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(IJEPC)**www.ijepec.com**LEADERSHIP STYLES OF PRINCIPALS, A CATALYST FOR
CULTIVATING RESEARCH CULTURE: SCIENCE MAPPING
OF PRESENT AND FUTURE TRENDS**Wan Mohd Khairi Wan Ibrahim^{1*}, Suhaidah Hussain², Azim Azuan Osman³¹ Faculty of Industrial Management, Universiti Malaysia Pahang Al-Sultan Abdullah, Malaysia
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DOI: 10.35631/IJEPC.1061074**Abstract:**

This study reviews leadership styles adopted by principals in school for fostering research culture. Leadership styles is a major contribution in landscaping schools including innovations and creativity environment. However, there has been no comprehensive understanding of knowledge structure in leadership styles adoption among principals in cultivating research culture in their institution holds in the literature. Through a bibliometric approach, 375 publications on leaderships styles adoption on innovation were retrieved from the Web of Science (WoS). A bibliographic coupling and co-word analysis were performed to uncover past and predict future trends in this regard. The analysis yields noteworthy themes concerning transformational leadership, instructional leadership, and distributed leadership, emphasizing their influence on fostering a strong research-oriented culture in schools. Additionally, the study identifies emerging trends and gaps in the current literature, offering insights into future research directions. The findings suggest that adopting a strategic combination of these leadership styles can effectively foster research activities, drive innovation, and support sustainable academic development. This study provides a foundational framework for educational policymakers and school leaders aiming to foster a vibrant research-oriented environment, ultimately contributing to the advancement of educational practices and outcomes.



Introduction

Leadership is crucial in shaping educational institutions. As principals, they lead and influence the institutional practices, professional development, and innovation (Kin & Kareem, 2021; Lingam et al., 2021). Significantly, the advancement of a research-oriented culture within educational institutions—distinguished by empirically supported methodologies and rigorous scholarly investigation—is progressively regarded as crucial for enduring enhancement (Verhoef et al., 2022). The leadership styles employed by school principals, including instructional, transformational, democratic, and laissez-faire methodologies, are instrumental in fostering or obstructing such a cultural environment (Haque, 2025).

Despite the heightened focus on leadership and research culture in educational contexts, the existing studies persist in showcasing fragmentation and multifariousness. A bibliometric review presents a meticulous quantitative technique to chart the academic environment by recognizing publication trends, notable contributors, citation behaviours, and thematic divisions (Donthu et al., 2021). Though research targeting leadership and organizational culture engages with many international landscapes, an evident shortfall in awareness exists concerning their location and timing (Atwater et al., 2021). Bibliometric studies have adeptly delineated the progression of educational leadership scholarship over numerous decades and geographical areas via methodical examinations of publication metrics, collaborative endeavours, and thematic advancements (Esen et al., 2020).

This study utilizes bibliometric techniques—such as bibliographic coupling and co-word analysis—using Web of Science (WoS) databases. This will enable mapping of the intellectual structure, identify key trends, and uncover research gaps within the nexus of leadership styles, principals, and research culture. Through this bibliometric lens, the study seeks to contribute to a richer understanding of how principal leadership styles influence school research culture, and to guide future research and leadership practice in education.

Literature Review

Researchers have stressed the value of undertaking research in the sphere of education (Narbarte & Balila, 2018; Schuelka & Sherab, 2019; Šorgo & Heric, 2020). This emphasis is attributed to the potential of research to enrich knowledge and comprehension across different domains, promote advancements in publications and technological development, foster intellectual development, and enhance the effectiveness of teaching as well as student involvement in the learning process (Chakraborty & Biswas, 2020; Galy, 2020; Jameel & Ahmad, 2020; Rafi et al., 2019).

Research activities within schools are widely recognized as essential in fostering a dynamic and intellectually engaging atmosphere (Chakraborty & Biswas, 2020). These initiatives play a pivotal role in improving the standard of education and facilitating the ongoing growth of teachers through the integration of innovative concepts and methodologies within the school environment (Wang et al., 2023).

Recognition of the critical role that leadership plays in encouraging innovation in organizations has grown in the last several years (Astuti et al., 2020; Yas et al., 2022). The leadership approaches employed by school principals have been recognized as a crucial factor influencing innovation within educational institutions (Hallinger et al., 1996). This is supported by research which shows that the leadership style of a principal can significantly influence teacher performance (Manzoor et al., 2024; Oktarin et al., 2021). Additionally, the leadership approach adopted by a school principal plays a significant role in establishing a conducive atmosphere for fostering innovation and efficiency among teachers (Khan et al., 2020).

Despite these contributions, research on principals' leadership styles and their relationship with research culture in schools remains fragmented and dispersed across diverse contexts and scholarly traditions. There exists a body of research suggesting that engagement in scholarly activities is crucial for the advancement of teachers' professional competencies and that school leaders contribute to the cultivation of a research-oriented environment (Kalkan et al., 2020; Rosyada Amrina & Fuad, 2025; Yuelin & Noichun, 2025); nevertheless, the overarching repository of knowledge regarding the integration and methodical delineation is still lacking. Bibliometric analysis provides a robust approach to overcome this limitation. Through systematic evaluating publication trends, citation patterns, and thematic networks, bibliometric studies enable scholars to evaluate the evolution of research on principals' leadership styles and school research culture (Aria & Cuccurullo, 2017; Donthu et al., 2021). This form of analysis not only delineates preeminent authors, institutions, and significant contributions but also illuminates areas that remain insufficiently explored and warrant further scholarly attention. Consequently, a bibliometric inquiry is indispensable in providing an evidence-based synthesis of the academic landscape, enhancing theoretical comprehension, and guiding both policy formulation and practical applications regarding how leadership can effectively cultivate a research culture in educational settings.

Methodology

Bibliometric Approach

Donthu et al. (2021) posit that the bibliometric approach is a quantitative methodology used for analysing bibliographic databases through the application of a science mapping technique. This research employs computer-assisted techniques and systematic review methodologies to retrieve indicators like the h-index from online databases, recognizing significant publications, authors, research patterns, publishing patterns, and organizations (Aliusta, 2023). The examination is enhanced through the application of scientific visualizations produced by dedicated software applications. Lately, there has been a marked rise in the dissemination of bibliometric evaluations (Lazarides et al., 2023).

The approach enhances the meta-analysis based on quantitative data and the systematic literature review based on qualitative data by incorporating a sense of objectivity in the assessment of scientific literature and reducing the influence of researcher bias through the synthesis of diverse scholarly perspectives (Ivan Župič & Tomaž Čater, 2015). As posited by Harsono et al. (2024), bibliometric analysis, in contrast to a systematic review, does not encompass the elimination of articles in the sampling process, thereby mitigating bias and subjectivity.

This approach facilitates a more thorough scrutiny of literature without necessitating exclusion based on criteria. As per the objectives of this research, the study presents two bibliometric analyses in the following manner:

Bibliographic coupling. This study explores the range of themes through an assessment of the latest advancements in a specific discipline (Donthu et al., 2021; Fauzi et al., 2024). The fundamental principle underpinning this analysis posits that in cases where two publications exhibit common references, a distinctive scientific theme is evident (Rojas-Lamorenena et al., 2022; Simion et al., 2023). The assessment is conducted on the most recent research streams found in the recent publication contributions (Azad & Parvin, 2022; Gheno, 2021).

Co-word analysis. The evaluation identifies keywords from the title, abstract, and keywords of the publication (Yang et al., 2023). Rojas-Lamorenena et al. (2022) claimed that it examines the relationships among terms within a particular domain by utilizing both textual explanation and graphical depiction. Moreover, co-word analysis assesses the mutual influence of keywords within a specific subject area and proposes potential future developments (Yang et al., 2023).

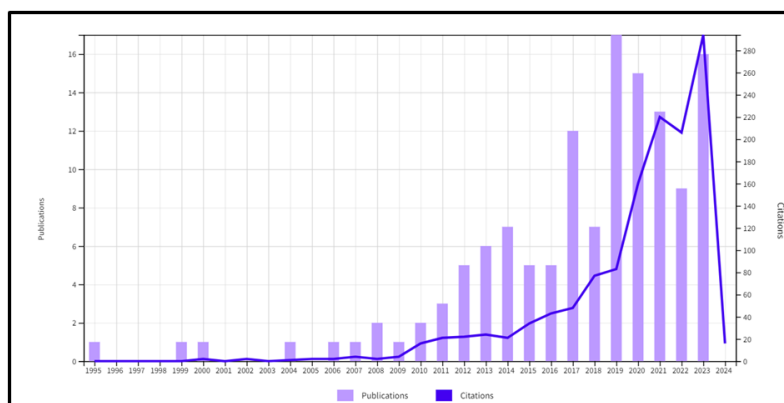
Research Design and Data Collection Procedure

We utilized the subsequent search query (table 1) to pinpoint academic works that are built on significant keywords.

Table 1: Search string in WoS database

No	Keywords	Justification
1	"leadership style*" OR "leadership model*" OR "leadership trait*" OR "leadership behavio?r"	To identify literature related to leadership style
2	"research" OR "innovati*" OR "creativ*"	To identify literature related to innovation environment.
3	"principal*" OR "school leader*"	To identify leadership literature related to school

Result & Discussion



The search in Web of Science (WoS) was conducted on the 31st of March 2024.

Figure 1: Number Of Publications and Citations on Leadership Style in Schools

Source: Web of Science

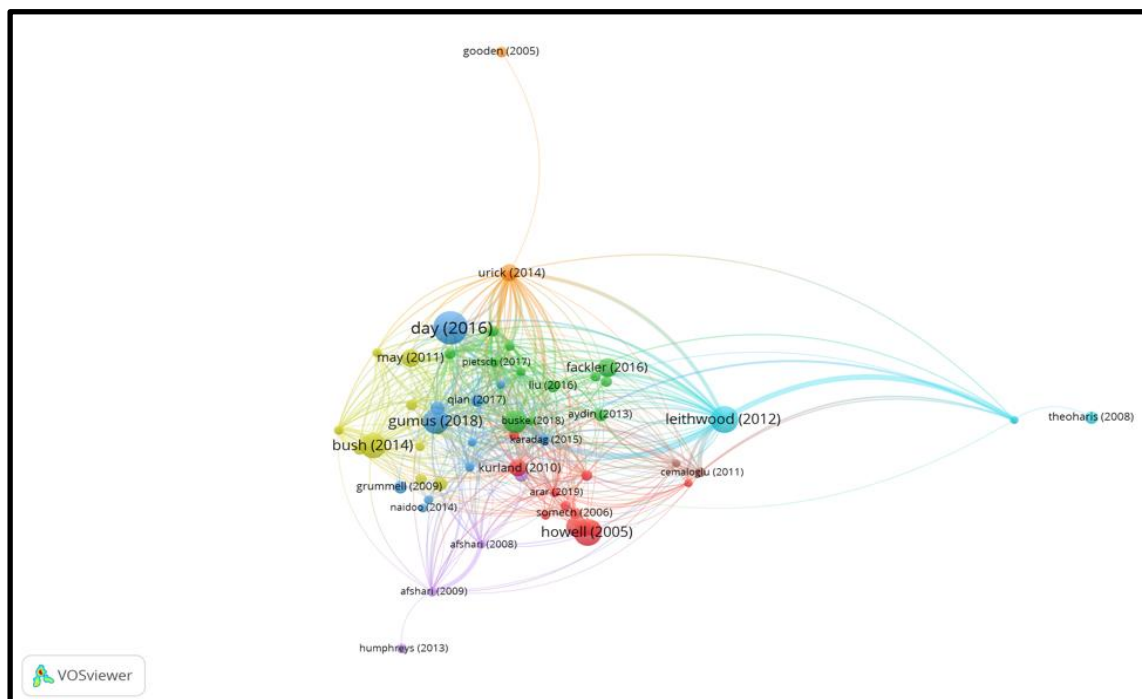
Bibliographic Coupling

Out of the 395 documents, a total of 56 documents were found to have surpassed a specified threshold of 20 citations. These 56 documents have been organized into 8 distinct clusters. The top 3 documents, as determined by their total link strength (TLS), consist of Leithwood & Sun (2012) (321 TLS), Urick & Bowers (2014) (252 TLS), and Karadağ et al. (2015) (233 TLS).

Table 2: Top 10 Documents in Bibliographic Coupling Analysis

Rank	Publication	Citation	Total link strength
1.	Leithwood & Sun (2012)	213	321
2.	Urlick & Bowers (2014)	88	252
3.	Karadağ et al. (2015)	28	233
4.	Urlick (2016)	23	188
5.	Bellibaş et al. (2021)	36	146
6.	Gumus et al. (2018)	186	135
7.	Cemaloğlu (2011)	29	135
8.	Bellibas & Liu (2018)	37	130
9.	Pietsch & Tulowitzki (2017)	29	129
10.	Eyal & Roth (2011)	154	126

Figure 2 illustrates the network visualization of bibliographic coupling, wherein four prominent clusters are distinctly observable, exerting significant influence on the diagram and thus necessitating additional scrutiny. Nevertheless, three minor clusters have been disregarded from the analysis. The identification of the major clusters is founded upon an inductive approach, involving a retrospective analysis of pivotal articles within said clusters synthesizing them according to shared themes and scholarly trajectories.

**Figure 2: Bibliographic Coupling of Leadership Styles In School**

Source: Web of Science

Cluster 1 (red): With 12 articles, cluster 1 is designated as "Educational Leadership and Behaviour." Howell et al. (2005) delved into the concept of championship behaviors and their influence on innovation performance. Meanwhile, Kurland et al. (2010) stressed the significance of school vision and transformational leadership in fostering organizational learning. The primary discoveries of this cluster underscore the importance of transformational leadership, a well-defined school vision, and cultural intelligence in advancing continuous learning and innovation.

Cluster 2 (green): Cluster 2, identified as "Leadership and Educational Effectiveness," consists of 12 papers that emphasize the crucial role of various leadership styles in improving educational outcomes. Eyal & Roth (2011) argues that the transformational leadership presented by principals yields a favorable outcome on teachers' motivation, job satisfaction, and engagement in innovative practices. Jackson & Marriott (2012) affirms that transformational leadership is most beneficial in societies that prioritize innovation and cooperation. Moreover, transformational leadership contributes to teachers' job satisfaction and organizational dedication, nurturing an environment conducive to innovation (Aydin et al., 2013).

Cluster 3 (blue): "Leadership Impact on School". Understanding the impact of leadership on research culture is crucial for this study. A meta-analytical study by Karadağ et al. (2015) validates the beneficial effects of educational leadership on student achievement, emphasizing the importance of prioritizing instructional objectives. Goldring et al. (2015) argues that the leadership of a principal, who integrates instructional and transformational practices, has a positive effect on both teacher job satisfaction and student achievement.

Cluster 4 (yellow): "Innovative and Contextualized Leadership in Education". Cluster 4 with 10 papers are focused on the dissemination of leadership practices, emphasizing the significance of reflective and collaborative leadership, and analyzing the effects of instructional and distributed leadership on educational achievements. It highlights the importance of nurturing inventive leadership techniques, leadership approaches that are adapted to specific contexts, and an environment of collaboration and encouragement within academic settings. Adams & Jean-Marie (2011) stresses the critical role of networks and professional learning communities in spreading innovative leadership practices among school principals. Mattar (2012) proposes that principals who actively participate in instructional leadership can notably improve teaching methods and student performance, thereby fostering a culture of research in the educational realm.

The following table 3 presents the summary of the bibliographic coupling analysis with cluster number and colour, labels, number of publications, and representative publications.

Table 3: Bibliographic Coupling Analysis on Principal Leadership Style on Research Culture

Cluster No and colour	Cluster label	Number of publications	Representative publication
1 (red)	Educational Leadership and Behaviour	12	Howell et al. (2005), Kurland et al. (2010)
2 (green)	Leadership and Educational Effectiveness	12	Eyal & Roth (2011), Jackson & Marriott (2012)

Cluster No and colour	Cluster label	Number of publications	Representative publication
3 (blue)	Leadership Impact on School	11	Karadağ et al. (2015), Goldring et al. (2015)
4 (yellow)	Innovative and Contextualized Leadership in Education	10	Adams & Jean-Marie (2011), Mattar (2012)

Co-word Analysis

Co-word analysis reveals 50 keywords out of a total of 1368 that satisfy nine specific thresholds. Likewise, the creation of the threshold was through multiple repetition to ensure the development of a reliable and consistent network map. The most frequently co-occurring keywords include transformational leadership (80 occurrences), performance (60 occurrences), and impact (45 occurrences). The fifteen most significant keywords are displayed in Table 4. Transformational leadership and performance are the most prevalent terms within the study's framework, indicating their utmost importance in the study of research culture.

Table 4: Top 15 Keywords in The Co-Occurrence of Keywords Analysis

Rank	Keyword	Occurrences	Total link strength
1.	Transformational leadership	80	274
2.	Performance	60	251
3.	Impact	45	207
4.	Leadership	81	205
5.	Management	47	168
6.	Distributed leadership	42	154
7.	Instructional leadership	34	153
8.	School leadership	53	151
9.	Principals	47	150
10.	Teachers	42	146
11.	Transactional leadership	29	121
12.	Principal leadership	23	115
13.	Commitment	19	94
14.	Principal	25	89
15.	Leadership styles	31	87

Figure 3 illustrates the network structure derived from the co-word analysis, effectively outlining four separate clusters that correspond to various thematic domains. In accordance with the author's inductive reasoning, suitable designations have been allocated to these four clusters.

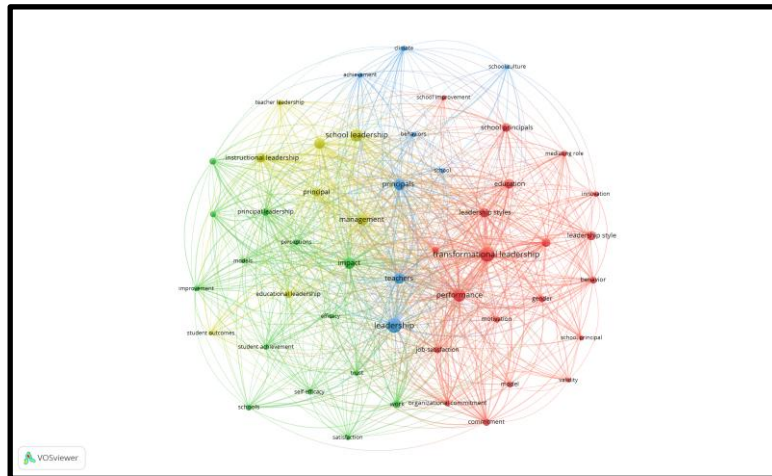


Figure 3: Co-word Analysis On Principal Leadership On Research Culture In School

Source: Web of Science

Cluster 1 (red): With a 20-word co-occurrence, the cluster is designated as "Educational Leadership." The significance of leadership styles in nurturing a research culture was highlighted. Mpuangnan & Roboji (2024) emphasized the importance of transformational leadership in integrating innovation into educational administrative practices. Hammad & Al-Ani (2021) disclosed the presence of obstacles in advancing educational research, primarily attributable to the deficiency in overseeing research endeavors within educational institutions. Therefore, the implementation of strong leadership styles, such as providing autonomy, offering constructive feedback, and encouraging competence and relatedness, plays a vital role in fostering a flourishing research environment (Sharma & Dhanoa, 2024).

Cluster 2 (green): "Workplace dynamics". Cluster 2, with 14 keywords, termed as "Workplace dynamics". It refers to the importance of a constructive working environment that nurtures innovation, collaboration, and aids technical personnel in their professional development, which plays a vital role in improving research performance and environment (Harris, 2024). Rachel (2024) concurred that grasping these dynamics is essential in promoting workplace cohesion, heightening employee involvement, and maximizing productivity. Through addressing these diverse elements, organizations can establish a more encouraging and efficient research environment.

Cluster 3 (blue): "School culture". Cluster 3 is labelled as "School culture". With 8 words in this cluster, Khuram (2024) concurred that the culture within a school plays a pivotal role in fostering a positive environment that encourages school members to engage in research activities, ultimately cultivating a research-oriented mindset among them. González Cardona et al. (2023) argues that the level of school research activities effectiveness is directly linked to the school culture, suggesting that the strength of cultural values directly impacts the research of the school.

Cluster 4 (yellow): Cluster 4 is labelled as "Leadership strategies". In the context of schools, leadership strategies are crucial for nurturing a research culture that encourages ongoing learning and scholarly investigation. Principals and senior teachers must adopt strategies that focus on developing a research-oriented culture within schools Gunawan et al. (2020). This involves more than providing necessary resources and training; it also requires creating a

supportive framework that facilitates research engagement among teachers Suson et al. (2020).

A summary of the co-word analysis is presented in table 5, comprising cluster number and color, cluster labels, number of keywords, and representative keywords.

Table 5: Summary Of Co-Word Analysis on Principal Leadership Style on Research Culture

Cluster No and colour	Cluster label	Number of keywords	Representative Keywords
1 (red)	Educational leadership	20	transformational leadership, performance, leadership styles, education school principals
2 (green)	Workplace dynamics	14	self-efficacy, satisfaction, trust, work, student achievement
3 (blue)	School culture	8	Leadership, teachers, principals, behaviors, climate
4 (yellow)	Leadership strategies	8	Management, school leadership, teacher leadership, distributed leadership, instructional leadership

Implications

Theoretical Implications

The results of this investigation make a substantial contribution to the theoretical comprehension of different leadership approaches and their influence on cultivating a culture of research in schools. The research highlights the importance of transformational leadership, which is defined by vision, inspiration, and intellectual stimulation, in cultivating a culture focused on research and promoting innovation within school (Gyimah, 2020). The study emphasizes the significance of transformational leadership, which prioritizes vision, inspiration, and intellectual stimulation, in playing a pivotal role in cultivating a culture geared towards research (Zulkifly et al., 2022). This underscores the theoretical paradigms that advocate for the indispensability of transformational leadership in driving innovation and involvement within school (Meng, 2022). The convergence of instructional and transformational leadership paradigms examined in this research is perceived as having the potential to progress theoretical frameworks that underpin a comprehensive leadership approach (Bush, 2014). The suggested integration can improve teacher satisfaction and student performance, thereby offering a more profound insight into successful leadership within schools (Uthman et al., 2016).

Managerial Implications

From a practical perspective, the findings obtained from this study provide numerous practical suggestions for principals and policymakers focused on improving the culture of research in schools. This study suggests that the policymaker should invest in leadership development programs that emphasize the integration of transformational and instructional leadership styles. Training programs should focus on equipping principals with the skills to inspire, support, and intellectually stimulate their staff, thereby fostering an environment conducive to research and innovation (Yaakob et al., 2020). The study also proposes that school principals ought to direct

their attention towards enhancing their emotional intelligence to provide improved assistance to their teachers (Kallciu et al., 2020). Through fostering a leadership approach that is supportive and emotionally intelligent, principals have the potential to amplify teacher motivation, job satisfaction, and general involvement in scholarly activities (Li et al., 2024).

Conclusion

This study gives a detailed scrutiny of the consequences of different leadership methodologies practiced by school principals on the growth of research culture in educational institutions. Utilizing bibliometric analysis, the study identifies crucial themes and patterns, emphasizing the pivotal roles of transformational, instructional, and distributed leadership in fostering a robust research-oriented environment.

The results emphasize the significance of strategic leadership strategies that not only stimulate creativity but also encourage sustainable academic development. By amalgamating theoretical perspectives with practical suggestions, this study provides valuable insights for educational policymakers and school administrators striving to cultivate a dynamic research environment.

Nonetheless, this investigation acknowledges its limitations, including the dependence on bibliometric data and the call for more qualitative and longitudinal studies. Subsequent research endeavors should fill these voids by examining contextual elements, utilizing mixed-method approaches, and exploring the enduring effects of leadership styles.

To summarize, this investigation enhances our comprehension of the intricate interplay between leadership styles and research culture, establishing groundwork for forthcoming exploration and pragmatic implementation in educational leadership. By promoting efficient leadership methodologies, educational institutions can establish settings that not only improve academic results but also nurture a climate of continual inquiry and innovation.

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