

# Systems Thinking Among Enrollees in a Principal Preparation Program

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## Abstract

Principal preparation programs are criticized for failing to produce school leaders who can successfully face the growing complexity of today's educational leadership. Inasmuch as the literature highlighted systems thinking as beneficial for complex situations, this study aimed to explore how preservice principals, enrolled in a systems thinking course as part of their principal preparation program, would identify practical opportunities to apply systems thinking principles in school leadership. Findings showed that preservice principals considered the characteristic of *leading wholes* as helpful for instructional leadership (curriculum and community) and the characteristic of *adopting a multidimensional view* as useful for interpersonal relationships and decision making. Implications and further research are discussed.

## Keywords

systems thinking, principal preparation programs, school leadership

School leaders' effectiveness is crucial to improving student outcomes, especially in schools with the greatest need. Leadership is the second most influential school-related factor on student learning, surpassed only by effective classroom teachers (Davis & Darling-Hammond, 2012; Mendels & Mitgang, 2013). While it is widely agreed that good principals do make a difference, what is less clear is how to prepare “good” principals. In fact, existing principal preparation programs are a source of concern among policymakers, university faculty, and educators (Anderson & Reynolds, 2015; Gutmore, 2015; Pannell, Peltier-Glaze, Haynes, Davis, & Skelton, 2015).

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In this context, researchers and field personnel have expressed their doubts as to the sufficiency of traditional approaches to preparing and licensing principals, claiming that principal preparation programs do not produce qualified principals who are capable of running schools successfully (Author 2, 2011; Williams, 2015). A recent U.S. report revealed that district leaders are generally dissatisfied with principal preparation programs' quality, and many universities believe that their programs warrant improvement (The Wallace Foundation, 2016).

In particular, research indicates that principal training programs have failed to keep pace with the growing complexity of 21st-century school leadership (Butler, 2008; Duncan, Range, & Scherz, 2011; Fleck, 2008; Hernandez, Roberts, & Menchaca, 2012; Lynch, 2012; Reed & Kensler, 2010). Leading any school, with its inexorable complexity, has never been an easy job. However, in line with today's dynamically changing global economic, social, and technological developments as well as dramatic educational reform trends, practitioners, and researchers alike agree that school leaders face particularly challenging difficulties (Fullan, 2014; Hargreaves & Braun, 2013).

Current-day school leaders' increasing encounters with situations characterized by rapid change, wide diversity, and escalating complexity call for prospective principals' explicit training in systems thinking (Author 1 & Author 2, 2014, 2017; Kensler, Reames, Murray, & Patrick, 2011). Systems thinking is an approach that advocates addressing any given issue as a whole, with an emphasis on interrelationships between its components rather than the components themselves. It does not try to break systems down into parts to understand them; instead, it focuses attention on how the parts act together in networks of interactions (Gharajedaghi, 2011; Senge, 2006).

Claiming that systems thinking can enable management over situations characterized by dynamic change and complexity, some authors have recommended it as a beneficial management approach (Brown, 2012; Jolly, 2015; Wilson & Van Haperen, 2015). In particular, systems thinking has been proposed as an advantageous perspective on school leadership, providing means for understanding and referencing numerous diverse aspects of principals' work (Author 1 & Author 2, 2014, 2017; Dyehouse, Bennett, Harbor, Childress, & Dark, 2009).

The current study explored the perceptions of preservice principals who were enrolled in a training program that explicitly imparted the concepts of systems thinking as part of their principal preparation. Qualitative methods were utilized to investigate the practical opportunities for systems thinking applications which these trained preservice principals identified in their own school reality.

## **Theoretical Background**

To lay the foundation for this study, the Theoretical Background first reviews the literature on the criticism of current preparation programs, which fail to train principals to deal with contemporary schools' complexity. Systems thinking, which may offer a crucial strategy for today's principals, is then presented. Thereafter, the development of systems thinking is discussed, leading to the research goal.

## *Preparing Principals for a Complex Reality*

The quality of principals' functioning depends to a great extent on the quality of their preparation (Hernandez et al., 2012). However, much of the literature has been critical of how school administrators are prepared (Anderson & Reynolds, 2015; Author 2, 2011; Gutmore, 2015; Pannell et al., 2015; The Wallace Foundation, 2016; Williams, 2015). According to Drago-Severson (2009, 2012; Drago-Severson, Blum-DeStefano, & Asghar, 2013), existing preparation programs involve informational learning, which focuses on increasing the learner's amount of knowledge and skills: "All too often . . . we teach leadership development in the same way we teach world history: by presenting just the facts, just the contents" (Drago-Severson, 2012, p. 8). She claims that for preparation programs to be most effective, they should involve transformational learning, which "relates to the development of the cognitive, emotional, interpersonal and intrapersonal capacities that enable a person to manage the complexities of work (e.g., leadership, teaching, learning, adaptive challenges) and life" (Drago-Severson, 2009, p. 11). In view of the broad criticism against existing preparation programs, understanding how to better prepare preservice principals for their future role is an urgent policy concern.

In particular, principal preparation programs are criticized for their failure to train principals to deal with contemporary schools' complexity (Darling-Hammond, LaPointe, Meyerson, Orr, & Cohen, 2007; Hernandez et al., 2012; Lynch, 2012). School is an inherently complex organization, involving a vast multiplicity of interacting activities, people, and purposes (Mitchell & Tarter, 2011; Senge et al., 2012). When facing operative decisions, leaders can potentially pursue myriad courses of action, each with particular strengths and weaknesses, and must take into account various stakeholders who uphold diverse or even incompatible desires, views, expectations, and demands (Ewy, 2009; Wells & Keane, 2008).

The complexity faced by today's principals stems both from the extra- and intra-school worlds. More than ever, leaders today are expected to be the change agents of their organizations (Clark, 2007). In particular, contemporary school systems' prevalent "era of accountability" poses high expectations from school leaders (Hargreaves & Braun, 2013; 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 achievement and for demonstrating bottom-line results (Ingersoll & Collins, 2017).

In addition, contemporary students and parents differ from their predecessors. Students use rapidly evolving and changing technologies and participate actively in an increasingly diverse, globalized, and media-saturated society. In this fast-changing 21st-century world, schools are expected to provide students with the specialized skills and adaptability that are necessary for occupational success in the indeterminate communities and workplaces of the coming decades (Lemley, Schumacher, & Vesey, 2014; Pellegrino & Hilton, 2012; Stevens, 2012). For leaders to become better

equipped for their future role in navigating education systems' internal and external complexity, systems thinking may offer a crucial strategy for success.

### *Systems Thinking in Diverse Contexts*

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 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 (Hieronymi, 2013). Some of the diverse definitions and explanations for systems thinking that have been formulated by scholars in recent decades include the following. Senge (1990), who explained how to use systems thinking to transform companies into learning organizations, 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)

More broadly, 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). From an epistemological perspective, Checkland (1999) asserted that when systems thinking is applied to human activity, it “is based upon the four basic ideas: emergence, hierarchy, communication, and control as characteristics of systems.” He added that “When applied to natural or designed systems, the crucial characteristic is the emergent properties of the whole” (p. 318). Arnold and Wade (2015) described systems thinking as “a set of synergistic analytic skills used to improve the capability of identifying and understanding systems, predicting their behaviors, and devising modifications to them to produce desired effects” (p. 675). For the definition to be consistent with the system thinking approach, they noted that these skills work together as a system.

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 (Author 1 & Author 2, 2014, 2017). These two meanings of systems thinking—*seeing the whole beyond the parts* and *seeing the parts in the context of the whole*, respectively—were used in the current study to explore the systems thinking concept.

By viewing any system through the lens of systems thinking, its multitude of variables may be seen as causally related in feedback loops, which consist of the system's outputs 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 traditional relation attributed to cause and effect that considers one event as responsible for another's

occurrence. Instead, the feedback-loop perspective conceptualizes the system as a whole because the first event does influence 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 managers' application of systems thinking assisted them to cope successfully with complex situations in a wide range of areas. For example, systems thinking was found to be an effective way for managers to deal with stakeholders' heterogeneity (Tejeda & Ferreira, 2014), to explain a system's complexities (Holmes, Finegood, Riley, & Best, 2012), to facilitate group learning and shared decision making (Van Mai & Bosch, 2010), to take a variety of influencing factors into account (Andrew & Petkov, 2003), and to increase coordination and cooperation between authorities and agencies (Leischow et al., 2008). Moreover, researchers found strong statistical correlations between systems thinking and project performance (e.g., Elm & Goldenson, 2012). Thus, systems thinking has often been 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 yet received sufficient empirical attention. Relatively few researchers to date 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, suggesting therefore that 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.

Similarly, 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 United States, 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 short, the existing literature on systems thinking in

school leadership often considers this framework as advantageous for improving a particular field or need at school or during education reforms.

### *Holistic School Leadership*

In their recent book, Author 1 and Author 2 (2017) presented their systems thinking approach for school leadership. Inasmuch as holism is the epistemological basis of systems thinking, the approach whereby educational leaders lead schools through the systems thinking framework was termed *Holistic School Leadership*. According to this approach, systems thinking offers a comprehensive way of both conceptualizing and practicing within the entire school setting. *Holistic School Leadership* may be applied regularly rather than as an exception, addressing the school's various kinds of challenges, problems, and tasks through the systems thinking lens.

Specifically, Author 1 and Author 2 (2017) described the four major characteristics of *Holistic School Leadership*, which are the ways in which school leaders apply the systems thinking view and perform at the systems thinking level (Author 1 & Author 2, 2014, 2017). (a) The first characteristic is the capacity for *leading wholes*—a holistic point of view oriented toward seeing the big picture and not only its individual parts. Principals who possess this characteristic perceive and conceptualize all aspects of school life as one large system. (b) The second 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, taking into account its potential consequences, recognizing possible delays between actions and reactions, and predicting various options for its future development. (c) The third 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. (d) 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.

### *Development of Systems Thinking*

Can systems thinking be learned by professionals in general and school leaders in particular? Zonnenshain (2012) stated that "There is an ongoing argument in the literature about whether systems thinking ability is inherited (innate) or learned (acquired)" (p. 1). Theoretically, this dichotomy is not compatible with the concepts of systems thinking. From a systems thinking perspective, the innate talent is embedded within a person, who, in turn, is embedded in an external environment. Although the innate talent may be a critical part of personal systems thinking ability, it is only one part of a system where multiple interactions occur. Thus, systems thinking development through the interaction between innate talent and learning should be emphasized (Author 1 & Author 2, 2014, 2016, 2017).

Moreover, Davidz (2006; Davidz & Nightingale, 2008), who explored the sources of systems thinking among engineers, claimed that just like any other skill, professionals can develop their systems thinking capability through learning. Zulauf (2007) read 120 reflective journals of graduate students in a systems thinking course and concluded that systems thinking can be learned, indicating that academic study may be considered one source of systems thinking. Under the same assumption that systems thinking can be learned, several other researchers explored methods for its teaching (Blizzard, Klotz, Pradhan, & Dukes, 2012; Hung, 2008; Levin & Levin, 2013; Taber, 2007; Thurston, 2000). The methods that have been suggested for systems thinking training are varied, including hypermedia (Thurston, 2000), metaphors (Taber, 2007), case studies (Blizzard et al., 2012), and modeling (Hung, 2008).

Altogether, the present study utilized these literatures on systems thinking to answer the question of how preservice principals who were enrolled in a preparation program that explicitly imparted the conceptual foundations of systems thinking perceived this framework's relevance to practical applications in schools. Empirical scrutiny of preservice program enrollees' perceptions about such practical opportunities, which have not been studied to date, may help improve existing principal preparation programs, which have been described as insufficient at producing the leaders that schools and students require.

## Research Context

The national school system in Israel serves about 1.6 million students, with approximately 73% in the Hebrew-speaking sector and 27% in the Arabic-speaking 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). In the wake of recent data portraying the great diversity among school populations in Israel, recent local educational policy 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 growing achievement gap, as evidenced in various international comparative examination studies (BenDavid-Hadar, 2016).

All principal preparation programs in Israel follow a similar curriculum and are supervised and operated under the pedagogical guidance of Capstones, the institute spearheading school principals' development. These 1-year programs consist of 250 hr of academic study and 150 hr of internship.

According to Capstones—The Israel Institute for School Leadership (2008), the Israeli principal's primary role is to serve as an instructional leader, with the goal of improving the education of all students in the school. Four secondary management dimensions support this primary role: 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 (referring to both staff members and students);

and managing the relationship between the school and its surrounding community. Thus, the principal, as a school leader, must manage a complex variety of dimensions and aspects pertaining to the school, creating close links among those components to ensure the success of all students (Capstones—The Israel Institute for School Leadership, 2008). Systems thinking would appear to benefit these complex interrelated roles, yet prior research in Israel has not yet sufficiently tapped the ways in which principals perceive systems thinking to be practically applicable to their school leadership.

To capture preservice principals' perceptions on systems thinking's possible practical applications in their specific school reality, the current study qualitatively explored enrollees in a one-semester academic course on systems thinking, delivered in one such principal preparation program. Inasmuch as systems thinking is usually not part of the curriculum in preparation programs, the particular course explored in this study was an opportunity to examine program enrollees' perceptions about practical opportunities for applying systems thinking in school reality.

During this 14-week course, consisting of 1.5-hr weekly sessions, preservice principals studied the concepts and procedures of systems thinking. The instructor was a systems thinking expert, who had studied this approach in depth. Specifically, the course addressed the two meanings of systems thinking—*seeing the whole beyond the parts* and *seeing the parts in the context of the whole*—as well as the four characteristics of school principals who perform at the systems level (Author 1 & Author 2, 2014, 2017), and the tools enabling its application such as system archetypes, which are stories of classic management problems that often occur in organizations (Senge, 2006).

The course, which took place simultaneously with the internship, adopted a constructivist approach, which upholds that learners tackle new information by integrating it into their prior ideas and knowledge, thereby creating new, synthesized understandings (Keaton & Bodie, 2011; Powell & Kalina, 2009). The constructivist approach also asserts that learning is more effective when it transpires within a meaningful context that links learned theories to authentic situations rather than teaching decontextualized abstract knowledge (Marlowe & Page, 2005). Indeed, scholars have recommended that higher education in general should involve and engage students in learning to apply theoretical knowledge to practical situations (Glanz, 2016; Hallinger & Lu, 2013; Hattie, 2009).

Likewise, our prior study focusing specifically on school leaders (Author 1 & Author 2, 2016) implied that principals' systems thinking develops mainly when learning occurs in direct relation to their educational work. That is, connections to real-time daily challenges in schools are central to principals' learning process. Accordingly, the current systems thinking course involved student-centered learning designed to help the preservice principals elicit their existing knowledge, analyze and synthesize the new knowledge in light of prior knowledge, and contextualize this integrated knowledge within the everyday reality of school leadership.

The course employed active learning methods, such as collaborative learning from personal real-life administrative cases; open discussions about inspiring educational/leadership questions; and working in small groups on educational assumptions and



beliefs. Students jointly analyzed conflicts, decisions, and dilemmas taken from their daily professional lives through the prism of systems thinking. They were expected to be able to transfer knowledge about systems thinking from theory to practice, to generalize systems thinking concepts from one setting to another, and to activate their acquired knowledge to implement it in a variety of everyday contexts.

## Method

The present study was qualitative in nature to gather rich textual utterances of preservice principals, aiming to capture their perceptions regarding the possible applications of systems thinking in school leadership (Taylor, Bogdan, & DeVault, 2016).

### Participants

Participants were a cohort of 24 preservice principals (18 females, 6 males) enrolled in a mandatory second-semester systems thinking course within a 1-year principal preparation program in central Israel. All participants held a master's degree as prerequisite for admission to the program and had, on average, 17 years of teaching experience ( $SD = 7.23$ , range: 2-29 years). They taught in elementary schools ( $n = 12$ ), middle schools ( $n = 3$ ), and high schools ( $n = 9$ ). All but two (91.7%) held important school middle-leadership roles such as assistant principal, counselor, or coordinator.

### Data Collection

Measures included reflective journals, interviews, and focus groups.

*Reflective journal.* Course participants were asked by the course instructor to insert an entry into a reflective journal after each of the 14 sessions, describing what they had learned and what came to mind during the session, and which additional insights they had gained following later reflection. Journal entries were submitted online through the course's website. In total, 264 reflective entries were analyzed, with a mean of 11 entries submitted per participant. The average length of each reflection was one page.

*Interview and focus group.* Participants were individually interviewed by the researchers in the middle of the course ( $n = 23$ ) and then participated in a focus group of four to six participants toward the end of the course (four groups,  $n = 22$ ), which were conducted by the researchers. The round-table focus-group discussion forum enabled a more dialogic setting, which produces unique data and insights because listening to others' verbalized experiences stimulates participants' memories, ideas, and experiences (Lindlof & Taylor, 2010).

Utilizing semistructured interviews and focus groups, the interviewer developed an interview guide, which offered a list of questions and topics needing to be covered but also allowed "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). Thus,

key questions were preplanned, but the interviews and focus groups were also conversational, with questions flowing from previous responses when possible. Interviews and focus groups were video recorded and transcribed for coding.

To optimally tap participants' unprompted leadership applications of systems thinking without priming interviewees to frame their discussions in light of this concept, the interviewer intentionally avoided explicitly mentioning the term *systems thinking* in the interviews and focus groups. As enrollees in a course called "systems thinking," participants may have assumed that such concepts and applications were relevant, but the interview and focus group questions only referred generically to various school situations, such as, "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?" or "Which important processes are currently occurring at your school? Why do you think they are important? What are their consequences? Could anything compromise them, and what should be done to prevent this?" Only the last part of each interview and focus group used the term "systems thinking" explicitly, asking questions like, "Is systems thinking important for school principals? In what way? What can systems thinking contribute to school leaders?"

The program director and the course instructor gave permission for data collection. Preservice principals were informed that the study aimed to explore preparation programs, that participation was voluntary and anonymous (pseudo-names were assigned), and that exiting the study at any time would be confidential and would not affect their course grade. All participants provided written consent. One participant exited the study after the interview.

### **Data Analysis**

Data analysis was based on the aforementioned framework of systems thinking characteristics. The four characteristics of systems thinking in school leadership, identified by Author 1 and Author 2 (2017), served as a starting point for data analysis. Specifically, analysis comprised a four-stage process—condensing, coding, categorizing, and theorizing. First, the necessary sorting and condensing (Miles, Huberman, & Saldaña, 2014) sought out the relevant portions of data based on the study's conceptual framework. At the second stage, coding, each segment of data (written or verbal utterance) was coded according to the aspect it represented (Tracy, 2013). After capturing the essence of utterances in the second stage, the third stage, categorizing, consisted of assembling similar utterances into clusters, to generalize their meanings and derive categories. Finally, the theorizing stage aimed to reach a conceptual construct of the categories derived in the previous stage and to see how they were interconnected and influenced each other as parts of one abstract construct (Richards & Morse, 2013).

### **Consideration of Researcher Bias**

In any qualitative empirical exploration, researchers should consider how their backgrounds and personal experiences inform their theoretical and methodological

perceptions concerning the inquiry. The researchers of this study offer complementary perspectives as they come from different backgrounds: The first author was a school principal for 17 years and is currently an educational leadership researcher, and the second author holds extensive expertise in such research. Their joint research over recent years, which has included ongoing mutual reflection, has increased their awareness of relevant conceptual and empirical issues. Specifically, to ensure critical thinking throughout the current study, they each wrote and then shared reflective journals, in line with recommendations for qualitative research (Etherington, 2004; Ortlipp, 2008). Furthermore, they created a panel of four experts to evaluate and critique their assumptions. These two educational leadership professors, one district educational superintendent, and one principal thus provided additional perspectives regarding our data interpretation.

## Findings

Analysis of this study's qualitative data revealed that participants considered the first two characteristics of *Holistic School Leadership* as applicable in school leadership, *leading wholes* and *adopting a multidimensional view*. Each characteristic was considered applicable in two main areas, as seen in the examples below presented with excerpts from participants' own voices (using pseudonyms). It should be noted that only these two out of the four characteristics of *Holistic School Leadership* were found in the data. Therefore, the other two characteristics were not included in the findings.

### *Leadership Applications for Leading Wholes*

As mentioned above, *leading wholes*, the first characteristic of *Holistic School Leadership*, means understanding the entire school—as well as any issue within it—as a whole system, above and beyond its subsystems and components, and recognizing how each functions as part of the entire system. *Leading wholes* was perceived by preservice principals as assisting in (a) curriculum leadership and (b) school community leadership.

*Leading wholes for curriculum leadership.* The notion of *leading wholes* as facilitating the development of the school curriculum was mentioned by 11 of the preservice principals. For example, George, an instructional coordinator in a middle school, with 12 years of teaching experience, described himself in his journal entry after Week 7 as already applying systems thinking to establish a better school curriculum:

While I studied the systems thinking course I thought about how I can implement it at my school. As an instructional coordinator in the present, and hopefully as a future school principal, I currently implement it in redesigning our school curriculum. . . . [The school's new curriculum] will be built on students' prior knowledge to allow gradual mastery from one grade level to the next. The new knowledge that will be introduced will be related to the basics, which will be reemphasized many times.

For George, systems thinking was seen as enabling development of a spiral curriculum, which could reinforce and solidify information each time students revisit the subject matter. He expected the spiral curriculum to allow necessary opportunities for logical progression from simplistic ideas to complicated ideas, while encouraging students to apply their early knowledge to later studies. George's utterances suggest that a systems thinking course during principal preparation may be valuable not only with regard to the future, considering the preservice principals as the principals of tomorrow, but also with regard to the present. Taking George as an example, preservice principals are often those figures in the school who act as the driving force behind attempts to improve teaching and learning quality, which can significantly influence student achievements.

While George expressed *leading wholes* regarding the different school grade levels, Lisa, a high school counselor with 11 years of teaching experience, emphasized the alignment of school curricula with external expectations and internal performance. Lisa wrote in her journal entry after Week 11:

I believe that to lead a school toward academic success, a systemic approach is required, because it is critical to align the school curriculum with district and state standards and goals, with classroom teaching and instruction, and with school resources' allocation. . . . Alignment is an ongoing process—as standards, curriculum, and assessments cycle through improvements.

Thus, Lisa identified the required alignment as a process rather than an event, requiring an ongoing view of the whole. *Leading wholes* also includes consideration of the environment that lies outside the boundaries of the system. In this context, Janet, a subject coordinator in an elementary school with 16 years of experience, claimed during her interview:

Seeing the school as a system, the principal needs to keep abreast of what is going on in the out-of-school world. . . . Principals often attend meetings at the district level and informational conferences at the state level. Thus, they have to serve as a conduit for information about new standards, curricula and approved textbooks.

Based on the characteristic of *leading wholes*, Janet expected principals to adapt the school curriculum to conform to the expectations of external authorities, thus emphasizing the school's interconnectedness with changes in its environment.

*Leading wholes for school community leadership.* The notion of *leading wholes* as facilitating leadership of the school community toward common academic goals was mentioned by 37.5% ( $n = 9$ ) of the preservice principals. For example, Diana, an elementary school subject coordinator with 18 years of teaching experience, recommended during her interview that every school should define its instructional mission collaboratively, as agreed upon by its various stakeholders:

From a systemic perspective, the principal should engage staff, students, parents, and community in developing a joint mission statement. . . . The principal is responsible for ensuring that a clear mission, which is focused on academic progress for all children, exists. However, she shouldn't define it alone, but through wide collaboration.

Like Diana, Bill, an elementary school grade-level coordinator with 17 years of teaching experience, also expressed the characteristic of *leading wholes* by emphasizing the various school stakeholders as a whole system. Diana did so while defining the school's instructional vision, whereas Bill did so in the context of communicating that vision. Bill wrote in his journal entry after Week 8 that the principal needs to communicate the school vision based on the systems thinking framework: "Schools are notorious for having an expansive list of priorities that change frequently. The principal has to make sure that all parts of the school community are aware of and in alignment with the school's improvement efforts."

Likewise, Joshua, a middle school educational climate coordinator with 15 years of teaching experience, expressed this *leading wholes* characteristic in his interview by pinpointing management's relations with parents as vitally important for school community leadership. Joshua articulated his view of parents as a fundamental aspect of the school community who must be taken into account, expecting his principal to create true partnership between the school and its parents' committee:

The environment exists as a constitutive entity for every system, and parents exist as a constitutive entity for every school. Our principal should decrease the mistrust between the school management team and the parents' committee. He has to create an environment of true partnership, rather than just negotiated truces or deals. Such partnership will undoubtedly contribute to the students' academic success.

Through the lens of *leading wholes*, Joshua voiced the belief that his principal could serve as a boundary spanner, bringing people together across traditional boundaries to work toward a common goal.

Concentrating on leading wholes for the teaching staff within the school community, some participants' utterances revealed their perception of systems thinking as a framework that principals could leverage to turn experienced teachers into leaders who could act as catalysts for meaningful school change. Gloria, an assistant high school principal with 16 years of teaching experience, said during her focus group session that the basic concepts of systems thinking require the cultivation of leadership in others: "The motto of systems thinking is that the whole is more than the sum of its parts. Thus, governing the school by expanding the number of people involved in making important instructional decisions ensures better results." Kimberly, an elementary school instructional coordinator with 26 years of teaching experience, who also participated in Gloria's focus group session, added that this motto is the reason why systems thinking should serve as a basis for creating a professional learning community:

Since the whole is really greater than the sum of its parts, teachers should engage with colleagues in an ongoing exploration of crucial questions that drive our work . . . although some teachers don't like it. However, whether you like it or not, you are a part of the whole school's joint development process.

Through the lens of *leading wholes*, Gloria and Kimberly regarded teachers as members of one large organization that operates as a whole, meaning that all teachers should help improve the entire school together.

In sum, preservice principals perceived *leading wholes*—a holistic point of view oriented toward seeing the big picture and not only its separate parts—as needed for leadership activities in the areas of curriculum and the school community. These two areas of effort targeting improvement in teaching and learning and aiming at ensuring the academic success of all students in the school may be seen as inherently related to the cornerstone of Israeli principal preparation programs—instructional leadership—which according to Capstones: The Israel Institute for School Leadership (2008) should comprise the principal's primary role.

### *Leadership Applications for Adopting a Multidimensional View*

As mentioned above, *adopting a multidimensional view*, the second characteristic of *Holistic School Leadership*, means the ability to simultaneously take various aspects of a given issue's emergence, existence, and future trajectory into consideration. *Adopting a multidimensional view* was perceived by preservice principals as assisting in (a) interpersonal relationships and (b) decision making.

*Adopting a multidimensional view for interpersonal relationships.* The notion of *adopting a multidimensional view* as facilitating healthy relationships within the school community was mentioned by 10 of the preservice principals. For example, in a focus group with Bob, an assistant high school principal with 21 years of teaching experience, he described how he had used systems thinking to solve a conflict involving an 11th grader and her parents, who had appealed the end-of-year failing grade that a highly respected veteran teacher had given her:

I was torn between the two sides: On the one hand, I wanted to be true to my educational belief that the student deserved a higher grade. On the other hand, I wanted to stand behind my teacher's decision, and I was also afraid of a conflict with the entire staff. I then remembered what we had learned in the systems thinking course, that any given situation has more than two contradicting courses of action. So I suggested to the teacher that we pass the decision over to a wider forum.

Like George (above), Bob had already begun implementing the concepts that he had learned toward the end of the systems thinking academic course, before even entering an active job as a school principal. Bob's anecdote indicates that the systems thinking course was already valuable in helping some preservice principals to deal with their current responsibilities in their middle-management roles.

Patricia, an elementary school grade-level coordinator with 22 years of teaching experience, who participated in Bob's focus group, gave another example for dealing simultaneously with two contradicting options: "Yesterday I received a parent's complaint about improper teacher behavior. Like Bob, I wanted to support my teacher. But I knew she was really wrong." She reconciled the two options: "I decided to combine the two sides, so I told the mother that the teacher is kind, helpful, patient, and has a sense of humor, and at the same time I said that the teacher's specific behavior was unacceptable." She viewed her approach as reflecting system thinking: "From the systems thinking perspective, two contradicting opposites may both be true. The two ways don't really contradict each other; they just look like they do. This holds true for many aspects related to our educational work." Looking for more than two extreme options and seeing contradictions as being able to coexist, both Bob and Patricia reflected the second characteristic of *Holistic School Leadership*—*adopting a multidimensional view*.

More broadly, Virginia, a high school information and communications technology coordinator with 19 years of teaching experience, recommended in a focus group session that school leaders should not be afraid of conflicts, seeing them as reflecting the school's multidimensionality: "In my view, conflict between teachers is a fact of life, and it's not necessarily a bad thing. It may illustrate the complexity of the system, demonstrating the differences between the conflicting parties' interests and objectives." Seeing conflicts among teachers as mirroring the complicated nature of the school as a system, Virginia assumed that the basic reason for conflicts was that each teacher held unique ideologies and values. Accordingly, she claimed that "open discussions and timely conversations can be very helpful."

*Adopting a multidimensional view for decision making.* The notion of *adopting a multidimensional view* as facilitating decision making was mentioned by 33.3% ( $n = 8$ ) of the preservice principals. For example, Jacob, an elementary school subject coordinator with 17 years of teaching experience, accused his current principal of remaining limited and rigid in his thinking. During his focus group, Jacob explained,

In our special education school, complex students are almost automatically transferred to another school. We are rarely creative or diverse in our solutions. . . . The principal, who leads these decisions, should think systemically and consider a wide range of solutions rather than staying stuck.

In contrast, Doris, an assistant middle school principal with 13 years of experience who participated in Jacob's focus group, described her current principal as actually performing at the multidimensional view level:

As a holistically oriented principal, my principal claims that we should think of at least five different ways that could solve the problem in question. She expects us to be creative and think out of the box for alternative choices. . . . [She] doesn't allow us to eliminate options just because they sound absurd. An idea that sounds off the wall may be the best solution.

Doris considered her principal as “holistically oriented.” She was able to identify her principal’s approach as characterized by a *multidimensional view* that considered various alternatives during decision making.

Making decisions through *adopting a multidimensional view* also includes leaders’ recognition of delays, that is, of the fact that a certain amount of time often passes between an action and its resulting feedback. Rebecca, an elementary school teacher with 21 years of experience, ascribed importance to taking delays into consideration. During her interview, Rebecca emphasized being patient until slow processes move forward, to avoid overreactions:

Problems may arise if we forget that the school as a system responds to our behavior modification program only after a while, not immediately. We may decide to take more corrective action than needed, or give up the process altogether.

In a slightly different way, Megan, an elementary school activities coordinator with 20 years of experience, considered delays as typifying complex, lengthy processes. She claimed that any school principal who is accountable for improving student achievements cannot in fact see progress immediately: “As in any other complex system, the results of our current actions will be felt only later. Therefore, we have to work today for tomorrow’s results.”

More broadly, Charlotte, a high school grade-level coordinator with 15 years of experience, applied the characteristic of *adopting a multidimensional view* to juggle various meanings of principalship. She wrote in her journal entry after Week 5: “During the preparation program we learned to distinguish between leadership and management. This distinction implicitly suggests a status difference: Leadership is seen as superior, while management is second in importance.” Charlotte did not agree with this hierarchy:

Systems thinking requires the principal to wear many hats. At various times, the principal has to be a leader, manager, diplomat, coacher, mediator, and so on, sometimes all within one school day. . . . It is definitely a balancing act, and principals must be proficient in all of these areas, as well as able to fluidly move from one role to another.

In sum, the second characteristic of *Holistic School Leadership*—*adopting a multidimensional view*—was perceived by preservice principals as facilitating positive interpersonal relationships and informed decision making. *Adopting a multidimensional view* enables leaders to see and juggle several aspects of a given issue simultaneously.

## Discussion

This study’s findings showed that preservice principals considered the first characteristic of *Holistic School Leadership*, *leading wholes*, as helping in school leaders’ role of instructional leadership (curriculum and community), and the second characteristic, *adopting a multidimensional view*, as useful to school leaders’ interpersonal relationships



and decision making. These findings suggest that explicit academic study about systems thinking during a principal preparation program may expand preservice principals' ability to identify opportunities for implementing the systems thinking framework into a variety of school leadership domains. It should be noted that the expansion of the systems thinking ability in study participants was not directly seen in this study. Moreover, this ability could be attributed—at least partially—to prior knowledge of system thinking. In addition, some of study participants' utterances could reflect examples given in class rather than a developed ability to apply systems thinking. Thus, this study's findings should be substantiated by further studies, as will be explained below.

As mentioned above, although Zonnenshain (2012) claimed that disagreement exists about whether systems thinking is an innate talent or a learned ability, most scholars agree that systems thinking can, at least to some extent, be learned and developed by professionals (e.g., Davidz, 2006; Davidz & Nightingale, 2008; Zulauf, 2007). In this regard, an academic systems thinking course may represent transformational learning that creates changes in ways of knowing, which are lenses through which experiences are filtered and understood (Drago-Severson, 2009, 2012; Drago-Severson et al., 2013).

The ability of the current sample of preservice principals to embed systems thinking into school reality may be linked to their experiences during this systems thinking course, which included active, student-centered learning methods. The attempt to directly involve students in the learning process reflected a constructivist approach (Keaton & Bodie, 2011; Marlowe & Page, 2005; Powell & Kalina, 2009), which enabled preservice principals to analyze situations taken from their daily educational work through the lens of systems thinking.

Moreover, the middle-management roles held by the majority of the current sample appeared to be important for preservice principals' ability to identify opportunities for systems thinking application. School middle leaders are those teachers who have management responsibility for staff or for an aspect of the school's work (Fleming & Amesbury, 2012; Hammersley-Fletcher & Strain, 2011) and who in many cases serve as the driving force behind improvements in the quality of teaching and learning (Heng & Marsh, 2009; Thorpe & Bennett-Powell, 2014). School middle leaders' ability to undertake a systemic view is important because educational organizations like schools are considered to be loosely coupled systems—in which events and activities occurring in one part of the system fail to reverberate in clearly patterned ways elsewhere (Orton & Weick, 1990; Weick, 1982). That is, the loosely coupled system incorporates independent organizational elements, like teachers who generally operate independently in separate classrooms. Although these individual members of the system are interrelated, their interactions are typified by low coordination, low information flow, and low interdependence (Dumay, 2014). As school middle leaders, study participants could frame systems thinking in their area of responsibility and consider to what extent their principals perform at the systems level.

The current study indicates that a course about systems thinking may be valuable in preparing principals who are capable of dealing with contemporary complex school leadership challenges. As noted above, traditional approaches to training and licensing

principals do not prepare them to successfully meet the complexity characterizing today's school leadership (Author 2, 2011; Fullan, 2014; The Wallace Foundation, 2016). Current preparation programs should develop preservice principals' ability to deal with complexity and change (Ng, 2015). Findings of the current study suggest that preservice principals who learned the basics of systems thinking during preparation program were able to point out opportunities to implement systems thinking for bettering school functioning in complex situations. Inasmuch as systems thinking is considered as enabling management of complex challenges (Brown, 2012; Jolly, 2015; Wilson & Van Haperen, 2015) and is recommended to school principals who face complexity, diversity, and change (Author 1 & Author 2, 2014, 2017; Dyehouse et al., 2009), this ability may help preservice principals to better frame and analyze the intricacy involved in contemporary school leadership.

Based on the findings of this study, it is recommended that current preparation programs explicitly incorporate the study of systems thinking into their curriculum. It may be worthwhile to integrate this perspective into other subjects that are studied in preparatory programs, such as instructional leadership, data-driven decision making, and school economics. Direct teaching of systems thinking should involve active learning and include opportunities to contextualize preservice principals' learning in actual school leadership experiences. Even better, preservice principals may be asked to apply systems thinking in their own school reality as a leadership development practice. In addition, preparation program designers may do well to add a work experience or internship requirement to principal preparation programs, aiming to provide on-the-job managerial training in systems thinking. Preservice principals will be expected to put into practice the systems thinking framework that they learned in the academic course, while receiving guidance from an experienced principal mentor. Such an internship would seem desirable to provide prospective principals with the opportunity to bridge theory and practice through "real-life systemic" experiences prior to entering the principalship role.

When explicitly incorporating the study of systems thinking into preparation programs' curriculum, a critical perspective is necessary as well: Whose interests are being served by higher capacity of systems thinking in school settings? If systems thinking is nurtured through organizational experiences (Author 1 & Author 2, 2016, 2017), how is it influenced by and interacted with organizational knowledge, power, and perceptions of the "truth"? Does promoting systemic school perspective help to secure the hegemony of the administration? Especially at the age of accountability and standards, can school leaders use systemic thinking to bridge and buffer external policy demands; thus better understanding the political network of power circulation as a leverage for advancing their internal agendas?

Compared with prior studies, the current study provides new data on preservice principals who participated in a systems thinking course during preparation program. However, the study has several limitations. First, inasmuch as the findings were collected within a particular context, their cross-cultural validity requires further investigation. This study should be replicated in various sociocultural contexts, enabling generalization of the findings to a broader population and substantiating their international validity. Second, considering that this study was based on preservice principals'

utterances, further research could complement verbally expressed perceptions with more objective measures such as direct observations to evaluate how they actually implement the systems thinking framework in their educational work. In further research study, participants could also be asked to record in their personal journals cases in which they use systems thinking in their middle leadership roles or internship. Finally, it would also be useful to carry out longitudinal studies, including follow-up data collection among the same participants to explore their systems thinking performance at a later stage, when they are appointed as active principals. This would facilitate evaluation of the systems thinking course's contribution over time, and more importantly, it would help to identify ways of supporting, enhancing, and accelerating systems thinking among preservice, novice, and even veteran principals.

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