

A Theoretical Study on the Network Structure of Transformational Leadership and Teacher Job Satisfaction Based on the Four Paths Framework

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Abstract

This study investigates the impact of transformational leadership on teacher job satisfaction using the Four Paths Framework, which consists of the Rational, Emotional, Organizational, and Family Paths. Teacher job satisfaction is recognized as a key factor influencing school performance, teacher retention, and student outcomes, making it a critical area of study in educational leadership. The research aims to provide a comprehensive theoretical model that captures the multidimensional effects of transformational leadership on job satisfaction.

Aims: The primary objective of this study is to explore how transformational leadership behaviors impact teacher job satisfaction through different pathways. Specifically, it examines the distinct influences of transformational leadership on teaching quality, emotional support, organizational commitment, and family and community engagement. The study targets educational institutions as its population, with a sample drawn from journal articles indexed in the Social Science Citation Index (SSCI) in the Web of Science database.

Methodology: A systematic literature review was conducted using journal articles published between 2014 and 2024, retrieved with the keywords "transformational leadership," "job satisfaction," and "teacher." A total of 111 relevant studies were identified. Social network analysis (SNA) was employed to analyze the relationships between high-frequency keywords related to transformational leadership and teacher job satisfaction. VOSviewer and Python software were used to identify key nodes and connections in the network, offering a visual representation of the findings.

Results: The network analysis of high-frequency keywords revealed that transformational leadership significantly enhances teacher job satisfaction through various pathways. The Rational Path improves teaching quality and professional accomplishment. The Emotional Path strengthens teachers' self-efficacy and emotional well-being. The Organizational Path increases teachers' organizational commitment and sense of belonging, while the Family Path facilitates support from family and community resources. These findings emphasize the multidimensional nature of leadership and its direct and indirect effects on job satisfaction.

Conclusion: The study provides a new theoretical perspective on educational leadership, offering empirical evidence that transformational leadership can effectively enhance teacher job satisfaction by addressing both professional and personal needs. The research highlights the importance of leadership in shaping positive organizational cultures and

recommends that educational management practices focus on strengthening leadership behaviors across all four pathways. Further research should explore the mediating effects of key factors within these pathways to provide a deeper understanding of the mechanisms at play.

Keywords: Transformational Leadership; Teacher Job Satisfaction; Social Network Analysis; Four Paths Framework

Introduction

In the field of educational management research, transformational leadership has gradually become a focal point due to its significant effect on enhancing teacher job satisfaction. The core idea of transformational leadership lies in the leader's ability to inspire followers' intrinsic motivation and developmental potential, thereby achieving mutual growth for both individuals and the organization (Bass & Riggio, 2005). Specifically, transformational leadership influences teacher job satisfaction through four key behaviors: inspirational motivation, individualized consideration, intellectual stimulation, and idealized influence. These behaviors effectively enhance teachers' emotional commitment, self-efficacy, and professional identity, thereby improving their job satisfaction (Eliophotou Menon, 2014).

Teacher job satisfaction, as a measure of educational quality and school effectiveness, directly impacts teachers' performance, students' outcomes, teacher loyalty, and organizational health (Klassen & Chiu, 2011). Satisfied teachers exhibit higher professional engagement and innovation, fostering positive learning environments (Skaalvik & Skaalvik, 2017). Improving job satisfaction reduces turnover rates and associated recruitment and training costs (Tschannen-Moran & Hoy, 2001). Research focuses on direct associations between leadership behaviors and satisfaction but lacks exploration of how these behaviors indirectly affect satisfaction through organizational networks (Eyal & Roth, 2011). Social Network Analysis (SNA) reveals how leadership behaviors influence job satisfaction (Moolenaar, 2012).

To further explore this complex relationship, the Four Paths Framework proposed by Leithwood and colleagues (Rational, Emotional, Organizational, and Family Paths) provides a systematic theoretical perspective for understanding how transformational leadership exerts multidimensional influences on teacher job satisfaction through different pathways (Leithwood et al., 2020). This framework encompasses leadership behaviors at the rational level (e.g., teaching quality), emotional level (e.g., teacher emotional commitment), and organizational level (e.g., resource allocation), while also considering the role of family and community. For instance, the rational path primarily focuses on enhancing teachers' sense of professional accomplishment through improved teaching content and strategies; the emotional path emphasizes boosting teacher emotional satisfaction through emotional support and care; the organizational path explores how improving school culture and climate can strengthen teachers' sense of belonging; and the family path investigates the indirect impact of family and community involvement on teacher job satisfaction.

Research Objectives

The primary objective of this study is to construct a comprehensive theoretical model that reveals the complex mechanisms through which transformational leadership behaviors influence teacher job satisfaction via multiple pathways. The specific objectives are as follows:

1. To analyze how specific behaviors of transformational leadership in the Rational, Emotional, Organizational, and Family pathways impact teacher job satisfaction. By conducting a literature review and network analysis, this study examines how transformational leadership affects teachers' teaching quality, self-efficacy, organizational commitment, and family support within the Four Paths Framework.

2. To identify key nodes and connections through social network analysis and reveal the structural relationship between transformational leadership and teacher job satisfaction. Utilizing social network analysis and high-frequency keyword analysis, this study identifies the key factors and connections that influence teacher job satisfaction and visualizes the network structure using data analysis tools.

3. To provide theoretical and practical guidance for educational management and future research. The findings of this study will offer empirical support for educational administrators seeking to improve teacher job satisfaction, especially through optimizing leadership behaviors that enhance teachers' professional accomplishment, emotional well-being, and organizational identification. Additionally, it will provide theoretical guidance for future research in this area.

Literature Review

In recent years, transformational leadership has become a significant focus in educational leadership research, particularly in exploring ways to enhance teacher job satisfaction. Numerous studies show that transformational leadership, by encouraging innovation, motivating teachers, and shaping a shared vision, can significantly improve job satisfaction (Eyal & Roth, 2011). Specifically, it influences teachers' attitudes and well-being by promoting professional development, enhancing self-efficacy, and improving the school's organizational climate (Skaalvik & Skaalvik, 2017). However, research often focuses on single dimensions, missing the interactions among multiple pathways. To address this gap, this study applies Leithwood et al.'s Four Paths Framework to explore transformational leadership's impact on teacher job satisfaction through Rational, Emotional, Organizational, and Family Paths (Leithwood et al., 2017).

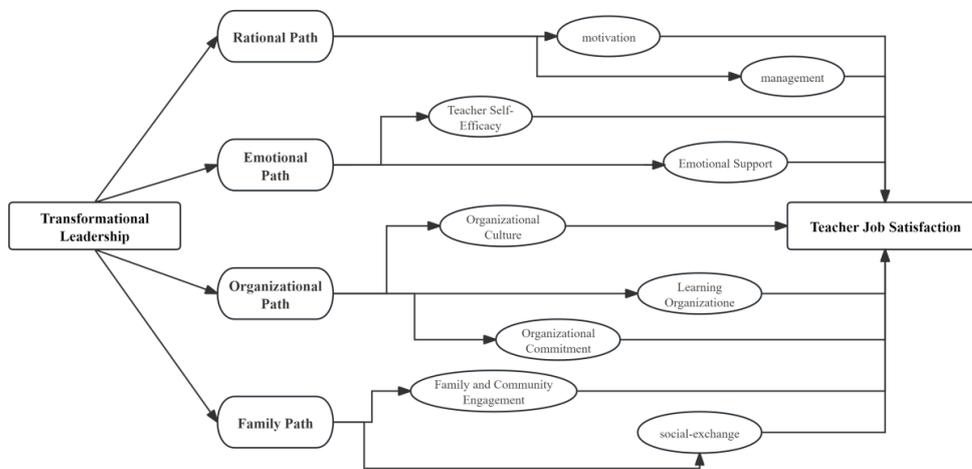


Figure 1 The Four-Path Framework for the Impact of Transformational Leadership on Teacher Job Satisfaction

Based on the Four Paths Framework, this paper further explores how transformational leadership influences teacher job satisfaction through different pathways. The Rational Path illustrates how leaders enhance teaching quality, thereby increasing teachers' sense of professional accomplishment. The Emotional Path explains how individualized consideration and emotional support directly boost teacher job satisfaction. The Organizational Path reveals the mechanisms by which transformational leadership shapes a positive organizational culture, fostering collaboration and trust among teachers, which in turn enhances job satisfaction. The Family Path reveals that external social support, such as the involvement of families and communities, also has a potentially significant impact on teacher job satisfaction. This comprehensive framework not only deepens our understanding of the mechanisms through which transformational leadership exerts its influence but also provides more strategic recommendations for educational practice, helping to effectively improve teachers' professional well-being and job satisfaction.

Research Methodology

1. Population and sample

The population of this study consists of academic literature related to transformational leadership and teacher job satisfaction. The sample is drawn from the Social Science Citation Index (SSCI) in the Web of Science database, covering relevant articles published between 2014 and 2024, ensuring the timeliness and representativeness of the sample.

2. Data Source and Search Scope

The present study retrieves data using the keywords TS="transformational leadership" AND TS="Job Satisfaction" AND TS=teacher, with the search parameters limited to articles published in English. These settings help ensure the relevance and accuracy of the research content.

To capture the major research trend over the past decade, the study limited the search period to January 1, 2014, to August 16, 2024. A total of 111 articles were retrieved, providing a solid data foundation for analyzing the application of transformational leadership in education and its impact on teacher job satisfaction.

3. Research Tools

VOSviewer is a specialized tool for constructing and visualizing scientific knowledge maps, widely used in bibliometrics and scientometrics with high scientific validity. It accurately identifies high-frequency keywords in literature through co-occurrence analysis, revealing relationships between research topics and helping researchers discover potential hotspots and trends. Additionally, VOSviewer provides intuitive visual maps that enhance the depth of understanding and presentability of research findings (van Eck & Waltman, 2014).

Python, a versatile programming language used in data analysis and scientific computing, is effective in social network analysis. Its powerful libraries, such as NetworkX, Pandas, and Matplotlib, handle large-scale datasets and enable in-depth network structure analysis. Python's flexibility allows researchers to customize analytical processes, extracting key information and generating clear visual results. By combining VOSviewer and Python, this study systematically analyzes the relationship between transformational leadership and teacher job satisfaction, ensuring rigorous methods and reliable results (McKinney, 2010).

4. Research Procedure

This study initially used VOSviewer software to identify 560 keywords, with a minimum occurrence threshold of six, resulting in 43 keywords for analysis. To ensure accuracy, keywords with different expressions but identical meanings (e.g., "job satisfaction" and "job-satisfaction," "teacher" and "teachers") were merged, leaving 41 high-frequency keywords for further analysis. Python software was then used to conduct a social network analysis of these keywords, revealing the relational network and structural characteristics among them, providing data support and a theoretical basis for further understanding the relationship between transformational leadership and teacher job satisfaction.

5. Conceptual Framework

This study applies Leithwood et al.'s Four Paths Framework (Rational, Emotional, Organizational, and Family Paths) to explore the multidimensional influence of transformational leadership on teacher job satisfaction. This framework has been extensively discussed in the literature review and will guide the analysis throughout the research process.

Research Results

High-Frequency Keywords.1

To minimize the interference of low-frequency keywords on the analysis results and ensure the representativeness and effectiveness of the high-frequency keywords, this study set a minimum occurrence threshold of six times for keywords. To more intuitively demonstrate the rationale behind this threshold setting, a cumulative frequency curve of keyword occurrences was plotted, as shown in Figure 2.

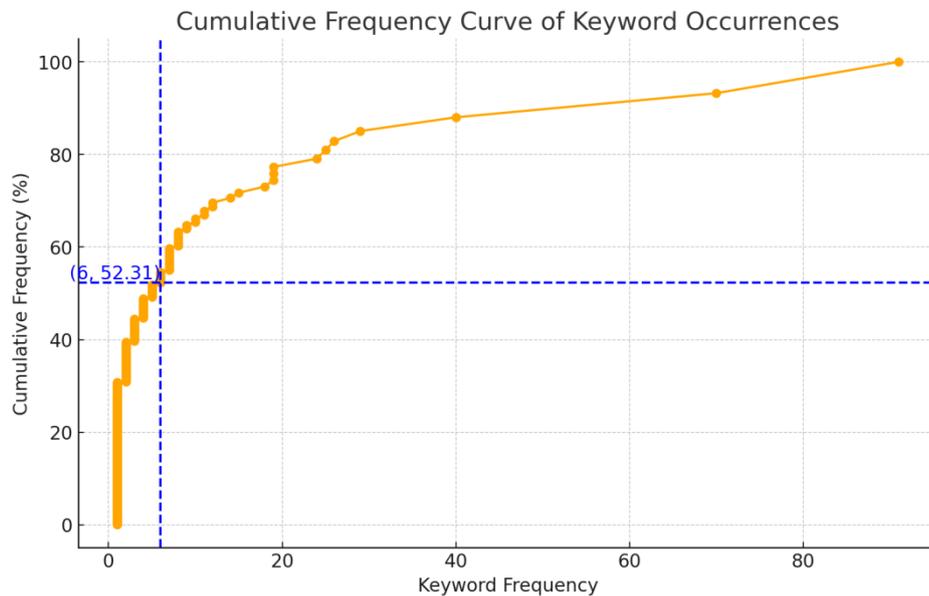


Figure 2 Cumulative Frequency Curve of Keyword Occurrences

As shown in Figure 2, among the 560 extracted keywords, the cumulative frequency gradually increases with the number of keyword occurrences. When the occurrence count reaches six, the cumulative frequency accounts for 52.31%. This indicates that although only 41 keywords were selected, their occurrence frequency represents 52.31% of the total occurrences of all keywords. From the analysis in Table 2, which contains the frequency data of the high-frequency keywords, it is evident that setting the threshold at six occurrences effectively captures the main concepts and trends in the research field, ensuring that the selected keywords are highly representative.

2. Network Centrality

Focusing on the relationship between transformational leadership and teacher job satisfaction, this study employs Social Network Analysis (SNA) to explore the structural relationships among relevant keywords from the perspectives of Network Theory and Graph Theory. Within this framework, SNA is used to analyze the network of keywords related to transformational leadership and teacher job satisfaction, uncovering their associations and interaction patterns within the research field. Centrality, a key metric, is utilized to assess the importance of each keyword in the network, thereby identifying the core concepts and factors in the research on transformational leadership and teacher job satisfaction.

The centrality calculation formulas used in this study are primarily derived from Freeman's 1978 seminal work "Centrality in Social Networks: Conceptual Clarification," published in the journal *Social Networks* (Freeman, 1978). The specific formulas are presented in Table 1.

Table 1 Centrality Calculation Formulas for High-Frequency Keywords

Centrality	Formula	Concept and Explanation
Degree Centrality	$C_D(v) = \frac{\text{deg}(v)}{n - 1}$	Indicates the number of direct connections a node (i.e., keyword) has with other nodes. Here, $C_D(v)$ represents the degree centrality of node v , $\text{deg}(v)$ is the number of edges directly connected to node v , and n is the total number of nodes in the network.
Closeness Centrality	$C_C(v) = \frac{n - 1}{\sum_{u \neq v} d(u, v)}$	Measures how close a node is to all other nodes in the network. Here, $C_C(v)$ represents the closeness centrality of node v , $\text{deg}(v)$ is the number of edges directly connected to node v , and n is the total number of nodes in the network.
Betweenness Centrality	$C_B(v) = \sum_{s \neq v \neq t} \frac{\sigma_{st}(v)}{\sigma_{st}}$	Assesses the role of a node as a bridge or intermediary in the network. Here, $C_B(v)$ represents the betweenness centrality of node v , σ_{st} is the total number of shortest paths between nodes s and t , and $\sigma_{st}(v)$ is the number of these shortest paths that pass through node v .

Based on the centrality calculation formulas proposed by Freeman (1978), this study calculated the centrality metrics for the high-frequency keywords and summarized the results in Table 2, which presents key indicators such as degree centrality, closeness centrality, and betweenness centrality for the high-frequency keywords related to transformational leadership and teacher job satisfaction. To provide a more intuitive representation of the relational structure among these keywords, a social network diagram was generated using Python software, as shown in Figure 3. This diagram illustrates the network structure of high-frequency keywords between transformational leadership and teacher job satisfaction.

Table 2 Centrality Values of High-Frequency Keywords

No.	Keyword	Frequency	DC	CC	BC	No.	Keyword	Frequency	DC	CC	BC
	job satisfaction	94	0.43	0.43	0.09	22	achievement	8	0.20	0.28	0.00
	transformational leadership	91	0.35	0.35	.06	3	self-determination theory	8	0.20	0.28	0.00
	performance	40	0.23	0.26	.00	4	burnout	8	0.20	0.28	0.00
	impact	29	0.23	0.29	.00	5	social-exchange	8	0.20	0.28	0.00
	commitment	26	0.23	0.29	.00	6	outcomes	8	0.20	0.28	0.00
	teachers	26	0.23	0.26	.00	7	principals	7	0.20	0.28	0.00
	organizational commitment	25	0.23	0.26	.00	8	schools	7	0.20	0.28	0.00
	transactional leadership	19	0.23	0.26	.00	9	citizenship behavior	7	0.18	0.18	0.00
	school leadership	19	0.23	0.29	.00	0	work engagement	7	0.18	0.18	0.00
0	mediating role	18	0.23	0.26	.00	1	behavior	7	0.18	0.18	0.00
1	principal leadership	15	0.23	0.29	.00	2	management	7	0.18	0.18	0.00
2	work	14	0.23	0.29	.00	3	principal	7	0.18	0.18	0.00
3	trust	12	0.23	0.29	.00	4	behaviors	7	0.18	0.18	0.00
4	instructional leadership	12	0.23	0.26	.00	5	model	6	0.18	0.18	0.00
5	organizational citizenship behavior	11	0.23	0.29	.00	6	attitudes	6	0.18	0.18	0.00
6	perceptions	11	0.23	0.29	.00	7	charismatic leadership	6	0.13	0.21	0.00
7	moderating role	10	0.23	0.26	.00	8	member exchange	6	0.13	0.21	0.00

In the Rational Pathway, "motivation" and "management" exhibit high centrality. "Motivation" has a degree centrality of 0.13 and a closeness centrality of 0.21, showing its influence on other nodes and its role in enhancing teaching strategies. "Management" has a degree centrality of 0.18 and closeness centrality of 0.18, highlighting its importance in improving teaching processes. "Teacher" has a degree centrality of 0.23 and a closeness centrality of 0.26, indicating their central role in implementing teaching content.

With regard to the Emotional Pathway, "self-efficacy" has a closeness centrality of 0.28, emphasizing its importance in teachers' confidence and emotional satisfaction. "Job satisfaction," with a degree and closeness centrality of 0.43, reflects the impact of leaders' emotional support.

In the Organizational Pathway, "organizational commitment" and "organizational citizenship behavior" are crucial. "Organizational commitment," with a degree centrality of 0.23 and a closeness centrality of 0.26, reflects teachers' loyalty. "Organizational citizenship behavior," with a degree centrality of 0.23 and a closeness centrality of 0.29, indicates positive contributions beyond formal duties, enhancing organizational culture and satisfaction.

Within the Family Pathway, "community involvement" and "social-exchange" theory explain the influence of teacher-family interactions on job satisfaction. Though "social-exchange" has a closeness centrality of 0.28, it serves as a bridge connecting different pathways.

Discussion

1. Rational Pathway and Teaching Improvement

From a social network perspective, transformational leadership plays a crucial role in improving teaching content and strategies through the rational pathway. This leadership style enhances teachers' professional skills and significantly improves teaching quality, thereby indirectly increasing teacher job satisfaction. Specifically, transformational leadership promotes the enhancement of teacher motivation through rational decision-making and management, enabling teachers to focus more effectively on achieving teaching goals. Key factors in this pathway, such as motivation and management, are closely related to transformational leadership within the network, demonstrating how leaders drive teachers' professional development through scientific analysis and effective strategies. Additionally, transformational leadership strengthens teachers' sense of professional accomplishment and satisfaction by optimizing the use of teaching resources and improving teaching methods (Leithwood & Jantzi, 2006).

2. Emotional Pathway and Emotional Support In the emotional pathway, transformational leadership enhances teachers' self-efficacy and satisfaction by addressing their emotional needs. This support alleviates work stress, improves emotional stability, and boosts job satisfaction. Research shows that emotionally supported teachers exhibit higher engagement and loyalty, profoundly impacting education quality. Social network analysis highlights the mediating role of emotional support, making it a critical avenue for enhancing teacher well-being. Additionally, transformational leadership fosters a supportive environment, promoting emotional connections and teamwork among teachers, further boosting their well-being and sense of professional accomplishment (Bass & Riggio, 2005).

3. Organizational Pathway and Teacher Belongingness

Transformational leadership, through the organizational pathway, enhances teachers' commitment and citizenship behavior, increasing their sense of belonging and job satisfaction. Leaders shape a positive organizational culture that fosters responsibility and teamwork. Research indicates that transformational leadership stimulates intrinsic motivation and teamwork by establishing a supportive culture (Avolio et al., 2004). Strengthening teachers' identification with the school effectively increases job satisfaction. This pathway highlights the crucial role of leaders in creating a supportive environment and motivating teachers to participate in school affairs, thereby enhancing overall school performance and teacher job satisfaction.

4. Family Pathway and Community Interaction

In the emotional pathway, transformational leadership enhances teachers' self-efficacy and satisfaction by addressing their emotional needs. This support alleviates work stress, improves emotional stability, and boosts job satisfaction. Research shows that emotionally supported teachers exhibit higher engagement and loyalty, profoundly impacting education quality. Social network analysis highlights the mediating role of emotional support, making it a critical avenue for enhancing teacher well-being. Additionally, transformational leadership fosters a supportive environment, promoting emotional connections and teamwork among teachers, further boosting their well-being and sense of professional accomplishment (Bass & Riggio, 2005).

Conclusion

This study, based on the Four Paths Framework (Rational, Emotional, Organizational, and Family Paths), systematically explored the multidimensional impact of transformational leadership on teacher job satisfaction. The findings clearly demonstrate that transformational leadership significantly enhances teacher job satisfaction through different pathways. In the Rational Path, leadership promotes teachers' professional development by improving teaching quality and a sense of professional accomplishment. In the Emotional Path, emotional support helps to boost teachers' self-efficacy and emotional fulfillment. In the Organizational Path, transformational leadership strengthens teachers' organizational commitment and sense of belonging by fostering a positive organizational culture. In the Family Path, family and community support effectively alleviates teachers' work stress and enhances emotional stability.

The key contribution of this study lies in revealing the multidimensional mechanisms through which transformational leadership influences teacher job satisfaction across various pathways, thereby extending existing leadership theories in the field of education. This research provides strong theoretical support for educational management practices, showing that leadership behaviors across multiple pathways can more effectively improve teachers' job satisfaction and professional well-being.

Suggestion

This study identifies the core factors influencing teacher job satisfaction, but future research should further explore the mediating and moderating effects of these factors in the relationship between transformational leadership and teacher job satisfaction. A deeper understanding of these complex mechanisms will help to fully reveal how leadership behaviors influence teacher satisfaction through multiple pathways. Additionally, since this study primarily relies on a literature review and social network analysis methods, future research should consider empirical studies to validate these findings and minimize the effects of temporal lag and data limitations. The selection and merging of keywords, to some extent, involve subjective judgment, so adopting more rigorous criteria in future research could enhance the generalizability of the results.

While the Four Paths Framework provides a multidimensional analytical perspective, future research should consider incorporating other theoretical models or frameworks for comparative analysis to provide a more comprehensive and in-depth understanding of the relationship between transformational leadership and teacher job satisfaction. By introducing more theoretical models and empirical studies, future research can offer richer theoretical support for educational management practices.

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References

- Avolio, B. J., Zhu, W., Koh, W., & Bhatia, P. (2004). Transformational leadership and organizational commitment: Mediating role of psychological empowerment and moderating role of structural distance. *Journal of Organizational Behavior, 25* (8), 951-968. <https://doi.org/10.1002/job.283>
- Bass, B., & Riggio, R. (2005). *Transformational leadership: Second edition*. <https://doi.org/10.4324/9781410617095>
- Eliophotou Menon, M. (2014). The relationship between transformational leadership, perceived leader effectiveness and teachers' job satisfaction. *Journal of Educational Administration, 52* (4), 509-528. <https://doi.org/10.1108/JEA-01-2013-0014>
- Eyal, O., & Roth, G. (2011). Principals' leadership and teachers' motivation. *Journal of Educational Administration, 49* (3), 256-275. <https://doi.org/10.1108/09578231111129055>
- Freeman, L. C. (1978). Centrality in social networks conceptual clarification. *Social Networks, 1* (3), 215-239. [https://doi.org/10.1016/0378-8733\(78\)90021-7](https://doi.org/10.1016/0378-8733(78)90021-7)
- Klassen, R. M., & Chiu, M. M. (2011). The occupational commitment and intention to quit of practicing and pre-service teachers: Influence of self-efficacy, job stress, and teaching context. *Contemporary Educational Psychology, 36* (2), 114-129. <https://doi.org/https://doi.org/10.1016/j.cedpsych.2011.01.002>

- Leithwood, K., Harris, A., & Hopkins, D. (2020). Seven strong claims about successful school leadership revisited. *School Leadership & Management*, 40 (1), 5-22. <https://doi.org/10.1080/13632434.2019.1596077>
- Leithwood, K., & Jantzi, D. (2006). Transformational School Leadership for Large-Scale Reform: Effects on students, teachers, and their classroom practices. *School Effectiveness and School Improvement*, 17 (2), 201-227. <https://doi.org/10.1080/09243450600565829>
- Leithwood, K. A., Sun, J., & Pollock, K. (2017). *How school leaders contribute to student success : the four paths framework*. Springer International Publishing. <https://doi.org/10.1007/978-3-319-50980-8>
- McKinney, W. (2010). *Data Structures for Statistical Computing in Python*. <https://doi.org/10.25080/Majora-92bf1922-00a>
- Moolenaar, N. M. (2012). A Social Network Perspective on Teacher Collaboration in Schools: Theory, Methodology, and Applications. *American Journal of Education*, 119 (1), 7-39. <https://doi.org/10.1086/667715>
- Skaalvik, E. M., & Skaalvik, S. (2017). Motivated for teaching? Associations with school goal structure, teacher self-efficacy, job satisfaction and emotional exhaustion. *Teaching and Teacher Education*, 67, 152-160. <https://doi.org/https://doi.org/10.1016/j.tate.2017.06.006>
- Tschannen-Moran, M., & Hoy, A. (2001). Teacher Efficacy: Capturing an Elusive Construct. *Teaching and Teacher Education*, 17, 783-805. [https://doi.org/10.1016/S0742-051X\(01\)00036-1](https://doi.org/10.1016/S0742-051X(01)00036-1)
- van Eck, N. J., & Waltman, L. (2014). Visualizing Bibliometric Networks. In Y. Ding, R. Rousseau, & D. Wolfram (Eds.), *Measuring Scholarly Impact: Methods and Practice* (pp. 285-320). Springer International Publishing. https://doi.org/10.1007/978-3-319-10377-8_13