

**Exploring systems thinking in school principals' decision-making**

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School principals' decisions are made within the complex organizations called schools. This study explored how systems thinking is reflected in principals' perceptions about their decision-making processes. Based on a qualitative analysis of interviews and focus groups, principals' descriptions of their own effective decision-making reflected systems thinking in the following three areas: (1) expanding the number of choices; (2) identifying possible consequences of various alternatives; and (3) seeking and analysing relevant information. As school is an inherently complex organization, the findings of this study shed light on the connection between the complicated nature of principals' decision-making and systems thinking. Implications and further research are discussed.

Keywords: systems thinking, school principals, decision making

### **Exploring systems thinking in school principals' decision-making**

Making decisions is one of the most important roles of a school principal (Hoy & Tarter, 2004; Shapiro & Stefkovich, 2016). It is also one of the toughest and riskiest parts of the job; bad decisions could damage a school and a career, sometimes irreparably (Johnson & Kruse, 2009; Marzano, Waters, & McNulty, 2005). Where do bad decisions originate? Many scholars agree that bad decisions are not necessarily indicative of bad intentions (Pettigrew, 2014). However, in many cases bad decisions can be traced back to the way in which they were made—i.e. the possible alternatives were not well recognized or understood, the wide range of consequences was not adequately considered, and the pertinent information was not fully collected (Walter, Kellermanns, & Lechner, 2012; Robbins & Judge, 2012; Yukl, 2013).

Principals' decisions are made within the complex organizations called schools (Johnson & Kruse, 2009). Life at school is composed of a great many events, people and processes. At any given moment, there are many varied occurrences taking place at any given school, which together constitute the school routine. Due to the interconnections within the school, each realm of activity affects other realms, for better or for worse. Moreover, a wide range of stakeholders has conflicting needs and desires (Ewy, 2009). Within this complexity, systems thinking may facilitate effective decision-making as a means for achieving the school's intended or expected results.

As an approach advocating the consideration of any given issue as a whole, systems thinking emphasizes the interrelationships between the system's 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 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). Specifically, several studies proposed systems thinking as a framework for decision making (Carlman, Grönlund, & Longueville, 2014; Pagani & Otto, 2013; Schiuma, Carlucci, & Sole, 2012; Yurtseven & Buchanan, 2016).

School leaders are constantly required to make decisions ranging from trivial issues right up to weighty ones, thus they could benefit from systems thinking (Senge et al., 2012). The present study seeks answers to the question of how systems thinking is reflected in principals' perceptions regarding decision-making processes. This exploration may contribute to both the extremely limited knowledge and to possible practical applications of systems thinking in school administration.

### **Theoretical background**

The theoretical background below will explain the complexity of principals' decision-making. Thereafter it will present the systems thinking framework, which may help principals in decision-making processes. Finally, it will discuss the need for additional literature on systems thinking in school leadership. The literature on these topics will be utilized to explore how school principals perceive systems thinking regarding their decision-making processes.

#### **School principals' decision-making**

Decision making is the process resulting in a conscious selection between several alternative possibilities in order to achieve a desired state in a given environment (Robbins & Judge, 2012; Yukl, 2013). Every decision-making process produces a final choice, which may or may not prompt action. Decision making is based on the values, preferences and explicit or tacit knowledge of the decision maker (Beach & Connolly, 2004; Walter et al., 2012).

Specifically, a decision making process involves five steps: (1) defining the problem; (2)

identifying the alternatives; (3) determining the criteria; (4) evaluating the alternatives; (5) choosing an alternative. This process may be seen as consisting of two parts: the first three steps are about structuring the problem, and the last two are about analysing the problem (Anderson, Sweeney, Williams, Camm, & Cochran, 2016). The need for a decision arises when internal or external changes surface, or when an earlier decision is found to be wrong or fails to produce the intended results. To make sense of these changes, the decision maker puts events in the proper context in order to draw on previous experiences and decide what to do next (Weick, 2009). The literature on the process of decision making draws attention to its complexity (Johnson & Kruse, 2009).

Decision making of school principals, which has been described as the 'sine qua non' of educational leadership (Davis, 2004, p. 621), is particularly complex. Principals' decision-making consists of much more than 'the mechanical application of existing rules, regulations and various levels of school and school-related policy' (Frick, 2009, p. 50). Given the intricacies of school contexts, discretion is imperative in educational decision-making, even when it comes to the implementation of external policy (Torres & Chen, 2006). School principals often become local policymakers who adjust authorities' guidelines to suit their particular situations (Spillane & Kenney, 2012).

In addition, school principals usually make a significant number of decisions, in many cases without being able to devote their full attention to all the relevant information needed for optimal results. Studies show that principals' decision-making often occurs in 'episodic intervals' with almost half of their time spent in activities lasting less than 4 minutes. Principals may take care of nearly 400 separate daily interactions. They are 'bombarded' and 'overwhelmed by demands' as they rush 'from task to task, not completing one before another interrupts them' (Findlay, 2015, p. 473). Gronn (2003) described principals' 'work intensification' (p. 18) as 'the new work of educational leaders: long hours, endless demands, punishing pace and continual frustration' (p. 68). Nonetheless, principals make countless spur-

of-the-moment decisions while overseeing a lunchroom or conversing with staff or students as they scurry along the corridor (Findlay, 2015).

Principals' decisions are made in domains where internal and external stakeholders often have different, and even incompatible, goals, desires, views, expectations and demands (Ewy, 2009). In this context, a school principal may be seen as standing at the school doorstep, between the extra- and intra-school worlds. The extra-school world includes the school board as the immediate formal authority and employer of both principal and school staff; the parents, either as individuals or in the form of a parents' committee as an organized actor; policymakers at the national and regional levels; and the local community. On the other hand, the intra-school world includes the school staff and the students (Kelchtermans, Piot, & Ballet 2011). The multiple conflicting loyalties of school principals make their decision making even more complex.

School principals' decision-making is particularly complex in the contemporary 'era of accountability', which involves high standards for student achievement alongside frequently-changing educational systems (Shepard, 2008; Taubman, 2009). In this outcome-based accountability environment, the staff in each school is held directly accountable for ameliorating its students' academic progress and outcomes (Hannaway & Hamilton, 2009). Understandably, as the chief figure at the helm, the school leader is thus held personally accountable for bringing about measurable student achievements and for demonstrating bottom-line results (Hamilton et al., 2007). In the current era of high expectations, strict demands and rapid changes, principals' decision-making is even more complicated. Thus, traditional tools of school leadership do not suffice; school leaders need additional decision-making frameworks to enable them to succeed.

### **Systems thinking**

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 or approach towards 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 recent decades, presented in chronological order: 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 behaviour by developing an increasingly deep understanding of underlying structure' (p. 141). Sterman (2000) asserted that systems thinking is 'the ability to see the world as a complex system, in which we understand that "you can't just do one thing," and that "everything is connected to everything else"' (p. 4). 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 behaviours, 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).

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 behaviour (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 interactions (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 to deal with heterogeneity of stakeholders (Tejeda & Ferreira, 2014); to explain a system's complexities (Holmes et al., 2012); to facilitate group learning and shared decision-making (Van Mai & Bosch, 2010); to take into account a variety of influencing factors (Andrew & Petkov, 2003); and to increase 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).

Particularly, studies in a variety of fields illustrate the role that systems thinking may play in decision making: 'Systems thinking developed over the last decades... to search for solutions to complex problematic situations in a holistic manner' (Yurtseven & Buchanan, 2016, p. 20). Pagani and Otto (2013), for example, presented two cases illustrating systems approaches to marketing strategy and decision making, aiming to propose a practical systems methodology and a holistic frame of reference allowing managers to focus on relevant issues and avoid the endless search for more details while drowning in proliferating useless

information. Focusing on a legal model for decision making about environmental policy goals, Carlman and her colleagues (2014) used systems thinking to put ecological models, designed to assist the implementation of sustainable development, in the context of societal steering systems for sustainable development. Schiuma and his colleagues (2012) proposed a systems thinking-based framework to explicate the working mechanisms by means of knowledge assets that can evolve on the basis of knowledge management initiatives and affect business performance improvements. According to these studies, systems thinking may be seen as a framework for decision making.

### **Systems thinking in school leadership**

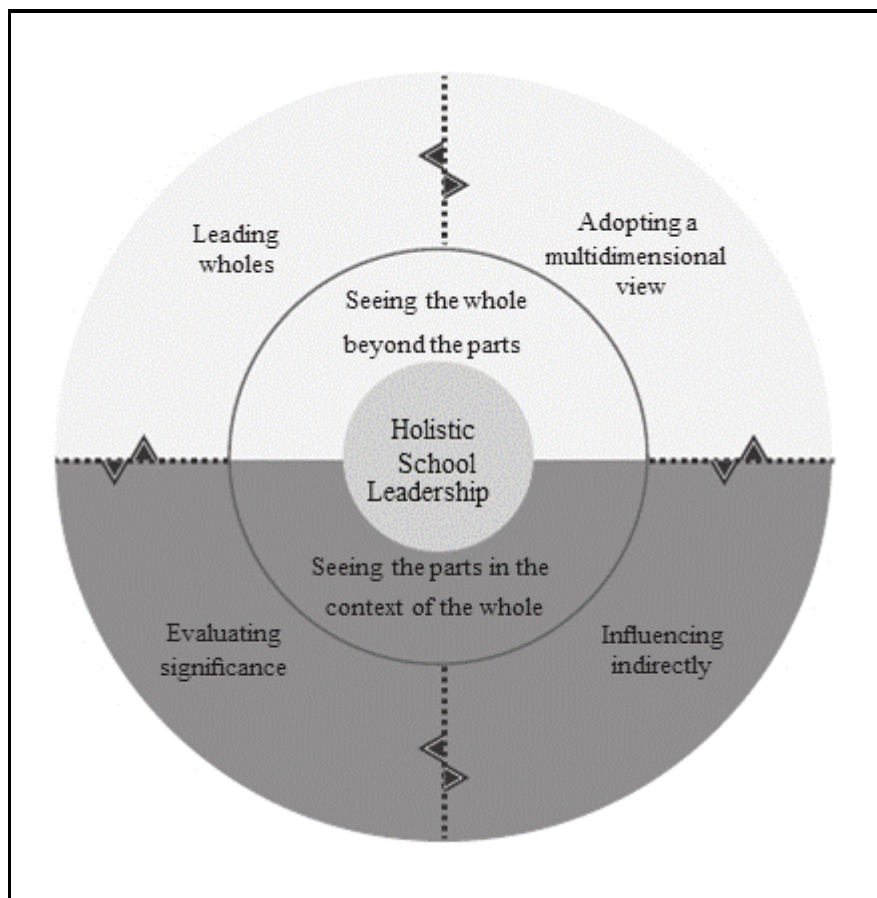
Systems thinking in the context of school leadership has not received sufficient empirical attention as of yet. Few researchers have examined the uses of systems thinking by school leaders. Kensler and her colleagues (2011), for example, asserted that educational leaders have access to large volumes 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 and her colleagues (2009) argued that systems thinking can provide a framework for representing many of the components in a complex curricular program, thus serving 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 schools. In the context of the No Child Left Behind federal legislation in the USA, systems thinking was proposed as a useful tool 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. In addition, several educational guidebooks have suggested ways to implement systems thinking in the school context, offering practical advice on using such thinking to confront today's educational demands and challenges,



including structured models for successful educational reforms (e.g. Fullan, 2005; Hoban, 2002; Senge et al., 2012; Zmuda, Kuklis, & Kline, 2004).

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 perceive and 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 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, 2017). These four characteristics are related to the two major meanings of systems thinking. As illustrated in *Figure 1*, *leading wholes* and *adopting 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*. These four characteristics were used in the current study to determine what falls under systems thinking in school leadership.

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



In sum, the literature about systems thinking in school leadership is meagre. In particular, the role that systems thinking may play in principals' decision-making has not been studied empirically so far. Given the complexity of principals' decision-making, as described above, our study seeks to explore how this systems thinking framework is reflected in principals' perceptions regarding decision-making processes, filling in existing gaps in the available knowledge. Specifically, this study seeks answer to the question of how the four characteristics of systems thinking in school leadership, identified in our previous research, were reflected in principals' perceptions regarding decision-making processes.

**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 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**

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 in decision-making processes (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). Inasmuch as gender, age and work experience were found to affect decision making (Cauffman et al., 2010; Van den Bos, Homberg, & de Visser, 2013; Zsombok & Klein, 2014), maximal differentiation sampling was implemented in this study regarding principals' gender, years of teaching experience, years of experience as principals in general, years of experience as principal in the current school in particular, school level (elementary, middle, high) 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 elementary schools ( $n=17$ ), middle schools ( $n=9$ ) and high schools ( $n=13$ ). 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, which allows for a more dialogic setting than that of a one-on-one interview (Krueger & Casey, 2009). 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 semi-structured method was found to be most appropriate for this study's purpose. Both interviews and focus groups were semi-structured, which 'allows the researcher to respond to the situation at hand, to the emerging worldview of the respondent, and to new ideas on the topic' (Merriam, 2009, p. 90). 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 one hour, and focus groups generally lasted two 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 decision making in general, such as: 'Think about an occasion when you needed to choose between several options for a project, to solve a problem, or to hold an event. Walk us through the process you underwent to make your decision the one with the best chances for a positive outcome'; 'Faced with a choice between qualified candidates for a promotion or a new hire, describe how you made your choice'; 'How do you act when there is a lack of knowledge about all the details of a particular situation?'; 'How do you analyse the causes and consequences of events at school? Please give an example'. Only the last part of each interview and of each 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 decision making, 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 the school principals (Flick, 2009; Marshall & Rossman, 2011; Rossman & Rallis, 2012). Here are some examples of codes: 'there is more than one option'; 'two opposing options at the same time';

'seeing indirect interconnections'; and 'self-awareness of limitations.' After having captured the essence of utterances in the second stage, the third stage (categorizing) involved 'Sorting and shifting through these coded materials to identify similar phrases, relationships between variables, patterns, themes, categories, distinct differences between subgroups, and common sequences' (Miles et al., 2014, p. 10). In this stage 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 transcribed data 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 decision making. 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, principals' descriptions of effective decision-making reflected systems thinking in the following three areas: (1) expanding the number of choices (2) identifying possible consequences of various alternatives, and (3) seeking and analysing relevant information.

While the first two areas may be seen as steps in the process of decision making, the third area may be considered as an activity that supports the process rather than part of the process itself. Although these areas are distinct, they are closely interrelated in the process of principals' decision-making.

### **Expanding the number of choices**

The first stage of decision making, which is often practiced unconsciously, is that of developing feasible choices. Findings emerging from the data analysis indicate that systems thinking was reflected in the principals' descriptions of expanding the number of these feasible choices. From the systems thinking perspective, each and every element or part within the school inevitably has a complex context by which it is influenced; therefore, there is always more than one reason, explanation, implication, or answer related to that part or element of interest. Following this assumption, a systems-oriented principal can take various courses of action into consideration. Considering a wide range of possible actions fits under systems thinking because it results from the ability to *see the whole beyond the parts*, which is one of the two major meanings of systems thinking. Specifically, it reflects *adopting a multidimensional view*, which is one of the four ways in which school leaders apply the systems thinking view and perform at the systems thinking level. As one example of a principal characterized by such a multidimensional view, Elizabeth, an elementary school principal with 14 years of leadership experience, said:

*I believe that one of the important roles of a school principal is to point out additional options. We all know that decision making should be structured, where we weigh the pros and cons of various options. But too often people within the school don't even understand that we should make a decision, because they mistakenly think that there is*

*only one option. And that's exactly my job: to identify additional options, showing that a decision should be taken.*

Decision making is the thought process consisting of selecting a logical choice from amongst the available options. Elizabeth claimed that for decision making to be possible, the school staff should recognize that there is more than one option. Identifying additional ways of action, which for Elizabeth is 'one of the important roles of a school principal', is a precondition for decision making to occur. Understanding that there is more than one way of action in a given situation, the perspective depicted by Elizabeth, reflects the systems thinking approach, avoiding a unidimensional view.

Samuel, an elementary school principal with 8 years of experience, asserted that even a recurring situation justifies examining possible alternative reactions each time, while refraining from adopting a single pattern consistently, over and over again. He described this multidimensional point of view regarding options of responding to challenging students:

*Sometimes we get used to responding to difficult students in a few set ways that we use again and again, such as suspension or exclusion. But there are infinite possible ways to handle such a student, so we should be creative and diverse in our courses of action. We cannot be repetitive; only if we constantly expand the range of practices that we use will we succeed in dealing effectively with misbehaving students.*

According to Samuel, when it comes to a challenging student, the principal may 'forget' that there is more than one possibility. A principal who is used to acting in a specific way may become 'stuck'. Considering the wide range of possibilities may reflect adopting a multidimensional view, which characterizes systems thinking in educational leadership.

The core premise of the multidimensional view is that there is more than one option in any given situation. Moreover, sometimes two opposing options, which may seem mutually exclusive, can both be practiced concurrently. Daniel, a high school principal with 11 years of leadership experience, explained this seeming paradox:



*When we deal with two contradicting options, I often say that both opposites are true. I will give you an example. Teachers often can't decide whether to be tough or attentive: Some claim that we must be tough, setting clear limits, being consistent and uncompromising, whereas others claim that we should understand the child's mindset and be sensitive to his/her needs. Now you see, those who claim that you need to be somewhere in the middle also view the two options as contradictory, as do those who say you have to sometimes be tough and sometimes be compassionate. But the truth is that these two ways of reacting don't really contradict each other, they just look as if they do. If you think about it, you will find that this holds true for many decisions we have to make in our educational work.*

According to Daniel, sometimes two options appear to be contradictory, while in fact they do not stand in opposition to each other. Thus, we do not have 'to be somewhere in the middle' but rather to understand how the two different options can coexist simultaneously.

Mary, a middle school principal with 4 years of experience, claimed during a focus group that there are many more than two options in any given situation:

*When I discuss a decision with teachers, sometimes at first they see two contradicting options: yes and no, in favour and against, black and white. I believe that there are always many more than two options. In fact, there are endless options in each situation. So I often ask teachers: which additional options do we have here, beyond the two extreme ones? Rapid noting of alternatives, no matter how silly, is an excellent discovery process.*

Mary revealed a multidimensional view when she advocated thinking 'out of the box' about many possible alternatives for dealing with any given situation. For her, brainstorming is the key to coming up with a range of solutions that can be compared and then prioritized.

According to Mary, teachers are not always able to identify more than two main contradicting

options for action in a given situation. Thus, the principal should assist them in recognizing the range of courses of action available.

Judy, a high school principal with 14 years of experience, who also participated in that focus group session, said that when you think creatively about alternatives, you must not reject any of them too quickly; rather, you should be open to consider courses of action that at first glance do not even seem realistic:

*Thinking creatively about alternatives is important, but not enough. Once you have listed or mapped the alternatives, be open to the possibilities they open up before you. Taking many more possible options into account, which comes with experience, has become my habit. Today I don't have to make an effort to do it, because it became my way of thinking, my second nature.*

Judy noted that her ability to see various possible choices has developed over the years, due to her managerial experience. Over time, it became her natural perspective, being applied automatically.

In sum, systems thinking was reflected in school leaders' descriptions of their ability to see several aspects of a given issue simultaneously, expanding the number of available choices related to a decision that they are required to make. Selecting from a wider variety of options, which is one of the characteristics of systems thinking in school leadership, is likely to increase the effectiveness of the decision-making process and its outcomes.

### **Identifying possible consequences of various alternatives**

After identifying the available options, school leaders' decision-making involves comparing the various options in an attempt to predict their outcomes and side effects. System thinking was reflected in study participants' utterances about identifying a wide range of influences of possible actions. Understanding that the school's separate components and subsystems are parts of one whole system—where changing one or more parts could affect the

others indirectly due to mutual, reciprocal effects—is a view that falls under one of the two major meanings of systems thinking, that of *seeing the parts in the context of the whole*.

Tori, an elementary school principal with 8 years of experience, was able to envision the school's indirect interconnections and attributed great importance to them. She likened this to a chain, where each link connects to the others:

*For example, when I make a decision related to a certain teacher's request about changing her class or timetable, I think about a sequence of reactions where one reaction causes additional reactions to take place. It is not easy to predict this whole chain, which sometimes reaches unexpected places. However, I must take into account the chain reaction, which is not always negative.*

Sharon, a high school principal with 5 years of experience, also looked for indirect influences of her decisions, offering a metaphor from her field of expertise, the natural sciences. During a focus group Sharon shared her view on this issue:

*As a science teacher, I know that when something happens in a system we should explore the entire system to find out the exact reason for that particular happening. If, for example, our garden is suffering from destructive aphids—we try to find out what causes the proliferation of that sort of aphids. We may find that their emergence results from the disappearance of seven-spot ladybugs, that eat the aphids. And why did the seven-spot ladybugs disappear? Due to the arrival of a new breed of birds that feeds on the seven-spot ladybugs. And what brought these birds? Deforestation due to construction—as the forest was these birds' natural habitat. So the deforestation brought about the aphids' destructive impact here. It's the same at school: when you have a problem, you have to look for the reason very carefully; the direct and immediate solution is not always the effective one.*

Metaphors are a dominant component of figurative language, reflecting cognitive processes through which humans encounter the world, perceive reality, and envision change. Sharon

likened the school to a community of living creatures that interact as an ecosystem. This metaphor depicts the different events and components of schools as if they had a life of their own. According to this metaphor, the source of all the events that occurred was the environment (the forest).

Denice, an elementary school principal with 7 years of experience, gave an example illustrating how a wide range of implications was taken into account when a decision was being made:

*Just a few minutes ago I met with first-grade teacher to talk about our course of action for a six-year-old student who kicked the teacher. We considered the possibility of a two-day suspension. This decision has many ramifications. The child could learn that there are unbreakable borders. He could also conclude that he was hopelessly disturbed. We might cause resentment in the child's parents. We could also inspire teachers to feel that they are protected. We could teach the students that we backup our teachers. We could expedite assistance for this aggressive poor child. And this is a relatively simple decision...*

When Justin, an elementary school principal with 12 years of experience, has to make a decision, he usually postpones it in order to take broad considerations into account:

*I believe that decisions I make have effects beyond what first meets the eye. The consequences may be in areas that I don't think about right away, but have an indirect connection to my decision. Thus, I always prefer to sleep on it, in order to think of all the repercussions my decision may have.*

By contemplating indirect influences of his decisions, Justin understood that the school is a complex system where each part is related to other parts, so that the consequences of an action in one realm of the system may be felt in other realms that are not obvious and known in advance. To deal successfully with the school's complexity, Justin delayed his decisions in order to better foresee their results.

For Justin, the delay he initiated was an opportunity to think over his decisions. However, the term 'delay' has an additional meaning in systems thinking: due to delays, or rather, time lags, between actions and their consequences, it is important to detect long-term consequences in the system. Thus, paying attention to slow and gradual processes is necessary.

Patricia, a middle school principal with 16 years of experience, spoke of how she takes into account the future consequences of her present decisions:

*Over the years, I got to know the nature of working in a school. In many cases, the school responds to our decisions only after a while, not immediately. Problems may arise if we are not aware of this, in which case we may decide to take more corrective action than needed, or give up on a certain process altogether.*

Donald, a high school principal with 11 years of experience, gave an example of the school's delayed response to his decision:

*We decided to compel students to come to school in uniform. At first it aroused opposition among both students and parents. It also forced us to confront the students in areas we had never dealt with before. However, I knew that over time this policy would contribute to better discipline at school and enhance the learning atmosphere, so I was not intimidated by the objections that emerged at the beginning.*

To summarize, principals' descriptions of identifying a wide range of influences that their choices had was a reflection of systems thinking. By regarding the school's separate elements as parts of a whole system, where changing one or more parts may affect the others indirectly, principals could see the system's parts in the context of the whole.

### **Seeking and analysing relevant information**

For effective decision-making, principals should find the information that is relevant to their decisions. In addition, they should analyse this information efficiently. Principals' utterances reflected systems thinking in their descriptions of their search for information. For example, systems thinking stood out in their willingness to learn from others' opinions, since a

principal who understands that each situation within the complex system has several aspects and a number of possible implications will seek to understand the full picture by listening to other points of view beside his own. In this context, Ben, an elementary school principal with 6 years of experience, stated:

*When a school principal thinks that he knows everything and that there is nothing left for him to learn, he will become 'stuck' and eventually his 'shelf life' will expire. For this reason, I like my management team meetings, because the members' opinions support and contribute to our ability to work in a wiser fashion. Instead of operating as a 'lone ranger' and feeling like I must know it all, I get the members of our management team to think together with me about projects, processes, problems, and actually about nearly everything. This way we come up with various perspectives on every situation.*

According to Ben, an important component of the principal's holistic, multidimensional ability includes self-awareness of his or her limitations; principals should not think that they know everything about their work. Instead, they should constantly learn from the variety of people around them, each of whom can contribute their unique perspectives, leading up to a better view of the whole.

Also Cynthia, a principal of a special education school with 11 years of experience, described her willingness to learn from others—not only from her school's management team but also from her school's staff:

*I often consult those around me through formal and informal discussions. Those I consult with may include my management team members, teachers, colleagues, administrative personnel, or even my family. I believe that a principal who is open to learning from everyone will be an example followed by her teachers, who in turn will also become open to new suggestions and improvements. In this way, we can embrace various and sometimes even contradictory perspectives on every occurrence at school. Our sages have already said: 'Who is wise? He who learns from every person'.*

Willingness to learn from others may lead to a collaborative decision-making style. In this regard, Robert, a middle school principal with 14 years of experience, said:

*I believe it's all about control. Choosing a collaborative decision-making style is about making a choice regarding the level of control you want, or need, in the decision-making process. More collaboration comes at the price of losing some of my control and independence, but leads to higher quality decisions, because when you choose a low level of collaboration you may pay attention to the wrong parts of the system, failing to recognize the most important pieces of the puzzle.*

Robert, who spoke about choosing to have a collaborative decision-making process, did not consider this process to be dependent on the principal's personality. His view reflects systems thinking, as it is based on the understanding that decisions reached by groups are often different than those reached by individuals, facilitating the discernment of various important parts of the system.

Systems thinking was reflected also in school leaders' descriptions of tolerance to ambiguity, where they make decisions under circumstances of uncertainty. In relating to the typical everyday amorphous problems that occur in schools, a holistically oriented principal who is accustomed to leading wholes can understand that the seemingly-separate details of the given situation are actually parts of one big picture. Thus, the principal's lack of current knowledge about all the details of a particular situation would not hinder his or her ability to make decisions based only on currently available partial information. As just one example, a case in point was given by Michael, a high school principal with 6 years of leadership experience, who described a dispute he had with senior staff members in his school about planning a new school year under the vague and changeable conditions often naturally existing at the end of the summer vacation:

*Some position holders in my school feel that they can't start planning the next school year until they get all the necessary information. You see, during the planning of a new*

*school year there is a lot of uncertainty. Only at a very late date do you have all the information you actually need for the new school year. Actually, you have it after the new school year has begun; as a matter of fact, maybe a month or two later... And based on this lack of information you're supposed to plan the new school year: to determine how many classes there will be in your school; to determine the role of each teacher and how many hours she will work; to accept new teachers, etc. As I said, some position holders in my school can't plan a new school year until they get all the information about it. They think that we shouldn't make a plan because there's the risk that we might have to change it later on. They want to wait until we have all—or almost all—the information, and only then to start planning. But I don't think so. I see the next year as a big picture, parts of which are covered, slowly unfolding and revealing themselves. You can see how such a picture would look, more or less, even when part of it is still hidden, so it is possible to plan the next year despite the uncertainty. We should use the available information, start planning based on it, and as time goes on and we know more and more, we can continuously refine our plan.*

Some of Michael's staff members found it difficult to make decisions without knowing all of the system's minutiae; they showed low tolerance for uncertainty and felt they had to thoroughly understand all the details involved in a given problem in order to be able to reach a decision and come up with a solution. According to Michael's point of view, on the other hand, the ability to function under conditions of uncertainty resulted from his ability to see the whole, or as he said, 'the big picture'.

In addition, systems thinking was reflected in principals' utterances about taking into account 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 and make appropriate decisions, I looked for patterns in the data. I examined in which areas the results resembled the scores on the achievement tests, and when I found similar patterns I understood the connections between climate, pedagogy and outcomes.*

Seeking to identify patterns within the available information reflects systems thinking, which involves distinguishing recurring patterns and linking various elements in school life together in order to derive meaning from them. Seeking and analysing major patterns in the available information enable the principal to discover the fundamental causes of the exam's results, rather than referring to separate symptoms of the situation.

In short, principals' willingness to learn from others, their tolerance to uncertainty and their ability to integrate a wide range of data reflected systems thinking throughout the process of seeking and analysing information.

### **Discussion**

This study sought answers to the question of how systems thinking is reflected in school leaders' descriptions of their decision-making processes, a topic that has not yet been studied. Qualitative analysis of participants' interviews revealed that systems thinking was reflected in school principals' descriptions of three areas of decision making. First, it is reflected in expanding the number of choices. Since decision making is considered to be a selection among several available alternatives (Robbins & Judge, 2012), this stage is sometimes skipped. From the perspective of systems thinking, before choosing between the available alternatives, additional alternatives should be sought and considered. There is more than one option, and even more than two contradicting options, in any situation. Second, systems thinking is reflected in broadening one's view of the possible consequences of various alternatives. It focuses on the indirect impacts of any option, seeking possible long-term consequences as well as short-term ones. Systems thinking can help the principal to take into

account the future consequences of present decisions, paying attention to slow and gradual processes. Third, systems thinking is reflected in increasing one's willingness to learn from others, facilitating the integration of multiple sources of information, and allowing for making decisions despite uncertainty. The first two areas may be considered to be stages in the decision making process, while the third area may be seen as an activity that supports this process rather than being part of it (Anderson et al., 2016). Although these three areas are distinct, they are closely interrelated in principals' decision-making process.

The findings of this study shed light on the connection between the complicated nature of principals' decision-making and systems thinking. A school is an inherently complex organization, involving a vast multiplicity of interacting people, activities and purposes. As such, it often runs up against basic conflicts: its operation can pursue numerous courses of action, each with its own particular strengths and weaknesses, and its different stakeholders may uphold diverse or even incompatible desires, views, expectations, and demands (Eller, 2010; Walker & Qian, 2006). In this context, the process of principals' decision-making is complex by nature, involving multiple criteria, various alternatives, a wide range of consequences, conflicting loyalties and considerable uncertainty. Within this complexity of school principals' decision-making, a systemic approach may be valuable.

Systems thinking stands in contrast to the reductionist approach, which attempts to understand systems by reducing them to their simpler parts. Considered to be one of the most influential thinkers in Western history, Descartes (1985) developed the notion of reductionism in the 1600s as an approach for understanding systems by reducing them to their simpler basic parts. According to this approach, the answer to every 'what is this' question would always be 'this is what it is made of'. Any entity is considered to be a collection or combination of components 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 (Rosenberg, 2006). The reductionist perspective became one of the most central, vastly

accepted beliefs of the modern era (Ahn et al., 2006). Thus, the entire universe, as well as everything in it, came to be regarded as a clockwork-like mechanism. Scholars upheld that to understand anything, human beings need only to investigate its separate parts and then put them together correctly. Indeed, according to reductionism, the only meaning of research was analysis, which is the process of breaking a complex thing into smaller parts in order to gain a better understanding of it. Recognition of the smallest components in isolation from each other was believed to enable the analyst to know the sum total; the analyst's only task would be to reassemble all of the components in order to recreate the whole (Mazzocchi, 2008).

Contrary to this reductionist approach, systems thinking is a holistic perspective that does not try to break systems down into parts in order to understand them; instead, it concentrates its attention on the whole, and on how the parts work together in networks of interaction. 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 reductionist 'the simple is the source of the complex', for the systems thinker 'the whole is more than the sum of its parts' (Gharajedaghi, 2011; Senge, 2006). When it comes to decision making, systems thinking entails understanding that because each element in the school functions as an interconnected part of an entire system, with implications for the system's other parts, it must by definition have more than a single reason, explanation or implication. Put differently, systems thinking provides a means of seeing the system as an integrated, complex composition of many interconnected components that need to work together for the whole to function successfully.

Systems thinking in principals' decision making can be perceived through the conceptual lens of sense-making, which is an ongoing process through which people work to understand issues or events that create ambiguities in routine (Maitlis & Christianson, 2014; Weick, 2009). It is an active process of constructing meaning from present stimuli, mediated by prior knowledge, experiences, beliefs and values that is embedded in the social context within which people work. When individuals encounter moments of uncertainty, they frame

their environment through an interpretive mental model in order to 'make sense' of what has occurred (Smerek, 2011; Sumbera, Pazey, & Lashley, 2014; Weick, Sutcliffe, & Obstfeld, 2005). The three areas of decision making, which were found in this study as reflecting systems thinking—expanding the number of choices, identifying possible consequences of various alternatives, and seeking and analysing relevant information—require principals to make sense of the wider system by collecting different data sources in order to create a better understanding of the situation. Through multiple interpretations of the ambiguous event, principals develop the initial sense of what is going on, which may provide a wider perspective regarding the available choices and various alternatives and relevant information, support the process of sense-making, whereby principals invest efforts in understanding issues or events that are novel, ambiguous, confusing, or in some other way violate their expectations (Maitlis & Christianson, 2014).

### **Implications**

According to the current study's findings, systems thinking may serve as a framework for analysing school principals' decision-making. Therefore, systems thinking may be used to facilitate the selection of new school principals. Naturally, the selection of the most capable candidates for school leadership positions has a significant impact on school performance. Thus, well-defined screening and assessment processes to select optimal school leaders are crucial for establishing and sustaining successful schools. Candidates who demonstrate high levels of systems thinking may possess a good chance of becoming effective decision-makers. Here are some examples of inexplicit questions that may reveal an aspiring principal's potential for systems thinking, divided according to the characteristics of *Holistic School Leadership*, as described in the theoretical background section (Shaked & Schechter, 2017): Which important processes are currently occurring at your school? Why do you think they are important? What are their consequences? Could anything hinder them, and what should be done to prevent this? (*leading wholes*); Please tell me about a conflict that arose at your school. What do you see as

the causes of this conflict? What were its implications? How do you think this conflict should have been handled? (*adopting a multidimensional view*); How, in your opinion, should a principal solve a problem that arises at school? Please give an example (*influencing indirectly*); Among all the occurrences of the last week at school, which do you think were of great significance? Why? (*evaluating significance*). Explicit questions also may reveal an aspiring principal's potential for systems thinking: Do you think you possess systems thinking? What is the meaning of this concept for you? How is it expressed practically?

Moreover, developing systems thinking during preparation programs may allow prospective principals to acquire an enhanced decision-making capacity. In fact, developing systems thinking may be valuable not only for future principals but also for performing ones. Systems thinking may be developed among present and future principals 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 et al., 2012), hybrid models (Levin & Levin, 2013), and modelling (Hung, 2008). Beyond the question of method, the constructivist approach emphasizes the importance of learning in a meaningful context as opposed to 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 decision-making is central to such learning.

The experience of prospective and in-service principals is also important in the context of their systems thinking and decision-making ability. 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 through 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. During this training period, aspiring principals will be expected to put into practice the systems-thinking skills they have learned within the decision-making context (Shaked & Schechter, 2017).

Role modelling too can contribute to the development of systems thinking and decision-making ability (Shaked & Schechter, 2017). Thus, mentoring carries significant benefits for school leaders. To ease novice principals' adjustment to their new role, it is becoming increasingly common for them to be paired up with an experienced mentor (Wallace Foundation, 2007), which is consistent with findings that new principals feel the need for mentoring programs to advance their professional development during their first years on the job (Zepeda, Bengston, & Parylo, 2012). A mentor who functions as a role model demonstrating a high level of systems thinking may contribute to the development of decision-making ability among beginning school leaders.

More broadly, systems thinking may also contribute to instructional leadership. Contemporary school principals are no longer seen as mere managerial or organizational administrators; 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). 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, 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 instructional leadership's enablers. In fact, systems thinking was perceived by middle and high school principals to contribute to improvement of school curriculum, development of professional learning communities, and interpretation of performance data (Shaked & Schechter, 2016).

Compared with prior studies, this study provides new data on systems thinking in principals' decision-making. However, further research is required. Theoretically, further research could expand the discussion on decision making beyond the rational perspective, which emphasizes logical aspects of selecting the best alternative, thus paying attention to emotional and behavioural influences on decision making. Methodologically, since the data were collected in a particular context, their cross-cultural validity was not explored. Replicating this study elsewhere in various socio-cultural 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 decision making, further research could complement principals' verbally-expressed perceptions with more objective research methods such as direct observation. 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. Similarly, an exploration of systemic decision-making in relation to other leadership characteristics and capabilities, such as principals' sense of self-efficacy, merits investigation. Further research could also examine correlations between systems thinking in decision making and leadership effectiveness, developing a fuller interpretation of the impact of school leaders that perform at the systems level. Finally, it would also be useful to carry out longitudinal studies, including repeated data collection among the same school principals in order to explore the development of their decision-making processes within the systems-thinking framework. This would enable the evaluation of decision making over time, and more importantly, would help identify ways to

support, enhance, and accelerate systemic decision-making among aspiring, novice, and even veteran principals.



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