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Pathways to school improvement: Discovering network patterns of school principals

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Pathways to school improvement: Discovering network patterns of school principals

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Abstract
The purpose of this study is to examine the network effect of school principals as it relates to school improvement. Network practices of school principals are compared to an innovative practice for improving networking practices. Through descriptive statistics and chi-square goodness of fit, we illustrate the difference between what school principals do concerning their networking practices for school improvement compared to an innovative ideal approach for using network working for school improvement. Findings indicate there is a statistically significant difference between school principals' networking practices in comparison to ideal networking practices for school improvement. There are also differences between who school principals seek out for ideas and who they seek out for feedback concerning their school improvements. Further discussion informs how the next generation of school principals can be equipped with innovative skills for tackling 21st-century school improvement issues.

Keywords: *Networking; principals; innovation; school improvement*

Introduction

Contemporary school improvement efforts have ushered in new policies and expectations that have reshaped the role of the school principal (Grissom, Egalite, & Lindsay, 2021). However, research indicates that principals often struggle with improving schools due to their limited emphasis on building strong social networks (Daly et al., 2014; Lockton, 2019; Muijs et al., 2010). We define social networks in schools as "a structure which, under the right conditions, is capable of stimulating potentially rich interactions among members resulting in new and creative ideas or practices not initially part of the repertoire of any individual network member" (Leithwood, 2019, p. 117). School improvement efforts typically focus on the internal context, potentially excluding valuable external influences (Muijs et al., 2010). This emphasis frequently directs school leaders towards prioritising compliance with district and state school improvement initiatives rather than exploring avenues for transformative changes in learning and teaching approaches (Bernhardt, 2018). Principals can enhance school improvement by adopting entrepreneurial mindsets, establishing social networks, and balancing external and internal networking efforts (Fancera, 2020; Hargreaves et al., 2014; Keuning et al., 2016).

When school principals increase their capacity to network, they increase collaboration and the pool of ideas to improve schools and allocate more resources (Bickmore et al., 2020; Bill and Melinda Gates Foundation, 2022). Principals who intentionally expand their networks within and outside school systems tend to empower teachers by deepening their professional knowledge, better customising professional development, and building leadership capacity within their school staff (Fancera, 2020; Leithwood, 2019; Liethwood & Azah, 2015). Thus, principals must balance their networking engagements with outside entities to yield new insights while also keeping close relationships with participants within the same school and system (Keuning et al., 2016; Jones & Harris, 2014).

Despite the benefits of networking, the impact of the networking capacity of school principals is understudied and often unaccounted for as a means of shaping school improvement and learning outcomes (Carolan, 2013; Moolenar et al., 2010; Leithwood & Azah, 2016). Minimal research is available that examines the intersection of principals and their social networks that help provide new ideas that lead to innovative approaches to school transformation (Daly & Moolenar, 2011; Hitt & Tucker, 2016). Therefore, we investigate the networking practices of school principals for school transformation.

Purpose of study

The purpose of this study is to contribute to the minimal research available that examines the network effect of school principals as it relates to school transformation. It will also introduce new research regarding whom principals go to for school transformation ideas and feedback. In addressing the challenges of leading school transformation, there is a distinction between seeking ideas (i.e., not having a clear course of action) and receiving feedback on a proposed idea. By examining the networking patterns of school principals, we posit that practitioners and policymakers will better understand how to purposefully establish pathways for principals to collaborate and gain new perspectives for innovative school transformation initiatives. The following questions guided this research study:

- To whom do school principals go for ideas for school improvement?
- To whom do school principals solicit feedback for school improvement ideas?

Literature review

The phrase “school improvement” has been frequently employed interchangeably with similar terms such as school reform or school transformation. We define “school improvement” as the process in which leaders establish the capacity to manage and implement change continuously that serves to improve leadership, teaching, and student learning (Fullan, 2023). Executing the school improvement process is a formidable undertaking. Despite it being a challenging and often time-consuming endeavour, school leaders have been recognised as change agents

in spearheading the process of school improvement. Hence, the term "school transformational leadership" has been employed to characterise the leadership approach for such an undertaking. When school leaders take the initiative in driving the school transformation process, the likelihood of achieving the necessary transformation increases concurrently with the improvement of student outcomes (Anderson, 2017; Fullan, 2015).

Some key features of the school transformational process include the leaders' ability to embody the school's vision and goals as well as motivate teachers to establish innovative instructional practices for school improvement (Ismail & Mydin, 2019). In addition, transformational leaders "show genuine consideration and act to help successfully address the faculty and staff's human issues as well as focus on the school's improvement plan" (Kaplan, 2015, p. 49). School improvement plans, especially in the United States, are federally mandated plans that involve multi-year goals and strategies that will support the transformation process, especially in low-performing schools (United States Department of Education, 2020).

The essence of school performance planning for school leaders, particularly the school principal, is to develop accountable and measurable outcomes that result in improved instruction, processes, and student outcomes (Boudett et al., 2020; Meyers & VanGronigen, 2019). Such plans encourage school principals to engage with the entire school community, including those who work outside of the field of education, to establish adequate goals and support (Porter et al., 2020). Thus, developing a school improvement plan that fosters deep collaboration within the school and with external stakeholders is key to executing strategies for improving student outcomes (Guzman, 2022; Mendenhall et al., 2013). Unfortunately, the prevailing focus on school improvement plans has fostered a culture of mere compliance among school leaders, diverting attention from their potential to serve as a catalyst for transformative teaching and the promotion of innovative learning to yield improved student outcomes (Bernhardt, 2018).

Given the complexity schools now face, especially post-COVID, school leaders need to establish deeper collaboration with all stakeholders to improve student outcomes that go beyond school improvement planning (Beauchamp et al., 2021; Kirtman & Fullan, 2016). Harris et al. (2023) observed that during the COVID-19 pandemic, collaborative efforts and the extent of networking among schools reached unprecedented levels, leading these scholars to advocate for a novel leadership paradigm coined "network leadership" as imperative for school improvement. The following sections will provide a brief overview of networking in education and school leadership.

Networking

Networking research gained momentum in the late 20th century when sociologists began to dominate this body of literature. This early research in networking was concerned with the consequences and outcomes of the use of networks and attempted to legitimise their use in organisations (Borgatti & Foster, 2003). Since then, perhaps the greatest growth area in organisational networking research

is that of social capital (Borgatti & Foster, 2003; Coleman, 1988). This strand of social capital literature considers and builds upon Walker and colleagues' (1994) concept of social support in combination with Lin's (1982, 1988) social resource theory. These earlier concepts reconsider the purpose of social ties and explain that although ties can exist between actors, this does not guarantee the provision of support or whether an actor will benefit from all social ties (Walker et al., 1994). Therefore, it is through capital that social networks become valuable to the actors. This capital can come in the form of connections to resources, assets, or information (Coleman, 1988). Initially, this concept of social capital was tied to the acquisition of a dense network of *resource-filled* others (Borgatti & Halgin, 2011; Coleman, 1988). To gain the most out of a network, actors and organisations were expected to be a part of a network of connections that would be dense, or well-connected, to provide the most benefits or resources (Borgatti & Foster, 2003; Borgatti & Halgin, 2011).

Burt (1992) and Granovetter (1983), opposed the idea of dense networks as being the best for acquiring social capital and argued the value of sparse networks. *The Strength of Weak Ties* theory was first introduced by Granovetter (1983) and explains that an individual or an actor is most likely to gain the most social capital from a sparse network. Dense networks are most likely to insulate individuals away from those outside of their immediate network (Granovetter, 1983). These types of networks, although dense, tend to limit interactions to people close to the actor such as friends, who are more likely to share the same ideas and ways of thinking. To acquire new information and innovative ideas, an actor will typically rely on weak ties or those outside of their immediate network with whom they do not always interact (Granovetter, 1983). Burt (1992) adds to Granovetter's (1983) work by describing *structural holes* in a network as the mechanism that allows for weak ties to exist (Borgatti & Foster, 2003; Borgatti & Halgin, 2011; Obstfeld, 2005). These structural holes are missing pieces in a network that allow the actor to interact with new individuals and create new acquaintances.

Networking has since become essential for advancing organisations and organisational learning and has since been linked to the development of innovative ideas, and reducing the organisation's exposure to risk and uncertainty (Cohen & Levinthal, 1990; Gibson et al., 2014). However, not all forms of networking can provide fruitful outcomes to organisations because not every organisation is prepared to use its network efficiently and effectively. Innovation in organisations is also dependent on the organisation's ability to exploit external knowledge through collaboration. Therefore, prior related knowledge or understanding between two network actors is important. Cohen and Levinthal (1990) describe this as *absorptive capacity*. Networks can only provide benefits to the organisation or actor when they are prepared with the knowledge necessary to assimilate and make use of new information (Cohen & Levinthal, 1990). Daghfous (2004) described absorptive capacity as the enabling process in which organisations explore and exploit external knowledge to innovate and adapt to their changing environment. Skilled

organisational leaders are essential to enhancing the exploration and exploitation of external knowledge to augment innovation (Flatten et al., 2015).

Networking in education

In the educational literature, networking has been described as a vital strategy for school improvement efforts (Evans & Stone-Johnson, 2010; Moolenaar et al., 2010, 2012). Hadfield and colleagues (2006, p.5) first described networking in education as "groups or systems of interconnected people and organisations (including schools) whose aims and purposes include the improvement of learning and aspects of well-being known to affect learning." This was later critiqued by Muijs et al. (2010) because it only focused on student learning and did not include the value of networks to other actors within schools. Muijs et al. (2010) created a broader definition of networking "at least two organisations working together for a common purpose for at least some of the time" (p. 6) which encompasses the variety of networks that can be constructed in education. Central in their definition is the term "organisations" which is intended to be inclusive towards connections among schools and other organisations, and not just focused on the individual connections between people. Schools, much like most organisations, function under an open system. Open system theory within education suggests that schools are often bounded by their capacity to take in resources from their environment. DiPaola and Tschannen-Moran (2005) point out that these boundaries within schools serve as a filtering mechanism for the overflow of information, technology, and resources that is common in our current knowledge-based society.

When properly structured, school networks have the potential to encourage continuous learning among their members, provide opportunities for sharing knowledge, and create a distributed leadership structure that empowers teachers as leaders (Evans & Stone-Johnson, 2010; Harris, 2008; Torres, 2019). Networking has been associated with gains in teacher knowledge and skills; increased professional development and the emergence of a learning culture among staff (Daniëls et al., 2019; Silva et al., 2017). Beyond the benefits that networking might have for educators, studies suggest the nature of these networks also benefits student achievement (Moolenaar et al., 2012; Muijs, 2015a). For example, teachers in a professional learning network can feel capable of motivating and supporting their students, which tends to improve student academic performance (Demir, 2021; Moolenaar et al., 2012). Networking is also shown to benefit school improvement when low academic achievement schools engage in partnerships with higher-achieving schools (Hargreaves et al., 2014; Muijs, 2015b) through collaborations, sharing ideas, and best practices (Gonzales & Roberts, 2021; Adjapong et al., 2018; Oddone et al., 2019).

Networking and school leadership

Effective leadership is the key to establishing and benefiting from a school network (Evans & Stone-Johnson, 2010; Fancera, 2020; Leithwood, 2019; Moolenaar et al., 2010; Moolenaar & Sleegers, 2015). Principals have an important role in encouraging and modelling networking

and play a significant role in connecting the community at their schools to the larger district (Moolenar & Sleegers, 2015; Green, 2018). The principal's role in connecting these two communities is influenced by their centrality in the network and the network's density. Within their school, a principal's network centrality can aid in developing an innovative climate (Daly & Finnigan, 2010; Moolenaar et al., 2010; Moolenaar & Sleegers, 2015). When the principal holds a central position in their school network and is considered close to the teachers they lead, these teachers are more willing to invest in change and become more involved in creating new knowledge and practice (Moolenaar et al., 2012). However, highly centralised networks can also result in an imbalanced distribution of information and resources (Daly & Finnigan, 2011). Thus, principals need to recognise their positionality within their network and navigate a balanced network pattern that is conducive to innovation for school improvement.

Similarly, a network's density considers the percentage of ties between people involved in a network that can help relay information and distribute resources quickly. Connecting to their larger districts and communities has proven to be more complicated for principals, and they are more likely to be in the periphery of their network. At the same time, central office administration makes up the core of these networks, maintaining an incongruence in density with those that lie in the periphery of the school network (Daly & Finnigan, 2011). Network closure can also prevent principals from seeking out or sharing knowledge (Daly & Finnigan, 2010, 2011). Principals tend to seek out networks in which they are comfortable, due to their hesitancy towards engaging in and seeking out innovative practices and knowledge (Daly & Finnigan, 2011). Principals' networking practices involve a preference for intentional and reciprocal relationships over random and asymmetrical connections (Hajisoteriou & Angelides, 2014). Having network closure can pose a challenge to principals and school educators as it limits them to immediate resources and prevents them from seeking solutions their networks or local communities might need.

Networking conceptual framework

Given the need for school leaders to balance their networking engagements within and outside of education, the researchers for this study used the Innovator's DNA framework as outlined by Dyer et al. (2019). This framework is a culmination of an eight-year study that examined the practices and dispositions of leaders who were deemed to have led innovative organisations. With over 3,000 interviews conducted with organisational leaders, Dyer and colleagues investigated how these leaders generated innovative ideas. Findings indicated that these innovative leaders were engaging in similar behaviours when discovering breakthrough ideas. These behaviours are known as *discovery skills* which consist of challenging the status quo, questioning, observing, networking, and experimenting. Applying these discovery skills, especially networking, is what distinguishes the most innovative organisational leaders.

The discovery skill of networking requires that leaders link their knowledge with those who are outside their field of expertise. Dyer et al. (2019, p. 113) observed organisational leaders "gain a radically different perspective when they devote time and energy to finding and testing ideas through a network of diverse individuals". There are two distinct approaches to networking: resource networkers and idea networkers (see Table 1).

Table 1: Discovery skill network framework

Resource Networking	**Idea Networking**
• Why the network? 1. Access to resources 2. Self or organisational promotion 3. Advance careers • Whom they target 1. People similar to them 2. People with significant resources, power, and influence	• Why the network? 1. Learn new, surprising things 2. Experiment, test ideas 3. Gain new perspectives • Whom they target 1. People not like them 2. Experts and nonexperts 3. People from diverse backgrounds and perspectives

Note. Network Framework from: Dyer, J., Gregersen, H., & Christensen, C. M. (2019). *The Innovator's DNA, Updated, with a New Preface: Mastering the Five Skills of Disruptive Innovators.* Harvard Business Press

Although both types of networkers attempt to gain fresh perspectives and ideas, leaders who maintain the status quo and seek out opportunities to gain resources or promote their organisations are typically involved in resource networking. Such leaders tend to mainly network with organisations or people within the same field. Very few innovative ideas are ignited when leaders engage in resource networking practices. Conversely, for leaders to gain new ideas and test them, they will typically engage in idea networking. Such engagement includes targeting people and organisations that are radically different from their respective fields as well as consulting with both experts and non-experts from very different backgrounds and perspectives (Dyer et al., 2019).

One key component of purposefully engaging in idea networking is to tap into outside experts. However, Dyer et al. (2019) warn that when leaders only talk to outside experts they run the risk of being indoctrinated with a particular conceptual framework and paradigm that may

not be correct. As such, it is more effective to lean on both experts and non-experts for ideas to improve and innovate. To help leaders develop their idea network, they are recommended to engage in idea networking events such as conferences, expand the diversity of their network, and invite outsiders to frequently interact with them and their organisation(s).

The need for networking for organisational improvement, especially among school leaders, is not a new concept. The essence of networking stems from Vygotsky's theory of learning. Vygotsky et al. (1978) posited that collaborative and cooperative learning is more effective than individualised learning experiences and should be a shared process throughout schools. Thus, when organisations deliberately intersect with others, their capacity to learn and establish new connections increases (Johansson, 2006). Furthermore, schools that focus on their networking enhance their capacity to improve, broaden their opportunities for growth and increase their resources (Muijs et al., 2010). When schools deliberately work with other competing schools and agencies, they are able to double the rate of improvement (Hargreaves et al., 2014).

The Innovator's DNA framework has been used in other studies within the fields of healthcare education, engineering, higher education, and business (Armstrong & Barsion, 2013; Ferguson et al., 2017; Ji & Bai, 2018; Tobar-Muñoz et al., 2020). Although the DNA framework includes other practices such as questioning, experimenting, and observing, this study is the first of its kind to use the Innovator's DNA framework as it relates to the networking practices of school principals.

Method

A survey design methodology was used to examine the networking practices of principals for school improvement. Specifically, survey items focused on measuring who principals sought out for school improvement ideas and whom they solicited for feedback in the context of discovery skills (i.e. a measure of social capital). Although researchers created the survey, or DNA Survey, question items underwent three phases of content validity.

Participants and procedure

School principals were randomly selected from schools in the southwest of the United States to respond to the DNA Survey, in which their responses were kept anonymously through the use of Qualtrics. The southwest region was chosen due to where the researchers were located. The process of gathering eligible survey participants involved the generation of a list of all school principals in a Southwest region of the United States. Three attempts through electronic surveying were used to obtain school principal responses, which occurred between Spring 2020 and Spring 2021. For each attempt, different days of the week and times were incorporated to optimise the school principal's response to the DNA Survey. Despite the instability brought

on by the response to a global pandemic, it was reasoned that principals would be open to the survey because of the need for innovative thinking and problem-solving. Furthermore, it has been acknowledged that the school closures resulting from the pandemic led to an unprecedented level of networking engagement for schools (Azorin, 2020; Harris et al. 2023). All completed surveys (N = 124) were then used to assess principals' networking practices.

The general demographic characteristics of principals (see Table 2) who responded were mostly women (58.9%) and White (80.3%). Among men, the white male was most represented (79.2% or 38 of 48 men). These demographic characteristics fit the current landscape of school leadership in that approximately 80% of schools across the U.S. are led by White principals with slightly over half identifying as women (National Center for Education Statistics, 2020).

Table 2: Survey demographics

			Title I status		**Grade level**				
	Male	**Female**	**Title 1**	**Non-Title 1**	**Elem**	**Middle**	**High**	**K-12**	**Other**
White	38	59	66	28	58	11	11	3	15
Hispanic, Latinx	5	7	11	2	9	1	1	1	1
Black, African American	2	3	5	0	3	1	1	0	0
American Indian or Alaska Native	2	0	2	0	2	0	0	0	0
Asian	0	1	1	0	1	0	0	0	0
Other/ multiracial	1	2	2	1	0	1	1	1	0

Measure

The DNA survey was constructed from the conceptual framework of the Networking Discovery Skill as described by Dyer et al., (2019), which informed item development and went through a process of survey development validity before dissemination to principals. The first phase started with the authors constructing survey items from existing literature. For three months, the authors

had weekly discussions on the wording of survey items to specifically design the survey with the appropriate content area and methodology. After a draft of survey items was created, the validity process continued with content expert validity and response validity. Through content expert validity, three content experts in the field of school leadership and administration were asked to review the DNA survey and provide feedback on its ability to provide the information desired by the authors. The content expert validity process took approximately 6 weeks and resulted in additional wording refinements to survey items. Content validity was followed with response validity from school principals, which involved asking at least two principals to voice their thinking and interpretation of each survey item as they responded to each item. Conducting response validity was to ensure our sample of principals could understand and answer survey items as they were intended to be answered. Survey items on networking within the survey were objective based and asked principals to choose from a list of individuals they would turn to for seeking advice or confirming their actions. Ultimately, the DNA survey provided a descriptive account of principals' networking practices in the form of social capital.

Data analysis

Non-parametric and descriptive statistics were used to observe the pattern of school principals' use of networking practices for school improvement. Specific categorical-type questions that guided the observation were: Who do you often go to gain new perspectives on school improvement practices? Who do you often go to for feedback about new ideas on school improvement practices? These network practice questions were used in the context of discovery skills. The specific categorical-type questions were objective-based and relied on principals' responses in identifying the key individuals they turn to for school improvement.

Principals can optimise their creative problem-solving for school improvement by following the Discovery Skill Network Framework (See Table 1 p. 8), which can leverage their social capital (or network practices) for school improvement. Thus, we tested the actual survey network practice proportions of whom principals turn to for school improvement help, compared to a principal seeking improvement ideas from everyone in their network equally (i.e., hypothesised network giving equal voice to all individuals). The Discovery Skill Network Framework (i.e., hypothesised network practice proportion) is 10.6% for each group of individuals, indicating an equal percentage of feedback and confirmation for school improvement decisions based on shared voice among individuals. In the DNA survey, there was consideration for principals to identify other groups of individuals (i.e., classified as *Other*) they might seek out concerning feedback and confirmation for school improvement. However, *Other* as a category of individuals was not estimated into the hypothesised network practice proportion.

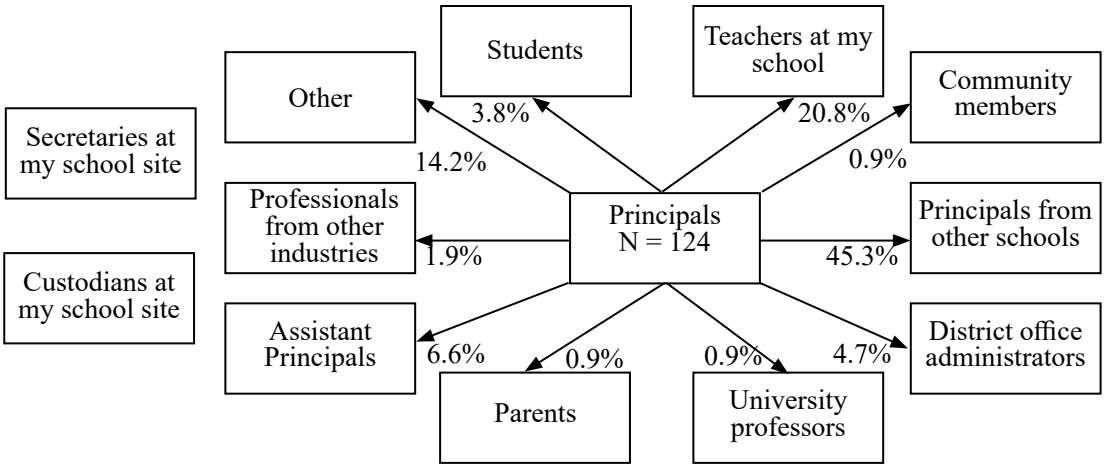

Figure 1. Network description of to whom school principals go to for ideas on school improvement

Results

Research Question 1: To whom do school principals go for ideas for school improvement?

A non-parametric comparison test (chi-square goodness) was conducted to observe network practices between principals and the Discovery Skill Network Model. There was a statistically significant ($p < .05$) difference between the observed and Discovery Skill Network Model, indicating a difference in expected principal network practices in relation to principal network survey responses.

When principals (N = 124) were asked, "Who do you often go to gain new perspectives on school improvement practices (i.e., the focus of the first research question)," principals chose 10 out of the 12 possible categories of individuals, which illustrated that not everyone in their network was considered. What was observed was that principals relied heavily on principals from other schools (45.3%) followed by teachers in their school (20.8%). After these two main categories, we saw the aid of assistant principals (6.6%) and district office administrators (4.7%) as another sets of individuals to seek new perspectives on school improvement. Less than 4% of principals who responded, considered gaining new perspectives on school improvement from five other categories (Students, parents, university professors, community members, and professionals from other industries, see Figure 1). Furthermore, principals did not seek perspectives from two categories of individuals (i.e., custodians and secretaries). In comparison to expected principal network behaviour (i.e., an equal utilisation of all 12 categories of individuals) these results were statistically different, $\chi 2\ (9) = 187.4$, $p < .001$. Additionally, principals were free to mark all of these categories of individuals for whom they sought new perspectives for school improvement. Thus, it is interesting that not all categories were chosen

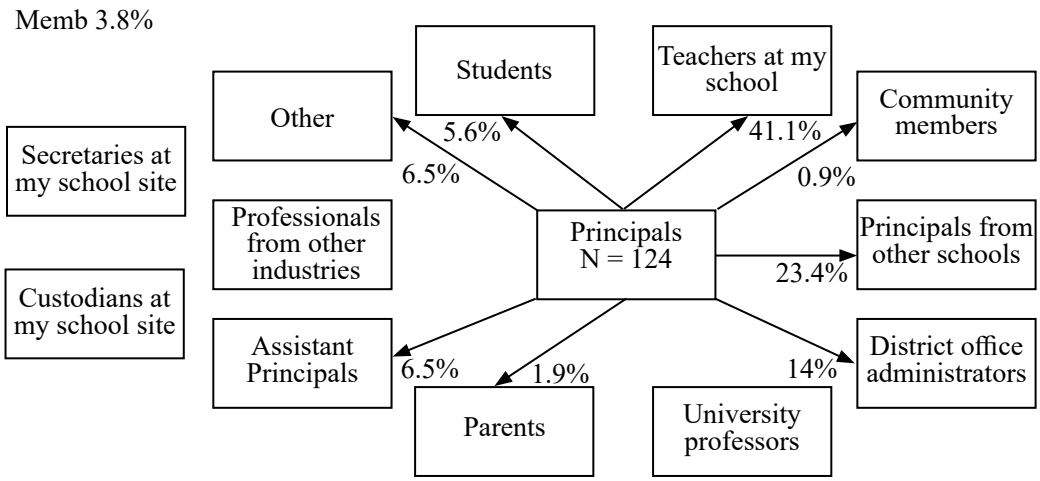

Figure 2. Network description of to whom school principals go to for ideas on school improvement

Research Question 2: To whom do school principals solicit feedback for school improvement ideas?

In addressing the second research question, principals (N = 124) were asked, "Who do you often go to for feedback about new ideas on school improvement practices?" The most cited category of individuals to whom principals go for feedback is teachers at their schools (41.1%) with the second category as principals from other schools at 23.4% (see Figure 2). The next noteworthy categories mentioned by principals when seeking feedback on school improvement were district office administrators (14%), assistant principals (6.5%), and students (5.6%). On the lower need of seeking individuals for feedback were parents (1.9%) and community members (.9%). Interestingly, there were four categories not mentioned at all concerning seeking feedback, which were custodians, secretaries, university professors, and professionals from other industries. In comparing these results to the network behaviour of principals seeking feedback for school improvement across all individuals in their network, there was a statistically different finding $\chi 2$ (7) = 111.69, $p < .001$.

Discussion

There was a noticeable statistical difference between principals' networking behaviour compared to the Discovery Skill Network Model (Dyer et al., 2019). Principals appeared not to be utilising the full extent of their networks for school improvement ideas and feedback. As observed in Figure 1, principals were going largely to other principals to generate ideas for school improvement. In Figure 2, school principals were seeking feedback mainly from teachers concerning school improvement ideas. Seeking teacher input for school improvement feedback may be tied to the

notion that any school improvement changes made are most observed and felt by the teacher (Hall & Hord, 2016). Feedback from teachers to administrators is a crucial component to implementing an innovation, yet when it only comes from teachers it can narrow the gateway to new ideas for improvement. Feedback and generating ideas from students, parents and the community were seldom solicited by participants of this study.

Very few principals networked outside their profession, yet research has asserted the importance of establishing robust networks inside and outside of the field of education for school improvement (Green, 2018; Hargreaves et al., 2014; Moolenar & Sleegers, 2015). When principals deliberately engage with others outside of their respective school or even field of expertise, they are more likely to develop an innovative school climate (Daly & Finnigan, 2010; Moolenaar et al., 2010; Moolenaar & Sleegers, 2015). Principals typically network mainly within their school more than with other schools within the school district due to convenience and comfortability (Daly & Finningan, 2011). Schools have a tendency to be atomised from external influences which often makes it difficult for leaders to network outside the profession. Theoretical linkages from the discovery skill of networking within the Innovator's DNA model connect with our results indicating that school principals can benefit from networking opportunities.

One plausible explanation for the lack of robust networking from school leaders is their lack of preparation, particularly from leadership preservice programmes, on the importance of networking (Cullen-Lester et al., 2017). Time management and pressure from the central office administration for principals to remain in their buildings rather than engage in external networking activities may also negatively impact their networking opportunities. Furthermore, the prevailing school models, fashioned after an industrial-age paradigm, contribute to the atomisation of schools, creating a significant impediment to networking leadership by limiting collaboration and networking within schools and with outside entities (Jefferson & Anderson, 2017). Studies have found that schools that collaborate with other schools and outside organisations tend to improve teaching and learning (Gonzales & Roberts, 2021; Stewart, 2012).

Another plausible cause for the lack of networking from school leaders, especially those from high-needs schools, stems from external threats. Daly and Finningan (2010) point out that when schools are threatened with political and community pressure to improve performance, the flow of new information to improve the school tends to be stifled, and leaders engage in ineffective decision-making and limit their ability to intersect ideas and practices with outside entities. The researchers concluded that "organisations under threat from sanction may, in fact, calcify centralised network structures and become more internally focused both of which may undermine change strategies" (p. 130).

Recommendations

Findings from this study indicate that school principals mainly networked for school improvement ideas within their schools. However, the literature presented in this article indicates that when

school leaders branch out to other schools and industries, they are more likely to establish an innovative learning environment and increase resources. Thus, school systems must develop new pathways for leadership development that will encourage and compel school principals to network beyond their school site. The theoretical implication for recommendation is to help school principals become cognisant of their networking patterns. School systems should create a self-introspective tool that will model the development of idea networking based on three sequential stages of awareness for: (1) networking patterns; (2) those within the principal's network; and (3) frequency network pattern. As school principals become aware of their networking patterns and frequency, school systems can redirect their focus and opportunities to diversify their networking patterns for school improvement.

Further studies need to investigate how to enhance the principals' network use and identify patterns to observe network strengths and weaknesses as they pertain to school improvement and climate. In this endeavor, researchers can work with principals to foster the optimal networks for school improvement, thereby customising unique networks per principal and identifying any common strategies across principals, schools, and districts.

Furthermore, researchers should examine the course content of educational leadership preparation programmes and professional development within school systems as it relates to networking development and execution. Since network capacity is such a vital component to school leadership and improvement, it would be beneficial to help such preparation programmes redirect their content and field experiences so that aspiring school leaders can better develop and diversify their networking patterns. More research is needed that examines to what extent professional development and leadership preparation programmes provide field experiences that focus on building networking capacity.

Limitations

In further describing the context of the study, limitations are presented to provide more insight into the study conducted. Although our study was specifically focused on the networking behaviour of school principals for school improvement, the survey instrument created by the researchers that underwent reliability and validity testing was created to capture a comprehensive account of principal behaviours as measured by the DNA framework (i.e., networking practices in the context of other discovery skills). The DNA framework assesses much more than networking behaviours. Thus, from our survey instrument, we only examined the networking question items. Meaning, there was room to expand further question items on exploring the network behaviour of principals in a much fuller way by making a specific survey instrument about networking behaviours rather than a comprehensive survey instrument measuring all discovery skills of the DNA framework. Additionally, the specific categorical-type questions were objective-based and did not undergo further internal consistency testing.

Another limitation was based on sampling, which relied on one source and during pandemic conditions. However we reasoned because of the pandemic, principals would be willing to share their networking practices for finding viable solutions. We conducted three attempts based on different days of the week and times during the day to reach more principals to participate in our study. These multiple attempts were used to strengthen our one source of information. More time between attempts was given to increase the final sample size but lists of active school principals were constructed from schools in the Southwest and utilised to repeatedly ask principals to participate. Our sampling did occur anonymously and during a pandemic, which limited school-level demographic information (e.g., not distinguishing urban from rural schools) and greatly increased competition for principal participation.

Conclusion

The observance of principal differences between idea generation and receiving feedback can be improved in a way to train and mentor principals into more conducive patterns for school improvement as described by the Discovery Skill of Networking Model. Our findings illustrate that principals are not engaging the full extent of their network for school improvement, which is an indication of how to enhance principals' networking practices using the framework of the study. To provide the next generation of principals with networking practices conducive to school improvement, school systems need to be more cognisant of principals' networking patterns. This study can be used as a starting point to help guide discussion to establish innovative networking practices and help principals tackle 21st-century school improvement issues.

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