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Holistic School Leadership: Systems Thinking as an Instructional Leadership Enabler

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Abstract

As instructional leadership involves attempts to understand and improve complex systems, this study explored principals' perceptions regarding possible contributions of systems thinking to instructional leadership. Based on a qualitative analysis, systems thinking was perceived by middle and high school principals to contribute to the following three areas of instructional leadership: (1) improvement of school curriculum, (2) development of professional learning communities, and (3) interpretation of performance data. Systems thinking as a potential enabler of instructional leadership is discussed and implications are suggested.

Keywords

instructional leadership, systems thinking, school principals

Contemporary school principals are not seen as mere managerial or organizational administrators any longer; at present, instructional leadership is one of their most significant responsibilities (Rigby, 2014; Salo, Nylund, & Stjernstrøm, 2015). They are expected to assume a prominent role as instructional leaders, who continually improve teaching and learning in order to promote high academic achievement levels for all students (DiPaola & Hoy, 2008; Tan, 2012). Thus, effective principals focus on instruction because they know that such focus will affect students the most (DiPaola & Hoy, 2008; Rigby, 2014; Salo et al., 2015; Tan, 2012).

Instructional leadership requires focusing not only on the trees but also on the forest—with the trees being particular situations or limited domains within school life,

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while the forest represents an overall view of the situations and domains that constantly interrelate and mutually affect each other within the school as a whole; thus, systems thinking may be one of its enablers. Being an approach that advocates thinking about any given issue as a whole, systems thinking emphasizes the interrelationships between its components rather than the components themselves. It does not try to break systems down into parts in order to understand them; instead, it focuses attention on the dynamic between the parts as it transpires in networks of interactions (Gharajedaghi, 2011; Senge, 2006). As such, systems thinking has two main complementary meanings: rising above the separate components to see the whole system and thinking about each individual component as a part of the whole system (Shaked & Schechter, 2014).

Systems thinking is considered to be an effective means of facing real-life situations (Brown, 2012; Jackson, 2009). Thus, it has been proposed as a way of assisting managers to deal effectively with contemporary challenges, which often arise in richly interconnected problem situations (Jolly, 2015; Wilson & Van Haperen, 2015). School leaders who face today's educational leadership complexities are among those who could benefit from systems thinking (Fullan, 2005; Senge et al., 2012). Since instructional leadership necessitates seeing the whole picture and discovering the connections between various school elements, this study explored principals' perceptions regarding possible contributions of systems thinking to instructional leadership.

Theoretical Background

Instructional Leadership

In recent years, instructional leadership's importance is increasingly being emphasized within the context of the school principal's role (Hallinger & Wang, 2015; Robinson, Lloyd, & Rowe, 2008). Thus, the requirement for principals to assume the main responsibility for instructional leadership is becoming more common throughout education systems worldwide (Hallinger, 2011; Rigby, 2014). Not many years ago, principals were mostly responsible for keeping students safe, as well as for overseeing and enforcing schedules and school policies. Operational tasks such as ordering supplies and preparing bus schedules were common daily tasks. Today, principals are expected to act as their schools' instructional leaders by promoting the best possible practices in teaching and learning so that students achieve maximal academic success (Seashore Louis, Leithwood, Wahlstrom, & Anderson, 2010). Despite their involvement in many tasks that tend to distract them from this goal, effective principals focus on instruction because they know that such focus will affect students the most (DiPaola & Hoy, 2008; Rigby, 2014; Salo et al., 2015; Tan, 2012).

The degree to which a principal emphasizes teaching and learning transmits a message regarding their importance to the staff. Thus, instructional leadership is a key component of the principal's job, and principals are central figures in school efforts to improve teaching (Mitchell & Castle, 2005; Printy, 2010). Researchers have stressed the importance of instructional leadership as a necessary component of high-quality

teachers' practice (Brazer & Bauer, 2013; Neumerski, 2012), pointing to a positive correlation between instructional leadership and student learning, student achievement, and school improvement (Graczewski, Knudson, & Holtzman, 2009; Leithwood, Harris, & Strauss, 2010; Robinson et al., 2008).

Early descriptions of instructional leadership included behaviors such as communicating the vision of the school's purposes and standards, monitoring student and teacher performance, recognizing and rewarding good work, and providing effective staff development programs (DeBevoise, 1984; Dwyer, 1984). Building on this and other research, Hallinger and Murphy (1985) presented a conceptual framework of instructional leadership. The framework consists of three dimensions: (1) defining the school's mission, ensuring that the school has a clear mission focused on the academic progress of students; (2) managing the instructional program, monitoring and developing the school's instructional program; (3) developing a positive school learning climate, creating an "academic press" through the development of a school climate characterized by high standards and expectations, capacity development, and continuous improvement. This framework is widely used by researchers and practitioners alike (Hallinger, 2011).

Specifically, this study focuses on several key aspects of instructional leadership. First, as instructional leaders, school principals are also expected to serve as curriculum leaders (Jenkins & Pfeifer, 2012). Thus, they must become self-efficacious in knowledge and skills concerning curriculum development (Ediger, 2014; Ylimaki, 2012). Increasing evidence convincingly points to a direct link between the quality of curriculum leadership provided by the principal and the teaching staff's effectiveness. Curriculum is at the heart of teaching and learning, and curriculum leadership skills are an essential part of the leadership tool-box required to help schools meet Adequate Yearly Progress in all student subgroups (Glatthorn & Jailall, 2009). School curriculum is an inherently complex system, typically referring to the knowledge and skills that students are expected to acquire, which include the learning standards and objectives they are expected to meet; the lessons that teachers teach; the assignments and projects required of students; the books, videos, presentations, and reading materials used for study courses; and the exams, assessments, and other methods used to evaluate student learning.

Another aspect of instructional leadership is developing school-based professional learning communities. A professional learning community consists of a group of individuals working together to solve a problem or to achieve a common goal, based on the knowledge that learning takes place through authentic tasks embedded in real life (Webster-Wright, 2009). Learning in such a group takes place through practical experiences, with reflection and mediated discussion having a valuable role in the process (Lieberman & Pointer Mace, 2008). Although researchers and scholars describe professional learning communities in various ways, many of them tend to depict them as groups of people who (1) engage in constant collaborative activities to identify and work toward common goals; (2) co-construct, share, and spread knowledge; and (3) share and reflect on individual practices (Hord, 2009; Wood, 2007a, 2007b). A teaching staff may be seen as a complex system of interrelated and interdependent

professionals who constantly interact with each other. Principals must allow teachers to work continuously as a team, reaching understandings and agreements through reflective dialogue concerning the optimal teaching practices to be used.

One more aspect of instructional leadership is the effective use of externally as well as internally generated data. Instructional leaders use data to reach decisions about a wide range of areas, such as curriculum development, classroom populating, and teachers' placement (Osborne-Lampkin & Cohen-Vogel, 2014). Moreover, research has shown that the principal's support of implementing and sustaining evidence-based practices at school is a critical variable (McIntosh, Kelm, & Canizal Delabra, 2016). The effective use of data, also known as data-wise leadership, is considered to be a key competence in successful instructional leadership (Demski & Racherbäumer, 2015). Since school leaders have access to large volumes of data from a variety of sources, development of their evidence-based ability is necessary (Kensler, Reames, Murray, & Patrick, 2011).

Other instructional leadership practices perceived by teachers to affect student achievement are intellectual stimulation, defined as continually exposing staff to cutting-edge ideas about how to be effective; systematically engaging staff in discussion about current research and theory; involving staff in reading articles and books about effective practices; and principals keeping themselves informed about recent research (Seashore Louis et al., 2010). Supervision of instruction practices is also one of an instructional leader's responsibilities. Such supervision by the principal helps novice teachers become more confident and competent at their jobs and provides them with professional development opportunities. At the same time it also supports veteran, experienced teachers' growth in their teaching practice and prevents burnout (April & Bouchamma, 2015; Range, Scherz, Holt, & Young, 2011).

To become effective instructional leaders, principals need comprehensive theoretical frameworks that are accompanied by complementary strategies (Rigby, 2014; Salo et al., 2015; Tan, 2012). Since instructional leadership involves efforts to understand and improve complex systems, this study explores principals' perceptions regarding possible contributions of systems thinking to instructional leadership.

Systems Thinking

Systems thinking stands in contrast to the reductionism of René Descartes, who lived in the 17th century. The reductionist approach attempts to understand systems by reducing them to their simpler parts. According to this approach, the answer to every "what is this" question would always be "this is what it is made of." Entities of a given kind are considered to be collections or combinations of entities of a more basic kind. Therefore, the best strategy for grasping a complex phenomenon is to attempt to provide an explanation of it in terms of ever-smaller entities (Mazzocchi, 2008; Rosenberg, 2006). In contrast to the reductionist approach, systems thinking is a holistic perspective, which believes that everything is connected to everything else; thus, the only way to fully understand a system is to understand its parts in relation to the whole. While

for the reductionists "the simple is the source of the complex," for systems thinkers "the whole is more than the sum of its parts."

Systems thinking is not a discipline but rather an interdisciplinary conceptual framework used in a wide range of areas; it is a type of orientation toward the world, a model for thinking and learning about systems of all sorts—scientific, organizational, personal, and public (Cabrera & Cabrera, 2015). Thus, the literature on systems thinking encompasses a broad range of fields, yielding a variety of definitions. Primarily representing the interdisciplinary area of systems science, these definitions cover complex systems, cybernetics, and dynamical systems theory, and applications in the natural and social sciences as well as in engineering (Hieronymi, 2013).

Here are some of the definitions and explanations for systems thinking formulated by scholars in the past decades. Senge (1990) defined systems thinking as

> a discipline for seeing wholes. It is a framework for seeing interrelationships rather than things, for seeing patterns of change rather than static "snapshots." It is a set of general principles. . . . It is also a set of specific tools and techniques. (p. 68)

Richmond (1994) claimed that systems thinking is "the art and science of making reliable inferences about behavior by developing an increasingly deep understanding of underlying structure" (p. 141). Checkland (1999) asserted that systems thinking is

> an epistemology which, when applied to human activity, is based upon the four basic ideas: emergence, hierarchy, communication, and control as characteristics of systems. When applied to natural or designed systems, the crucial characteristic is the emergent properties of the whole. (p. 318)

Arnold and Wade (2015) opined that systems thinking is "a set of synergistic analytic skills used to improve the capability of identifying and understanding systems, predicting their behaviors, and devising modifications to them in order to produce desired effects. These skills work together as a system" (p. 675). Despite the absence of a commonly accepted definition for systems thinking, these diverse definitions clearly yield two main complementary meanings: rising above the separate components to see the whole system and thinking about each separate component as a part of the whole system (Shaked & Schechter, 2014). These two meanings of systems thinking—*seeing the whole beyond the parts* and *seeing the parts in the context of the whole*—were used in the current study to explore the concept of "systems thinking."

Through the lens of systems thinking, the multitude of variables existing in any system may be seen as causally related in feedback loops, which consist of outputs of the system that are routed back as inputs, as part of a circuit of causation. The feedback loops themselves interact, and these interactions constitute the structure of the system and determine its behavior (Ford, 2009). Feedback loops challenge the perceived relation between cause and effect, where the first event is considered responsible for the occurrence of the second. From the feedback-loops perspective, understanding the system as a whole is necessary since the first event influences the second, but the

second event also influences the first, leading to a circular series of events (Åström & Murray, 2008). Thus, causation in systems is not wholly obvious and tends not to be direct (Pryor, 2008). Moreover, time may pass between an action and its result; such a delay may create a situation where one can easily underreact or overreact, because the full impact of the action cannot yet be assessed correctly (Senge, 2006).

Several researchers have demonstrated how the application of systems thinking assisted managers in coping successfully with complex situations in a wide range of areas. Systems thinking was found to be an effective way for dealing with heterogeneity of stakeholders (Tejeda & Ferreira, 2014); for explaining a system's complexities (Holmes, Finegood, Riley, & Best, 2012); for facilitating group learning and shared decision making (Van Mai & Bosch, 2010); for taking into account a variety of influencing factors (Andrew & Petkov, 2003); and for increasing coordination and cooperation between authorities and agencies (Leischow et al., 2008). Moreover, researchers have found strong statistical correlations between systems thinking and project performance (e.g., Elm & Goldenson, 2012). Thus, systems thinking was described as an effective approach in the context of business management (Brown, 2012; Jolly, 2015; Wilson & Van Haperen, 2015).

Systems Thinking in School Leadership

Systems thinking in the context of school leadership has not received sufficient empirical attention. Few researchers have examined the uses of systems thinking by school leaders. Kensler et al. (2011), for example, asserted that educational leaders have access to large volumes of data but lack the skills to use them effectively for continuous school improvement, and that therefore systems thinking may help facilitate the development of evidence-based practices. Dyehouse, Bennett, Harbor, Childress, and Dark (2009) argued that systems thinking can provide a framework for representing many of the components in a complex curricular program and may serve as a more precise and explicit method of interpreting and assessing program results than existing methods. Wells and Keane (2008) demonstrated how Senge's (2006) "laws" of systems thinking may be implemented to develop professional learning communities in school systems. Within the context of the No Child Left Behind federal legislation in the United States, systems thinking was proposed as useful for improving public relations (Chance, 2005). Systems thinking was claimed to help educational leaders to see public relations as a continual, systematic process that is essential for engaging the school community's support to improve students' learning.

One of the rare studies that focused on quantitative measurement of the effectiveness of systems thinking's application as a holistic educational leadership approach was conducted by Nicholas Pang and John Pisapia (2012a, 2012b). Using the Strategic Thinking Questionnaire (Pisapia & Reyes-Guerra, 2007), they found that according to Hong Kong principals' self-reporting, the school principal's holistic leadership approach based on systems thinking was the strongest predictor of school leaders' effectiveness, distinguishing between more effective and less effective leaders. In addition, school leaders who demonstrated more extensive use of systems thinking

also reported taking more frequent actions to accomplish the school's goals, develop a learning organization that continuously transforms itself, and ensure trust and emotional commitment to the school's aspirations and values among the teaching staff.

Several books about systems thinking in school leadership are available (e.g., Hoban, 2002; Senge et al., 2012; Zmuda, Kuklis, & Kline, 2004). Some of them recommend using systems thinking for successful educational reforms. For example, the focus of Michael Fullan's (2005) book, *Leadership and Sustainability: System Thinkers in Action*, lies on the sustainability of educational reform. Fullan argues that school improvement is too often temporary and that systems cannot achieve real progress in their desired change unless they foster a sustainable agenda, referring to large-scale long-lasting reform. In his view, sustained school improvement requires "system thinkers" who can address the entire system at all levels: school and community, district or local education authority, and state or national policy. Systems thinkers know that all three of these levels influence each other. Furthermore, they proactively and naturally take into account large portions of the educational system because they know that context matters, for better or for worse, and that part of their work involves changing the context, which can only be accomplished by taking action in the broader contexts. Thus, according to Fullan, school principals should be almost as concerned about the success of other schools as they are about their own schools, because sustained improvement of their own schools is not possible unless the entire system is moving forward. That is, principals must understand not only their own reality and work but also re-imagine the whole system at the same time, thus expanding principals' perspective beyond school boundaries (see also Fullan, 2004). Being a district and system player, looking out to improve within, is one of the keys to maximizing the principal's impact (Fullan, 2014). Similarly, Alan Daly and Kara Finnigan (2016) argued that in order to raise education outcomes, a system-wide—rather than school-by-school—improvement is required. Without a broad leadership view of the whole system, there will be no real change in schools that do not function properly.

In our previous study (Shaked & Schechter, 2014), we described the four major ways in which school leaders apply the systems thinking view and perform at the systems thinking level. (1) The first characteristic of systems thinking leaders is the capacity for *leading wholes*—a holistic point of view oriented toward seeing the big picture and not only its individual parts. Such principals conceptualize all aspects of school life as one large system. (2) The second characteristic—*influencing indirectly*—refers to leaders' ability to address the school's tasks and challenges circuitously. This strategy is based on their awareness that countless reciprocal influences are at play among various school elements, each of which is connected to others, affecting them and being affected by them. (3) The third characteristic—*adopting a multidimensional view*—refers to seeing several aspects of a given issue simultaneously. Effective principals notice a wide range of reasons for a given issue's emergence and existence, take into account a variety of its consequences, and predict various options for its future development. (4) The fourth characteristic—*evaluating significance*—considers elements of school life according to their significance for the entire system. Principals distinguish between important and less important issues to be resolved, identifying patterns. Since holism is

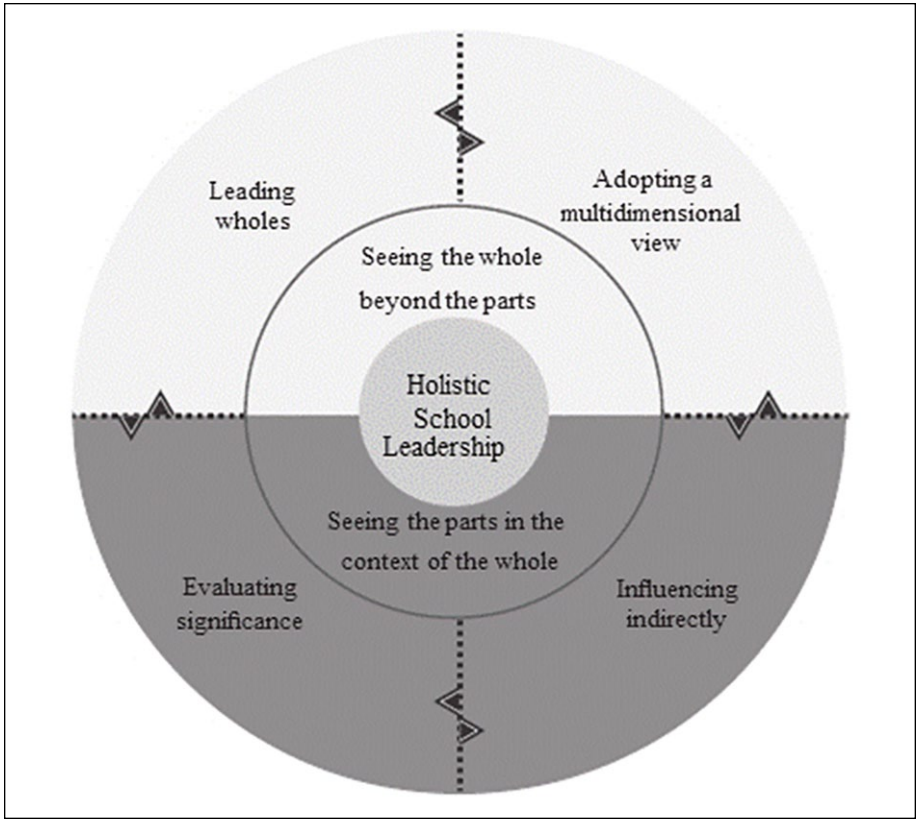

Figure 1. Characteristics of *Holistic School Leadership* according to the meanings of systems thinking.

the epistemological basis of systems thinking, our systems-thinking approach for school leadership is termed *Holistic School Leadership*, whereby educational leaders lead schools through the systems-thinking framework (Shaked & Schechter, forthcoming). These four characteristics are related to the two major meanings of systems thinking. As illustrated in Figure 1, *leading wholes* and *using a multidimensional view* reflect *seeing the whole beyond its parts*, while *influencing indirectly* and *evaluating significance* are related to *seeing the parts in the context of the whole*.

In sum, the literature about systems thinking in school leadership is meager. In particular, the role that systems thinking may play in enabling instructional leadership practices has not been studied so far. Since instructional leadership enactment requires principals to optimize the entire system as a whole, and the curricular and professional elements in the context of the general functioning of the school, our study seeks to explore principals' perceptions regarding possible contributions of systems thinking to instructional leadership, filling in existing gaps in the available knowledge.

Research Context

The current study focused on Israeli school principals. The national school system in Israel serves about 1.6 million students, with approximately 73% in the Jewish sector and 27% in the Arab sector (Israeli Central Bureau of Statistics, 2013). According to the Gini coefficient for measuring a nation's distributive inequality, Israel is among the countries with the broadest gap between rich and poor, alongside the United States and Mexico (Organisation for Economic Co-operation and Development, 2011, 2016). Mindful of the great diversity among school populations, recent educational policy in Israel has been directed toward achieving high levels of equality in educational outcomes across the board, thus aiming to narrow the achievement gap upward through growing performance pressure. In practice, however, Israeli student achievements are still characterized by a low level of achievement combined with a growing achievement gap, as evidenced in various international comparative examination studies (BenDavid-Hadar, 2016).

The Israeli educational system is highly centralized (Inbar, 2009), with Ministry of Education control extending to writing and distributing curricular materials, standards, testing, and hiring and firing of school staff. While all schools follow a basic national curriculum, they do have the freedom to specialize (e.g., in the arts, environmental studies, or other subjects) in accordance with Ministry guidelines. In recent years, a relaxation of registration-by-zone in urban schools has resulted in increased competition among schools. This more flexible policy has not affected suburban and rural schools, which operate in a less competitive environment. The flexible registration (urban context) has been coupled with attempts to decentralize the school system through efforts such as school-based management and school autonomy. The Ministry of Education has a declared policy of enabling school autonomy; yet principals hesitate to act autonomously because, in reality, the Ministry does not seem to be relinquishing control (Inbar, 2009; Nir, Ben-David, Bogler, Inbar, & Zohar, 2016).

The primary role of Israeli school principals as articulated by Capstones, the institute that spearheads school principals' development in Israel, is to serve as instructional leaders in order to improve the education and learning of all students. Four additional areas of management support this function: designing the school's future image—developing a vision and bringing about change; leading the staff and nurturing its professional development; focusing on the individual; and managing the relationship between the school and the surrounding community (Capstones, 2008).

Method

The goal of the current study was to explore possible benefits of systems thinking to instructional leadership, which is an area that has not yet been studied empirically. Like most research on systems thinking (e.g., Frank, 2012; Hung, 2008; Taber, 2007; Zulauf, 2007), the present study was qualitative in nature so as to provide rich textual descriptions of the complex ways in which people experience a given issue or situation. Thus, we explored the meanings that school principals attach to issues and

situations involving the use of systems thinking for instructional leadership (Taylor, Bogdan, & DeVault, 2016).

Participants

Seeking to maximize the depth and richness of data, we used maximal differentiation sampling (Creswell, 2014), also known as heterogeneous sampling. This is a purposive sampling technique employed to capture a wide range of perspectives, thus gaining greater insight into a given phenomenon by contemplating it from various angles (Merriam, 2009). Maximal differentiation sampling was implemented in this study regarding principals' gender, years of teaching experience, years of experience as principal in general, years of experience as principal in the current school, school level (middle school vs. high school), and geographical district. We did not begin the study with a set number of participants—in fact, we defined the study sample on an ongoing basis as it progressed (Taylor et al., 2016). In practice, we approached 61 school principals until we obtained 39 of them who qualified for diverse sampling. Thus, the 39 participating school principals (26 women, 13 men) were from all school districts. They worked in middle schools ($n = 11$) and high schools ($n = 28$). On average, participants had 22 years of teaching experience (range = 9-34), and 7 years of experience as principals (range = 2-17).

Data Collection

Data were collected through interviews and focus groups. All 39 participants were offered the option of participating in a focus group. Nine principals whose schedules allowed them to participate did so, forming two focus groups of 4 and 5 principals each. The remaining 30 principals who could not participate in the focus groups were interviewed. The semistructured method was found to be most appropriate for this study's purpose. Both interviews and focus groups were semistructured, allowing new ideas to be brought up during the interview/focus group as a result of what study participant said (Merriam, 2009). The central questions were preplanned, though the interviews and focus groups were also conversational, with questions flowing from previous responses when possible. Interviews and focus groups were audiotaped for later transcription and analysis, with participants' consent. Interviews with principals generally lasted 1 hour, and focus groups generally lasted 2 hours. Focus group participants did not know each other.

During both interviews and focus groups we intentionally avoided mentioning the term "systems thinking" so as to prevent priming interviewees to frame their discussions in light of this concept. Without saying so explicitly, we tried to bring interviewees to talk about systems thinking by asking questions pertaining to instructional leadership in general, such as the following: "How would you explain your role as a principal to someone else in another field?" "What sorts of issues do you regularly spend time on? What kinds of tasks would you eliminate from your routine if you could? Why?" "What does professional development of teachers means to you?"

"How do you work to improve student achievements?" Only the last part of each interview and focus group used the term "systems thinking."

Data Analysis

Data analysis was a three-stage process—condensing, coding, and categorizing. Once data were collected, we found that not all of it could serve the purpose of the study, necessitating a sorting process (Miles, Huberman, & Saldaña, 2014). Thus, during the first stage of analysis (condensing), we sought the excerpts of data relating in any way whatsoever to systems thinking in instructional leadership, which was the topic of the study. During the second stage (coding), each segment of relevant data (utterance) was coded according to the aspect of systems thinking which it represented (Gibbs, 2007). This stage, contrary to the previous one, was data-driven and not theory-driven because we did not use a priori codes but rather inductive ones, developed by direct examination of the perspectives articulated by principals (Flick, 2009; Marshall & Rossman, 2011; Rossman & Rallis, 2012). After having captured the essence of utterances in the second stage, in the third stage (categorizing) we clustered similar utterances together in order to generalize their meanings and derive category definitions. At this point we reworked categories to reconcile disconfirming data with the emerging analysis.

To ensure trustworthiness, a member check was held, giving the data, transcription, and tentative themes to participants and asking for their feedback (Schwartz-Shea, 2006). Transcripts were sent back to participants, along with a request to evaluate their responses and make any necessary additions or refine their responses if needed. Using this strategy allowed for an examination of the descriptive data versus participants' reactions, thus endorsing and solidifying principals' perceptions regarding their leadership role. Fifteen participants changed their answers, clarifying their remarks and adding things they forgot to say.

In a qualitative exploration, the researchers should pay attention to how their backgrounds and personal experiences influence the theoretical and methodological perceptions related to the inquiry. As the researchers in this study, we come from different backgrounds: one of us was a school principal for 17 years and is currently an educational leadership researcher, while the second gained extensive experience in educational leadership research. Our joint work, which includes ongoing mutual reflection, allowed us to become more aware of the conceptual and methodological issues pertaining to the current research. Specifically, as reflective journals have been recognized as an important aspect of qualitative research (Etherington, 2004; Ortlipp, 2008), we wrote and shared our reflective journals throughout the study to ensure critical thinking.

Findings

Based on the qualitative analysis of the data derived from the current study's participants, systems thinking was perceived by principals to enhance the following three areas of instructional leadership: (1) improving school curriculum, (2) developing

school-based professional learning communities, and (3) using performance data. Although these areas are distinct, they are closely interrelated in the context of principals' instructional leadership role.

Systems Thinking and School Curriculum

Findings emerging from the data analysis indicated that systems thinking was perceived by school principals as enabling the holistic development of school curriculum. Emphasizing the importance of the whole and the interdependence of its parts, systems thinking assists school leaders in grasping the big picture of both curriculum components and the interrelationship between the curriculum and other school issues. This notion was mentioned by 18 principals.

From the systems thinking perspective, coordination is a key issue that principals must understand and address. Principals often review curricula, and they also usually review teaching practices. Obviously, they review student achievements too. However, systems thinking facilitates the coordination of these different aspects. The coordination of curriculum, instruction, and assessment reflects *seeing the whole beyond the parts*, which is one of the two main meanings of systems thinking.

Linda, for example, a high school principal with 12 years of experience, focused on coordinating school curriculum, teachers' mode of instruction in class, and assessment of student learning. In her view, beyond improving each of these areas separately, the principal should make sure they fit in with each other:

> Many things affect student achievement: the annual teaching programs must be well prepared, the teaching methods to be used have to be updated and student-centered, etc. However, to improve student achievements, which is the ultimate goal of all our work here, I cannot deal with each of these topics separately; standards, curriculum, instruction and evaluation must be combined. They're different dimensions of the same issue.

Linda sought to coordinate curriculum, instruction, and assessment. Moreover, since improving student achievements is the goal, and this goal is measured by standard-based assessments, the curriculum, instruction, and assessments must be aligned with the standards. Linda's point of view reflects systems thinking, which claims that an improvement process must be holistic. From the systems thinking perspective, improving each component separately will not result in improvement of the whole, since the whole is more than the sum of its parts. Moreover, to improve the whole, what must be optimized is mainly the interaction among its parts. Linda implemented this perspective to enhance student achievements; she did not address each step in the process separately but rather increased the interaction between them.

Similarly, Lisa, a high school principal with 8 years of experience, believed that if there is a disconnect between standards, curriculum, instruction, and evaluation, student achievement levels will not rise. For her, the coordination of these elements is an ongoing process, since curriculum, teaching practices, and evaluations cycle through improvements. Moreover, Lisa did not consider the coordination of standards,

curriculum, instruction, and assessment to be a task that should employ her exclusively. Instead, she regarded this as an issue to be dealt with by all teachers:

> I established staff meetings during which teachers work together to interpret the standards, study the curriculum, share effective teaching strategies, examine benchmarks, and analyze student work. I want the teachers to see the connections between all the links of the chain, because they are all dependent on each other.

Lisa not only coordinated standards, curriculum, teaching, and assessment but also developed a professional learning community. As will be explained below, developing a professional learning community may also be seen as an expression of systems thinking.

Also Jacob, a middle school principal with 7 years of experience, perceived standards, curriculum, teaching, and assessment as intertwined:

> The assessment tasks are integrated into the learning-teaching-assessment process. The assessment provides teachers and students with performance data regarding their progress toward achieving the standards, and this data is utilized to judge the effectiveness of the curriculum, the materials being utilized, and the mode of instruction. I would say that the assessment provides us with the diagnostic information that assists us in identifying strengths and weaknesses in order to establish priorities while planning our educational work.

Systems thinking involves seeing separate events as parts of an ongoing process. According to Jacob, seeing teaching, learning, assessment, and improvement of curriculum and instruction as an interactive process provides a form of holistic thinking toward improving school curriculum.

The systems thinking perspective also facilitates holistic development of curriculum among the different age levels. The school headed by Patricia, a high school principal with 6 years of experience, is divided into three units, with each two-grade level comprising a separate unit. Performing at the systems level, Patricia considered the curriculum of the different units to be parts of one continual process. Thus, she expected teachers to be familiar not only with their own students' curriculum but also with that of all grades in school:

> The syllabus for all age levels is cyclic, meaning that we always review the previous material when we are about to teach a new subject. The problem is that in our school there's a break between every two levels. But you are not only the teacher of your own pupils; you are a team member. Teachers should know a bit more than just what happens in their own classroom, because the curriculum of all age levels is actually a continuous one.

Patricia considered the curriculum to be spiral, with material being revisited repeatedly over the years rather than learned once within a short period of time. Put differently, she did not see each grade-level's curriculum as standing on its own. Instead, she saw it holistically, demonstrating *seeing the whole beyond the parts*, which is one of the two main meanings of systems thinking. Similarly, she implemented her systems

thinking view regarding the teaching staff. Instead of seeing each teacher as working with a particular age group only, her view was holistic, regarding each teacher as one who works in the whole united entity which is the school.

A holistic approach in connection with the various disciplines comprising the curriculum was articulated by Robert, a school principal with 5 years of experience, who spoke about his middle school students' reading skills. In elementary school, students unlock the secrets to decoding words and putting them together to read sentences and paragraphs. Moving into middle school, they acquire the skills needed for delving into more sophisticated literature. For Robert, developing reading skills among middle-school students should be done not only in reading lessons, but during all other lessons as well:

> This is the time when our students develop their advanced reading skills, which allow them to master the contents of various disciplines. Thus, developing reading skills is not a matter for reading lessons only. The strategies imparted in reading lessons must be applied in all classes, otherwise they may be worthless.

Claiming that reading skills cannot be acquired by middle school students without being exercised in all classes, Robert saw reading lessons as part of a broader learning process. In other words, he felt the importance of what was being learned in reading lessons for other lessons, demonstrating *seeing the parts in the context of the whole*, which is one of the two main meanings of systems thinking.

In sum, principals' perceptions suggest that systems thinking may contribute to instructional leadership as it enables the development of school curriculum holistically. This holistic lens facilitates the recognition of the interrelations between the curriculum of different disciplines and different age levels, as well as the interrelations between the curriculum and other school aspects.

Systems Thinking and Professional Learning Communities

In a school-based professional learning community, the school staff finds itself asking: Which of our school's features and practices have been most successful in helping students attain high levels of achievement? How could we adopt these characteristics and practices in our own school? What commitments would we have to make to one another to create such a school? Which indicators could we monitor to assess our progress? When the staff has compiled shared knowledge and found common grounds on these questions, the school will have a solid foundation from which to move forward with its improvement initiative. According to the data analysis of principals' perceptions, systems thinking can nurture and be nurtured in school-based professional learning communities, where educators collaborate to improve teaching skills and students' academic performance. This notion was mentioned by 18 principals.

Educators who are forming a professional learning community must work together to achieve their collective purpose of quality learning for all students. For this purpose, school leaders have to promote a collaborative atmosphere. During a focus group

Elizabeth, a high school principal with 13 years of experience, proposed a conceptual basis for forming a professional learning community at school:

> I believe that a school teacher is not only the teacher of her own students; she is a part of the school team, which is responsible for all students' learning. For this reason I expect every professional in the school to engage with colleagues in an ongoing exploration of crucial questions that drive our work, because if you like it or not—you are part of a joint development process of the whole school.

Elizabeth regarded teachers as members of one large organization that operates as a whole, meaning that all teachers should help improve the entire school together. A single teacher should focus not only on his or her position but rather feel responsible for the whole school's output, and therefore engage in collaborative learning. This point of view, which considers each teacher as a part of a whole team, reflects *seeing the parts in the context of the whole*, which is one of the two main meanings of systems thinking.

Edward, an elementary school principal with 13 years of experience, participated in the same focus group meeting, and he too linked the idea of a professional learning community to the systems thinking framework:

> Some teachers are so loyal to their specific jobs that they are not concerned with how their decisions impact any other teachers or classes in the school. They have little or no sense of responsibility for the results attained by students of other classes. I believe that by working as a learning community, teachers will see the school as a whole interacting organization, where each decision is evaluated according to the way in which it impacts the whole.

Edward claimed that when teachers primarily focus on their own positions and responsibilities, they may miss out on the bigger picture. Like Elizabeth, Edward's conceptual basis for developing a professional learning community reflects *seeing the parts in the context of the whole*, which is one of the two main meanings of systems thinking. However, for Edward systems thinking also results from working together in a professional learning community, because teachers who are encouraged to see not only their own jobs but rather the purpose of their school as a whole are likely to develop a systemic perspective.

Alan, a middle school principal with 5 years of experience, also explained the need for a professional learning community:

> In my opinion, principals should not impose their own predetermined way. They must respect various voices, and work to establish a common path. They should lead from the center rather than from the top, and concentrate on presenting core questions. I believe that joint discussion of these questions will result in better school performance.

Alan justifies the establishment of a professional learning community without redefining the meaning of being a school teacher as Elizabeth and Edward did.

Instead, he redefines the meaning of being a school principal. According to Alan, the principal does not have to be the smartest person in the room; the kind of wisdom that the principal needs is collective, facilitating dialogue and collaboration among the teaching staff. However, like Elizabeth and Edward, Alan's position also represented systems thinking, as he emphasized mainly the whole and the interactions between its parts.

Not only does systems thinking provide the conceptual justification for the foundation of professional learning communities, but it also increases the principal's willingness to consider others' opinions. A principal who understands that each situation within the system has several aspects and several possible implications seeks to understand the full picture by listening to varied points of view. In this context, William, a middle school principal with 6 years of experience, stated,

> A school principal who thinks that he knows everything about teaching and learning, and that there is nothing left for him to learn, will become "stuck" and eventually "expire." Instead of operating as a "lone ranger" and feeling like I must know it all, I get the teachers to think about school improvement together with me.

According to William, principals should not think that they know everything about school improvement. Instead, they should constantly learn from the people around them, establishing collaborative learning. Willingness to reach decisions while taking others' opinions into account reflects *adopting a multidimensional view*, which as noted above is one of the characteristics of systems thinking among school leaders.

Susan, a high school principal with 8 years of experience, described how seeing the big picture encouraged the teachers at her school to participate in professional collaborative learning:

> Teachers sometimes grumble about the many meetings and discussions in which they must participate at school. However, when I established our professional learning community, the discussion on the broad topics of the school's goals, and the actual results of the efforts to attain them, motivated them to participate, because it enabled them to see their own specific work in the context of the whole system. That gave meaning to their concrete educational work, beyond the usual limited point of view.

According to Susan, the broad perspective of the whole system provides deeper meaning to the daily minutiae. This reflects *seeing the parts in the context of the whole*, which is one of the two main meanings of systems thinking.

To summarize, principals' perceptions suggest that systems thinking can contribute to instructional leadership by facilitating the development of professional learning communities. Systems thinking provides the conceptual basis and the motivation necessary for turning the teaching staff into a learning community, also increasing the principal's willingness to consider a variety of opinions and perspectives.

Systems Thinking and Interpreting Performance Data

As schools face increasing pressure to improve student achievements, the use of data has become more central to the way principals evaluate teachers' practices and monitor students' academic progress. Armed with data and the means to harness the information it can provide, principals can make instructional changes aimed at improving student achievements, such as prioritizing instructional time, refining instructional methods, and dedicating additional individual instruction time to students who are struggling with particular subjects. Principals' perceptions suggest that systems thinking facilitates data analysis and evidence-based decision making. This notion was mentioned by 14 principals.

As aforementioned, one of the characteristics of systems thinking in school leadership is *adopting a multidimensional view*. When a principal considers a single occurrence at school to have several causes and therefore views a single explanation for it as unsatisfactory, he or she is exhibiting a multidimensional view. John, a high school principal with 5 years of experience, offered the example of a meeting intended to discuss the school's results on the national language examinations. The results were not as good as the teaching staff believed they could have been. During the discussion some staff members pointed to "the sole and exclusive explanation" for this: One teacher said that the reason for the poor achievements was the lack of an instructional coordinator; another claimed that the school simply did not allocate a sufficient number of hours to language classes; and still another teacher claimed that the teachers are not professional enough. John criticized this way of thinking:

> There's always somebody, or a few somebodies, who know the exact cause for the problem at hand. I believe there's never one single reason for anything that happens in a school, or anywhere, for that matter. A school is such a complicated entity, consisting of so many components that influence each other, that there are always quite a few reasons for anything that occurs in it. Of course, some of the reasons are primary and some are secondary. However, to improve our achievements, we must avoid pointing to one single reason for anything, because looking for such a reason without considering all the varied factors influencing student achievements makes it difficult to attain a full explanation of our results.

John was capable of juggling several notions at once regarding his school's disappointing results on the national examinations, believing that no single reason exists for anything that happens in a school. In his view, whenever you want to improve student outcomes, you must take into account the whole spectrum of factors that may be affecting them.

In order to improve student achievements, school leaders should monitor not only the achievements themselves but also various factors affecting them. Systems thinking facilitates the integration of a wide range of data, as illustrated by George, a high school principal with 14 years of experience. George described how he derived meaning from his school's annual external evaluation exams, which measure three main elements: student achievements, pedagogical environment, and school climate:

> The most important thing in this report, for me and for my superiors too, is student achievements. Now, to understand why we got the results we did, I looked for patterns in the data. I examine in which areas the results are similar to the scores on the achievement tests, and when I find similar patterns I understand the connections between climate, pedagogy and outcomes.

Seeking to identify patterns in the information available to him, George demonstrates systems thinking, which involves distinguishing recurring patterns and linking various elements in school life together in order to derive meaning from their combinations. Identifying major patterns in the data enables the principal to look for the fundamental causes of the exam results rather than referring to symptoms, thus facilitating the treatment of problems from their roots.

When schools invest efforts in improving student achievements, they obviously expect to attain better future results. From the systems thinking perspective, school principals must understand that acting toward the improvement of student achievements often does not yield immediate results. Problems may arise when principals are not aware of the impact of this delay on the process of improving achievements, in which case they may give up on it entirely. Barbara, a middle school principal with 11 years of experience, analyzed her high school's assessment data. Her school was in the midst of a large-scale change, and the results seemed quite disappointing. Barbara did not give up:

> We need to carefully examine what we are not doing right. Our improvement efforts require a considerable investment of resources, time and purposeful attention, and the results are indeed disappointing. However, I believe they may be noticeable only after a while. We have to make decisions with discretion, and not shelve our improvement plan too early.

Barbara had taken the available data to heart. Nevertheless, she adjusted her decisions to her knowledge that there may be a case of delayed feedback here, as such time-lags between the action taken and the appearance of its expected results do occur. Thus, she was not tempted to overreact, which could have caused the system to retreat.

To summarize, principals' perceptions suggest that systems thinking may contribute to instructional leadership by enabling school leaders to use available data wisely. It allows one to take a wide variety of available factors into consideration, facilitating better data analysis and evidence-based decision making.

Discussion

This study aims to explore systems thinking's possible contributions to instructional leadership. Principals' voices suggest that systems thinking may serve as a potential instructional leadership enabler in three main areas: (1) improving school curriculum, (2) developing a school-based professional learning community, and (3) interpreting performance data effectively. As aforementioned, instructional leadership involves

various practices. As part of their instructional leadership, school principals are expected to serve as curriculum leaders (Jenkins & Pfeifer, 2012). Another aspect of instructional leadership is developing a school-based professional learning community, which can facilitate teachers' ongoing work processes by assisting them in reaching agreement upon the best teaching practices possible through reflective dialogue and action research (Anderson & Herr, 2011; Dufour, Dufour, Eaker, & Many, 2010). Effective use of data is also an aspect of instructional leadership (Demski & Racherbäumer, 2015). Other instructional leadership practices are intellectual stimulation, specified as exposing teachers to cutting-edge ideas regarding how to be most effective, engaging teachers in discussion about current research and theory, involving teachers in reading articles and books about effective practices, and principals keeping themselves informed on the latest research (Seashore Louis et al., 2010). Supervision of instruction is also one of an instructional leader's responsibilities (April & Bouchamma, 2015; Range et al., 2011). This study's findings suggest that systems thinking was perceived by principals as pertaining to some facets of instructional leadership, albeit not to all of them. For example, the principals' utterances did not point to systems thinking as enabling intellectual stimulation nor to supervision of instruction.

Analyzing principals' perceptions, systems thinking may facilitate some core activities of school-leaders as they strive toward improving teaching and learning. Thus, it may be seen as one of the enablers of instructional leadership. At the same time, systems thinking may result from other factors, or even from instructional leadership itself, as it delineates behaviors and ways of thinking that require principals to connect the various components of schools in a cohesive manner. For example, principals' systemic views may contribute to the structure and culture of productive learning communities focusing on teaching and learning, while productive learning communities can nurture administrators' and teachers' holistic perceptions of schoolwork. Therefore, systems thinking and instructional leadership may be seen as interrelated, influencing each other in various ways.

This study holds theoretical and practical implications. Systems thinking is considered effective in facing real-world situations (Brown, 2012; Jackson, 2009). Thus, it has been recommended as a way to deal effectively with contemporary management challenges (Jolly, 2015; Wilson & Van Haperen, 2015). Several scholars have suggested ways to implement systems thinking in the school setting, offering practical advice on using systems thinking to confront today's educational challenges and expectations (e.g., Fullan, 2005; Hoban, 2002; Senge et al., 2012; Zmuda et al., 2004). According to the current study's findings, systems thinking is a possible enabler of instructional leadership, helping today's principals to fulfill one of their important missions.

As aforementioned, several researchers have examined the uses of systems thinking by school leaders. Kensler et al. (2011), for example, asserted that systems thinking may help facilitate the development of evidence-based practices. Dyehouse et al. (2009) argued that systems thinking may serve as a method of interpreting and assessing program results than existing methods. Wells and Keane (2008) demonstrated how Senge's (2006) "laws" of systems thinking may be implemented to develop

professional learning communities in school systems. According to the statements of this study's participants, systems thinking is not a *tool* for school leaders but rather a school leadership *approach*, where the term "approach" refers to a comprehensive way of both conceptualizing and practicing within the entire work setting. Systems thinking may be seen as a worldview or perspective about school leadership, which offers a way to consider events, people, and processes. It may suggest an effective way to reference everyday school life, ongoing management issues, and numerous diverse aspects of principals' work (Shaked & Schechter, forthcoming).

Practically, considering systems thinking as a possible enabler of instructional leadership may be used to select new school principals. Selection of the right candidates for school leadership positions renders a significant impact on school performance. Thus, well-defined screening and assessment processes to select the optimal school leaders are crucial for establishing and sustaining successful schools. Moreover, whereas we consider systems thinking as an enabler of instructional leadership, developing systems thinking during preparation programs may allow prospective principals to acquire an enhanced instructional leadership capacity. In fact, developing systems thinking may be valuable not only for future principals but also for expanding instructional behaviors among performing principals (Shaked & Schechter, forthcoming). The development of systems thinking among present and future principals can be done in several ways. First, Zulauf (2007) claimed that systems thinking can be acquired through learning, so that academic study may be considered one of its sources. Several methods for teaching systems thinking have been proposed, such as hypermedia (Thurston, 2000), metaphors (Taber, 2007), case studies (Blizzard, Klotz, Pradhan, & Dukes, 2012), hybrid models (Levin & Levin, 2013), and modeling (Hung, 2008). Beyond the question of method, the constructivist approach emphasizes the importance of learning in a meaningful context rather than abstract instruction (e.g., Keaton & Bodie, 2011; Powell & Kalina, 2009). The study of new methods as decontextualized knowledge is less effective than learning them by linkage to authentic situations (Marlowe & Page, 2005). According to this approach, school principals' development of systems thinking due to formal learning may occur mainly in the context of their active educational work. The connection to school's daily challenges is central to such learning.

In addition, Davidz and Nightingale (2008) have revealed that the primary mechanisms enabling systems-thinking development in engineers include experiential learning, which incorporates both work experience and life experience. School leaders may also develop their systems-thinking abilities through managerial experience, gained due to leadership roles within the school or even beyond the school system. Thus, it may be beneficial to add a work-experience internship requirement to principal preparation programs, aiming to provide school leaders with on-the-job managerial training in systems thinking. By doing so, aspiring principals will be expected to put into practice the systems-thinking skills they have learned (Shaked & Schechter, forthcoming).

Role modeling also contributes to the development of systems thinking (Shaked & Schechter, forthcoming). Thus, mentoring carries significant benefits for school leaders. To ease the novice principals' adjustment to their new role, it is becoming increasingly

prevalent for them to be paired up with an experienced mentor (Wallace Foundation, 2007), which is consistent with findings that new principals feel that mentoring programs are necessary for their professional development during their first years on the job (Zepeda, Bengston, & Parylo, 2012). A mentor as a role model who demonstrates a high level of systems thinking may contribute to the beginning school leader's systems-thinking development.

Compared with prior studies, this study provides new data on the possible contributions of systems thinking to instructional leadership. However, further research is required since the data were collected in a particular context, so that their cross-cultural validity was not proven. Replicating this study elsewhere in various sociocultural contexts will enable generalization of the findings to broader populations, possibly substantiating their international validity. In addition, since this research focused on principals' verbal descriptions of systems thinking in instructional leadership, further research could complement principals' verbally expressed perceptions with more objective research methods such as direct observations. Moreover, a comparison of this study's conceptual framework according to principals' characteristics (e.g., gender, education, experience) and school characteristics (e.g., age level, socioeconomic status) was beyond the scope of the current study, requiring further research. Finally, longitudinal studies, including repeated data collection among the same school principals in order to explore their instructional leadership capacity within the systems-thinking framework, would also be useful.

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