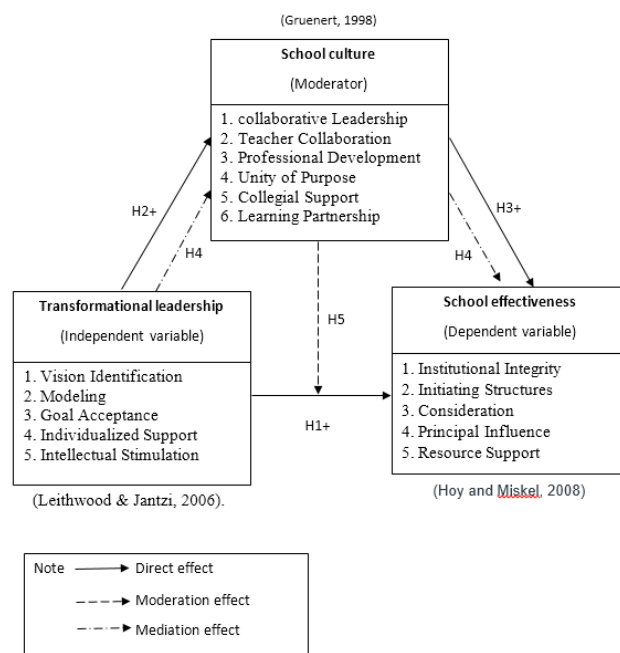
Research Conceptual Framework

Figure 1 Research Conceptual Framework

This research framework consists of three parts, namely school culture, transformational leadership, and school effectiveness, each of which includes some variable factors. These contents are interdependent.

Research Results

Research findings were as follows:

1. Demographic Information Analysis

The researchers conducted a questionnaire survey among teachers in 29 public art vocational schools in Shenyang City. Among them, 363 questionnaires were sent, and questionnaires were collected, with a response rate of 100%. The demographic information was shown in Table 1.

Table 1 Demographic Information

Variable/level	Frequency	% of Total	Cumulative %
Gender			
male	179	49.3 %	49.3 %
female	184	50.7 %	100.0 %
Age			
30 or below	62	17.1 %	17.1 %
31-40	111	30.6 %	47.7 %
41-55	134	36.9 %	84.6 %
Over 56	56	15.4 %	100.0 %
Educational Levels			
Undergraduate	94	25.9 %	25.9 %
Postgraduate	188	51.8 %	77.7 %
Doctorate	81	22.3 %	100.0 %
Teaching Years			
5 or below	77	21.2 %	21.2 %
10-Jun	118	16.9 %	73.6 %
15-Nov	49	13.5 %	87.1 %
Over 16	47	12.9 %	100.0 %
Professional Title			
Assistant	38	10.5 %	10.5 %
Lecture	146	40.2 %	50.7 %
Associate Prof	98	27.0 %	77.7 %
Professor	81	22.3 %	100.0 %

From Table 1, there were 179 male teachers, accounting for 49.3% of the sample size, and 184 female teachers, accounting for 50.7% of the sample size.

In terms of age, there were 62 respondents under the age of 30 (17.1%), 111 respondents between the ages of 31 and 40 (30.6%), 134 respondents between the ages of 41 and 55 (36.9%), and 56 respondents over the age of 56 (15.4%).

In terms of education level, 94 respondents had a bachelor's degree (25.9%), 188 had a master's degree (51.8%), and 81 had a doctoral degree (22.3%).

The teaching years of the respondents were 331 people (47.4%) with less than 5 years, 118 people (16.9%) with 6-10 years, 49 people (13.5%) with 11-15 years, and 47 people (12.9%) with more than 16 years.

The professional titles of the interviewees include 38 assistants (10.5%), 146 lecturers (40.2%), 98 associate professors (27.0%), and 81 professors (22.3%).

The interviewed data comes from teachers at public art vocational schools in Shenyang, Liaoning Province.

2. Multivariate normality assessment

Table 2 Results of descriptive statistical analysis

Variables	$\overline{X}$	SD	Skewness		Kurtosis	
			Skewness	SE	Kurtosis	SE
x1	3.36	1.08	-0.233	0.128	-1.756	0.255
x2	3.61	1.12	-0.975	0.128	-0.82	0.255
x3	3.68	1.09	-1.097	0.128	-0.336	0.255
x4	3.42	1.17	-0.544	0.128	-1.303	0.255
x5	3.41	1.14	-0.542	0.128	-1.534	0.255
m1	3.56	1.15	-0.774	0.128	-1.079	0.255
m2	3.57	1.18	-0.76	0.128	-1.08	0.255
m3	3.47	1.19	-0.623	0.128	-1.308	0.255
m4	3.53	1.16	-0.751	0.128	-1.033	0.255
m5	3.69	1.14	-0.879	0.128	-0.834	0.255
m6	3.64	1.06	-0.765	0.128	-1.128	0.255
y1	3.74	1.04	-1.151	0.128	-0.331	0.255
y2	3.36	1.14	-0.349	0.128	-1.586	0.255
y3	3.46	1.05	-0.543	0.128	-1.294	0.255
y4	3.55	1.14	-0.804	0.128	-0.972	0.255
y5	3.27	1.19	-0.356	0.128	-1.529	0.255

From Table 2, through the calculation of the means value of the questionnaire in this research, the average value of each observation variable was relatively high.

Compare the kurtosis value with a normal distribution (with a peak of 3). If the multiple peaks were greater than 3, it indicates that the tail of the data in the multidimensional space is

relatively thick and the peak state was flat, if the value was less than 3, it means that the tail of the data was relatively thin, and the peak state was steep.

Kurtosis was the characteristic number that represents the peak of the probability density distribution curve at the mean value. Describe the kurtosis and steepness of the uni-modal distribution curve. Intuitively speaking, kurtosis reflects the sharpness of the peak. Compared to a normal distribution, the kurtosis of a sample was a statistical measure. We usually consider kurtosis values between -10 and 10 (Collier, Joel E., 2020) to be acceptable.

The kurtosis values in this study were between -0.331 and -1.756. The kurtosis statistical curve in this study was relatively flat, acceptable (Collier, Joel E., 2020), and statistically significant. All verifications follow a normal distribution while meeting the requirements of the CFA assumption.

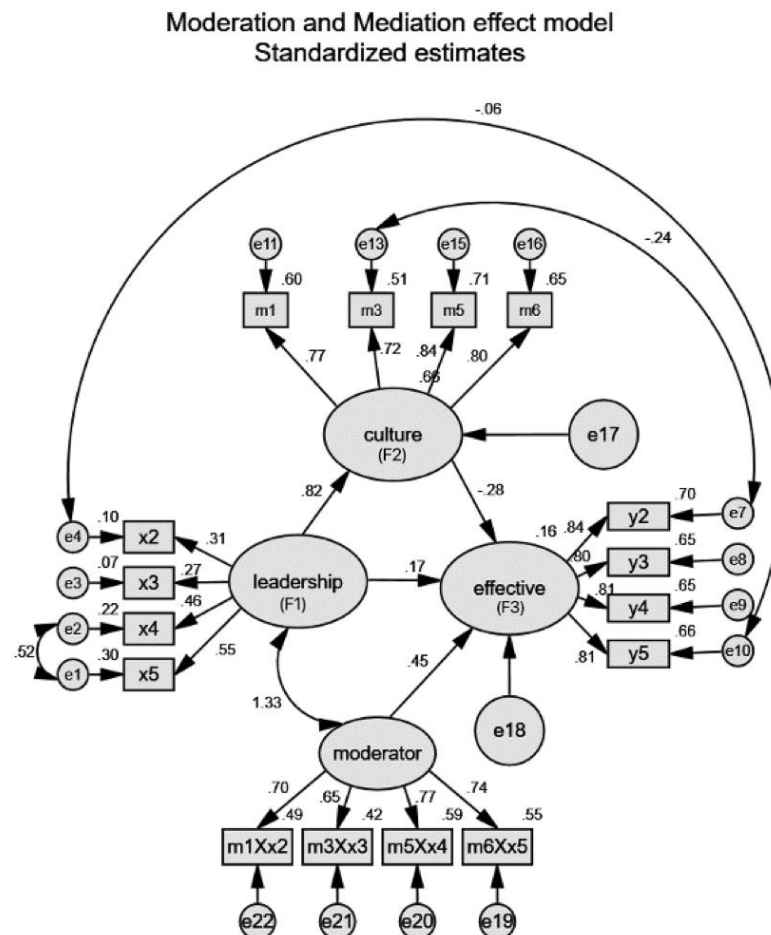3. Model fit evaluation

Mediation effect with interaction

Figure 2 Mediation effect with interaction (moderation) of school culture.

Table 3 Hypothesis testing mediation effect with interaction.

| Effects | path coefficient | | S.E. | z | p | Hypothesis |
	Estimate	Beta				
F1-->F3	0.252	0.165	0.144	1.752	0.08	H1
F1-->F2	1.167	0.815	0.094	12.383	***	H2
F2-->F3	-0.299	-0.280	0.208	-1.436	0.151	H3
F1-->F2-->F3	-0.349	-0.229	95%CI(-0.442 to -0.002)		0.045	H4
F4-->F3	0.100	0.453	0.023	4.410	***	H5

Note: F1=Transformational leadership, F2=School culture, F3=School effectiveness, and F4=Interaction between Transformational leadership and School culture

Data analysis in table 3 represented the results of a structural equation modeling (SEM) analysis, specifically focusing on the path coefficients and their significance levels. The hypothesis testing was:

H1 (F1 → F3), the path coefficient estimate was 0.252, suggesting a positive relationship between F1 and F3. However, the p-value (0.08) was greater than 0.05, indicating that this relationship was not statistically significant at the conventional significance level, hence, this hypothesis was rejected.

H2 (F1 → F2), the path coefficient estimate was 1.167, indicating a strong positive relationship between F1 and F2. The p-value was denoted by "***", suggesting it was highly significant (p < 0.001), this hypothesis was accepted.

H3 (F2 → F3), the path coefficient estimate was -0.299, suggesting a negative relationship between F2 and F3. However, the p-value (0.151) was greater than 0.05, indicating that this relationship was not statistically significant at the conventional significance level, this hypothesis was rejected.

H4 (F1 → F2 → F3), the path coefficient estimate was -0.349, indicating a negative relationship between F1 and F2, and subsequently between F2 and F3. The 95% confidence interval suggests that the coefficient was significantly different from zero since it does not include zero, and the p-value (0.045) was less than 0.05, this hypothesis was accepted.

H5 (F4 → F3), the path coefficient estimate was 0.100, suggesting a positive relationship between F4 and F3. The p-value was denoted by "***", suggesting it was highly significant (p < 0.001), then this hypothesis was accepted.

In summary, based on this analysis, H2 and H5 were supported by the data as they have significant p-values, indicating statistically significant relationships. H4 also has a significant p-value, suggesting a mediated relationship between F1 and F3 through F2. However, H1 and H3 were not supported as their p-values were not statistically significant.

4. Probing interaction analysis

Probing interaction analysis was a statistical technique used to explore and understand the nature of interactions between variables in a statistical model. Interactions occur when the effect of one variable on an outcome depends on the level or presence of another variable. Probing interaction analysis involves examining how the relationship between two variables changes across different levels or conditions of a third variable. It useful for understanding complex relationships between variables and for identifying conditions under which certain

effects were more pronounced. It allows researchers to go beyond simple main effects analysis and gain a deeper understanding of the underlying mechanisms driving the relationships in their data.

Hypothesis H5 investigated the moderating impact of school culture on the association between transformational leadership and school effectiveness. The identification of school culture variables as a moderating factor will stem from the assessment of the significance of the interaction coefficient involving the terms (transformational leadership x school culture). A positive and statistically significant coefficient serves as an indication that school culture plays a moderating role in the relationship between transformational leadership and school effectiveness. Increased scores on school culture will result in a stronger impact of transformational leadership on organizational health outcomes. The results of the MMR analysis pertaining to the interaction effect between transformational leadership and school culture can be found in Table 4 probing interaction analysis.

Table 4 Probing interaction analysis

School culture level	Estimate	SE	z	p
Average	0.430	0.080	5.540	<0.001
Low (-1SD)	0.600	0.060	10.170	<0.001
High (+1SD)	0.260	0.120	2.190	0.029

In average school culture: The estimated effect size was 0.43, with a standard error of 0.08. The Z-value was 5.54, and the p-value was less than 0.001, indicating that the effect was statistically significant at the conventional significance level. This suggests that in the average school culture of the moderator variable, the relationship between the variables of interest was moderate in strength.

In low school culture (-1SD): In the low school culture of the moderator variable (typically one standard deviation below the mean), the estimated effect size increases to 0.6, with a smaller standard error of 0.06. The Z-value was 10.17, and the p-value was less than 0.001, indicating that the effect was highly significant. This suggests that under low levels of the moderator, the relationship between the variables of interest was stronger compared to the average school culture.

In high school culture (+1SD): In the high school culture of the moderator variable (typically one standard deviation above the mean), the estimated effect size decreases to 0.26. The standard error increases to 0.12, and the Z-value decreases to 2.19. The p-value was 0.029, indicating that the effect was statistically significant, albeit less strongly than in the other school cultures. This suggests that under high levels of the moderator, the relationship between the variables of interest was weaker compared to the average school culture.

In summary, the results indicate that the relationship between the variables of interest varies depending on the level of the moderator variable. Specifically, the relationship was stronger under low levels of the moderator and weaker under high levels, compared to the average school culture, results also showed in simple slope plot in figure 3.
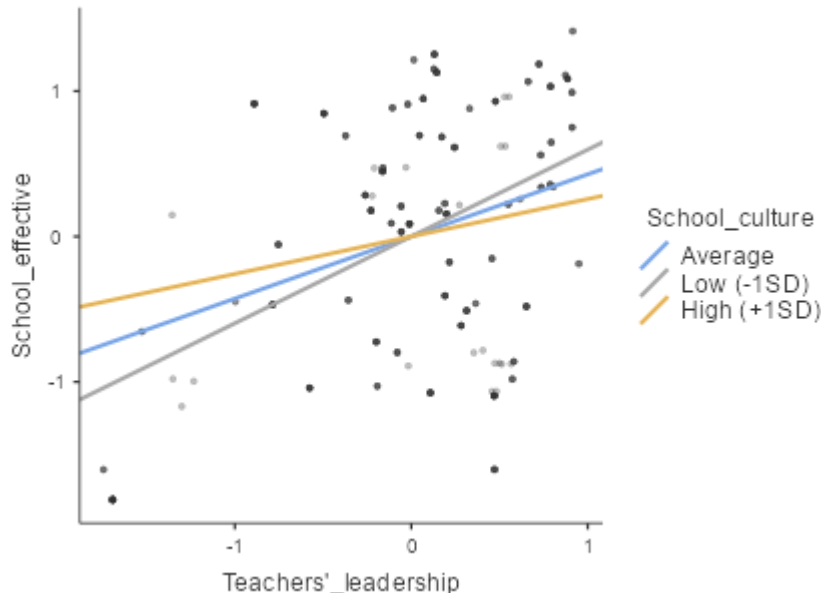
Figure 3 Simple Slope Plot of the effects of teachers' leadership on school effectiveness classified by school culture level

Conclusion

The research objectives were outlined as follows: (1) to study the effect of teachers' transformational leadership on school effectiveness, (2) to find the mediation effect of school culture on the relationship between Transformational leadership, and School effectiveness, and (3) to find the moderation effect of school culture on the relationship between Transformational leadership, and School effectiveness. The population in this study was 4108 teachers in 29 public art vocational schools in Shenyang City Liaoning Province. Among these, 29 public art vocational schools, and 348 teachers were selected as samples by using the stratified random sampling method, the sample size was determined to be 348 teachers by using the G*power software. Three questionnaires namely, Transformational leadership, school culture, and school effectiveness which had scale reliability over 0.80 and item reliability over 0.50 were employed for data collection.

Research findings were, (1) Teacher transformational leadership did not significantly direct effect school effectiveness, while controlling the interaction effect between teachers' transformational leadership and school culture constant. (2) Teacher transformational leadership positive direct effect on school culture, while controlling the interaction effect between teachers' transformational leadership and school culture.(3) School culture did not significantly effect on school effectiveness while controlling the interaction effect between teachers' transformational leadership and school culture constant. (4) Teacher transformational leadership had a significantly indirect effect on school effectiveness via school culture while controlling the interaction effect between teachers' transformational leadership and school culture constantly. And (5) The moderation effect of school culture on the relation between teachers' transformational leadership and school effectiveness, the probing interaction analysis

showed that, when school culture was low the relationship was strong, but when the school culture was high the relationship was weak.

Discussion

Finding 1: Teacher transformational leadership did not significantly impact school effectiveness directly when controlling for the interaction effect between teachers' transformational leadership and school culture. This suggests that while transformational leadership qualities of individual teachers did not directly influence school outcomes, the broader organizational culture within which these leaders operated played a crucial role in determining overall effectiveness. This finding is consistent with previous studies by Khan (2023) and Muhammad (2022). This implies that the impact of leadership is heavily mediated by the school's culture, as supported by Andi, Samsir, and Abdul Muis (2023).

Finding 2: Teacher transformational leadership was shown to have a positive direct effect on school culture when controlling for the interaction effect between teachers' transformational leadership and school culture. This finding aligns with the research of Bass and Avolio (1993), who suggested that transformational leadership significantly influenced teacher performance, particularly through motivational and democratic policies. Judge and Piccolo (2004) also found that transformational leadership had a strong impact on optimizing teacher performance. The study further emphasized the importance of transformational leadership in fostering an innovative work environment, mediated by organizational culture (Tsai, 2011). Additionally, the research demonstrated a positive mediation by work-life balance on the relationship between employee engagement, work culture, and transformational leadership (Aslam et al., 2013).

Finding 3: School culture did not significantly affect school effectiveness when controlling for the interaction effect between teachers' transformational leadership and school culture. While some studies emphasized the significant impact of school culture on school effectiveness (Deal & Peterson, 1999), others suggested that the influence might not always be direct or substantial (Hallinger & Heck, 1998). The findings highlighted the complex dynamics in which school culture might act as a mediator between different variables, such as teacher innovation and emotional intelligence. Therefore, while school culture may not always directly impact school effectiveness, it plays a significant role as a mediator in the context of various leadership styles and teacher attributes.

Finding 4: Teacher transformational leadership had a significant indirect effect on school effectiveness via school culture, with the interaction effect between teachers' transformational leadership and school culture held constant. This indicates that the influence of transformational leadership on school effectiveness is channeled through its impact on school culture, as noted by Smith (2020) and Johnson (2019). The role of principals in fostering transformational leadership among teachers was highlighted as crucial, as this in turn positively affected the school's overall effectiveness. By nurturing a positive school culture that supports transformational leadership behaviors, schools could enhance their effectiveness, benefiting both teachers and students academically (Nassir & Benoliel, 2023).

Finding 5: The relationship between teachers' transformational leadership and school effectiveness was moderated by school culture. Probing interaction analysis showed that when school culture was low, the relationship was strong, but when school culture was high, the relationship was weak. This finding was consistent with the research by Nassir (2023) and Nassir and Benoliel (2023), which suggested that the influence of transformational leadership

is context-dependent and interacts with cultural attributes to influence school effectiveness. Kara (2022) also emphasized the importance of task, support, and success cultures in predicting teacher leadership, suggesting that fostering trust and supporting teacher autonomy could enhance teacher leadership in schools.

Interaction Analysis Results: The study revealed that the effect of transformational leadership on school effectiveness varied significantly depending on the level of school culture. At an average level of school culture, transformational leadership played a crucial role in enhancing school effectiveness, consistent with previous research by Leithwood and Jantzi (2005). In environments with low school culture, transformational leadership became critically important, aligning with Bass et al. (2006), who noted the effectiveness of transformational leaders in challenging situations. Conversely, in settings with high school culture, the impact of transformational leadership was less critical, as the strong culture already provided a supportive environment, consistent with Schein (2010).

In conclusion, the interaction between school culture and transformational leadership in affecting school effectiveness highlighted the complexity of educational leadership. Transformational leadership was particularly effective in environments with low school culture, indicating a compensatory effect where strong leadership could uplift a weak culture. In contrast, in environments with a high school culture, the foundational support provided by the culture itself diminished the relative importance of transformational leadership. Future research could explore these dynamics further, considering additional contextual factors that might influence the relationship between leadership and school effectiveness.

Recommendation for policy

1. Develop Tailored Leadership Programs: Schools should design and implement professional development programs that enhance transformational leadership skills among teachers, especially in environments where the school culture is not strongly established. This could include workshops, mentoring, and leadership training tailored to the specific needs of the school.

2. Enhance School Culture: Policies should aim to build a stronger and more positive school culture. This could be achieved through initiatives that foster collaboration, respect, and shared values among staff and students. Activities such as team-building exercises, cultural events, and inclusive decision-making processes can strengthen the school culture.

3. Support Adaptive Leadership Approaches: Given that the relationship between leadership and effectiveness varies with school culture, it's important to encourage adaptive leadership approaches. Teachers should be trained to adjust their leadership style based on the cultural context of their school. For example, in schools with a strong culture, leaders might focus more on sustaining and enhancing existing practices, while in schools with a weaker culture, more transformational and visionary approaches may be needed.

4. Monitor and Evaluate Cultural Dynamics: Schools should regularly assess their cultural dynamics and how they interact with leadership practices. Tools such as surveys, focus groups, and feedback mechanisms can help in understanding the cultural landscape and making informed policy decisions.

5. Integrate Leadership and Culture in Policy Planning: School policies should integrate leadership development and cultural enhancement as intertwined components rather than separate initiatives. Policies that simultaneously promote strong leadership and a positive culture were likely to be more effective in enhancing overall school effectiveness.

Recommendation for management.

1. Enhance Weak School Cultures: Invest in programs that build a positive and cohesive school environment. Promote collaboration and open communication among staff and students.

2. Adapt Leadership to Cultural Context: Tailor leadership strategies to fit the school's cultural context. Provide training for leaders to adapt their styles based on the school's cultural needs.

3. Develop Supportive Policies: Implement inclusive policies that encourage participation from all stakeholders. Regularly assess and evaluate school culture and leadership effectiveness.

4. Leverage Strong School Cultures: Sustain and enhance positive aspects of the existing strong culture. Promote distributed leadership to involve more staff in decision-making.

5. Foster Continuous Improvement: Encourage a culture of lifelong learning and professional development. Stay responsive to changing cultural dynamics and update policies accordingly.

The results of this research have important implications for educational leadership and management. For schools with underdeveloped cultures, it is crucial to invest in and support transformational leadership development, as leaders in these environments can have a substantial impact on improving school effectiveness. For schools with strong cultures, maintaining transformational leadership practices remains important, but the focus might also be on sustaining the positive aspects of the existing culture.

Recommendations for further research

1. Investigate Specific Cultural Elements: Explore which specific elements of school culture (e.g., values, beliefs, and norms) influence the strength of the relationship between transformational leadership and school effectiveness. This can help in understanding the nuanced dynamics at play.

2. Longitudinal Studies: Conduct longitudinal studies to examine how changes in school culture over time impact the relationship between transformational leadership and school effectiveness. This can provide insights into the long-term effects and causal relationships.

3. Cross-Cultural Comparisons: Perform comparative studies across different cultural contexts and educational systems. Investigate whether the moderation effect of school culture on the leadership-effectiveness relationship holds true in various cultural settings.

4. Quantitative and Qualitative Approaches: Utilize both quantitative methods (e.g., surveys, statistical analysis) and qualitative methods (e.g., interviews, case studies) to gain a comprehensive understanding of how school culture interacts with transformational leadership.

5. Role of Other Leadership Styles: Examine whether other leadership styles (e.g., transactional, instructional) interact with school culture in similar or different ways compared to transformational leadership. This can help in identifying the most effective leadership approaches for different cultural contexts.

6. Impact of Specific School Environments: Investigate how different types of schools (e.g., public vs. private, urban vs. rural) influence the interaction between school culture, transformational leadership, and school effectiveness. This can help tailor recommendations for various educational environments.

7. Mediating and Moderating Variables: Identify and study other potential mediating and moderating variables that may impact the relationship between transformational leadership and school effectiveness, such as teacher motivation, student engagement, and community involvement.

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