Systems thinking among school middle leaders

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Abstract
Systems thinking is a holistic approach that puts the study of wholes before that of parts. This study explores systems thinking among school middle leaders – teachers who have management responsibility for a team of teachers or for an aspect of the school's work. Interviews were held with 93 school coordinators, among them year heads, heads of departments, evaluation coordinators, instruction coordinators, and information and communications technology coordinators. Data analysis revealed that systems thinking among school middle leaders consists of four characteristics: (1) seeing wholes; (2) using a multidimensional view; (3) influencing indirectly; and (4) assessing significance. The findings of this study expand the existing knowledge on systems thinking in school leadership, discussing practical implications as well as further research avenues.

Keywords
Systems thinking, school middle leaders, school leadership

Introduction

School middle leaders are those teachers who have management responsibility, below that of the senior management team, for staff or for an aspect of the school's work. While the senior team shapes the school's ethos, sets policy and establishes guidelines, the middle leaders, who constitute an intermediate layer of management, are responsible for implementing the decisions and making them a reality (Dean, 2003; Fleming and Amesbury, 2012). Faced with an increasingly challenging, fast-paced, and demanding educational environment (Cordeiro and Cunningham, 2014), school middle leaders' role is more complex, and expectations of them are higher. Thus, the traditional tools at their disposal are not enough (Hammersley-Fletcher and Strain, 2011; Thorpe and Bennett-Powell, 2014). Given the importance of school middle leaders to the development of well-performing schools (Bennett et al., 2003; Fleming and Amesbury, 2012), the exploration of new strategies for them may be considered a most worthy and, in fact, necessary topic for empirical study.

This study explores systems thinking among school middle leaders. *Systems thinking* is an approach advocating thinking about any given issue as a whole, emphasizing the interrelationships

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between its components rather than the components themselves. It does not try to break systems down into parts in order to understand them; instead, it focuses attention on how the parts act together in networks of interactions (Gharajedaghi, 2011; Senge, 2006). The literature implies that systems thinking is an effective means for facing real-world problems (Elm and Goldenson, 2012; Kasser, 2013), recommended for dealing with complex organizational challenges (Jolly, 2015; Wilson and Van Haperen, 2015).

The current study explores the characteristics of systems thinking among school middle leaders. This exploration was driven by the paucity of prior research on this topic and the growing importance of school middle leaders' role (Fitzgerald, 2004; Fitzgerald and Gunter, 2006; Fletcher-Campbell, 2003; Seong and Ho, 2012). The findings of this study may narrow gaps in the knowledge on systems thinking in school leadership and assist in finding ways to support the development of systems thinking among school middle leaders. We turn next to the study's conceptual framework, which is grounded in the literatures on school middle leaders, systems thinking, and systems thinking in school leadership.

Conceptual framework

School middle leaders

School middle leaders are middle-level managers, such as year heads or heads of departments. They work at non-principal roles, have additional responsibilities to those of the schoolroom teacher, and implement the policies determined by the school's senior management (Bennett et al., 2003; Wise, 2001). In many cases, these middle leaders are the driving force at improving the quality of teaching and learning. They play a critical role in leading teams of teachers to ensure that curricula are developed, delivered, and assessed, programs are evaluated, and teachers are appraised (Brown et al., 2000; Fleming and Amesbury, 2012). Thus, in light of the emerging worldwide trend of decentralization as a means to encourage school-based development and innovation, school middle leaders are required to be effective change agents, even in fundamentally conservative educational systems (Heng and Marsh, 2009).

School middle leaders' work is heavily dependent on how their roles are constructed and the capacities, abilities, and attitudes of the leaders (Gurr and Drysdale, 2013). The key factors that enable school middle leaders to perform their duties are an official leadership position, access to expertise, support by senior management, and interpersonal synergies among the leaders. While senior managers usually perform transformational leadership, school middle leaders generally perform instructional leadership (Seong and Ho, 2012). School principals consider excellent practice a requirement for the promotion of a teacher to middle leader. Teachers are interested in middle management in order to influence teaching and learning and improve practice, not in management for its own sake (Fletcher-Campbell, 2003).

Despite the importance of the middle leaders' role, the literature on school leadership often overlooks their educational work (Fitzgerald, 2004; Fitzgerald and Gunter, 2006). Leask and Terrell (2013: 1) noted that "much of the literature on educational management, school improvement and school effectiveness has described the importance of head teachers … there has, however, been a relative neglect of the importance of the role of the middle manager." Hence, it is necessary to expand the existing knowledge regarding the educational work of middle leaders.

Moreover, because schools and school systems have been utterly reshaped by the demands of outcome-based accountability, the roles of school middle leaders have changed over the past two

decades. In today's test-based accountability environment, each school's staff is held accountable for enhancing its students' academic progress and outcomes (Hunt, 2013). In this context, the middle leaders are required to support teachers in doing their work effectively and to bring about measurable student achievements (Hammersley-Fletcher and Strain, 2011). Thus, they need additional strategies to enable them to succeed, as reflected in their requests for further development (Thorpe and Bennett-Powell, 2014).

Systems thinking

Systems thinking was first mentioned toward the end of the first half of the 20th century, as a method that contrasted with Descartes' scientific reductionism (Von Bertalanffy, 1960). In scientific reductionism, complex phenomena are understood by reducing them to their simpler basic parts (Rosenberg, 2006). In contrast, according to systems thinking, the only way to fully understand why a phenomenon arises and persists is to understand its parts in relation to the whole (Hammond, 2005).

Systems thinking is not a discipline, but rather a widely used, interdisciplinary conceptual framework. It is "an orientation to the world, and a model for thinking about and learning about systems of all kinds – scientific, organizational, personal, and public" (Cabrera, 2006: 93). Thus, the literature on systems thinking encompasses a broad range of fields and journals, yielding a variety of definitions, including the following.

- The art and science of making reliable inferences about behavior by developing an increasingly deep understanding of underlying structure (Richmond, 1994: 141).
- The art of simplifying complexity, while seeing through chaos, managing interdependency, and understanding choice (Gharajedaghi, 2011: 335).
- 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" (Sterman, 2000: 4).
- An epistemology that, when applied to human activity, is based upon the four basic ideas of emergence, hierarchy, communication, and control as characteristics of systems. When applied to natural or designed systems, the crucial characteristic is the emergent properties of the whole (Checkland, 1999: 318).
- A discipline for seeing wholes, or a framework for seeing interrelationships rather than things, for seeing patterns of change rather than static "snapshots" (Senge, 2006: 68).

Despite the absence of a commonly accepted definition for systems thinking, these diverse definitions clearly yield two main complementary meanings for systems thinking: rising above the separate components to see the whole system, and thinking about each separate component as a part of the whole system. These two meanings of systems thinking – *seeing the whole beyond the parts* and *seeing the parts in the context of the whole* – were used in the current study to explore the data provided by school middle leaders.

Systems thinking in school leadership

Systems thinking could provide a frame of reference for comprehensive school reform, enabling strategic planning that focuses on predetermined measurable outcomes, encompassing the organization's total resources and purpose, and defining how goals will be accomplished (Miller-Williams and Kritsonis, 2009). Yet, with these advantages, systems thinking has received little

research attention. King and Frick (2000) claimed that schools could not be effectively redesigned without the employment of systems-thinking skills, which enable those concerned to analyze existing schools and to design alternative systems by exploring how people and elements in the school environment interact. Thus, the answer to the question of how schools may become places of transformation lies in systems thinking (Zmuda et al., 2004).

Regarding parent–school relationships, systems thinking may help reframe parent–school partnerships as learning communities that aim to create new knowledge and innovation by enabling the experiences and capabilities of teachers and parents to interact in order to make tacit knowledge explicit (Price-Mitchell, 2009). Within the context of the No Child Left Behind federal legislation in the USA, systems thinking was proposed as useful for improving public relations, helping educational leaders see public relations as a continual, systematic process that is essential for engaging the school community's support to improve students' learning (Chance, 2005).

Systems thinking may also foster teachers' collective learning (Cheng, 2011), because work using this approach emphasizes the interrelatedness of goals. Teachers thereby review the system to identify its interconnections and then form solutions based on this deeper understanding, developing professional learning communities (Wells and Keane, 2008). Systems thinking may also be significant in evaluating curricula and educational programs. Curriculum evaluation via systems thinking can ensure district-wide uniformity and consistency in evaluation (Jasparro, 1998). Dyehouse and her colleagues (2009) compared linear and systems-thinking approaches for evaluating educational programs, and demonstrated how systems thinking provides added value by modeling the participant groups, instruments, outcomes, and other factors in ways that enhance the interpretation of quantitative and qualitative data. Kensler and her colleagues (2011) asserted that because educational leaders have access to large volumes of data but lack the skills to use them effectively for continuous school improvement, systems thinking might help facilitate the development of evidence-based practice.

Guidebooks for using systems thinking in educational leadership are mostly directed toward educational reform, and offer frameworks for successful educational transformation. Focusing on the sustainability of educational reform, Fullan (2005) asserted that sustained improvement of schools requires ''system thinkers,'' addressing the entire system comprising three levels: school and community, district or local education authority, and state or national policy. These system thinkers, regardless of their own level in the system, know that all three levels influence one another. Similarly, Hopkins (2007) argued that in order to realize the potential of system leadership, we should move from individual school improvement efforts and short-term objectives to a sustainable system-wide response, which seeks to re-establish the balance between national prescription and school leading reforms. Thus, ''system leadership'' is required – leadership that goes beyond a single school, where leaders work directly for the success and welfare of students in other institutions as well as their own (Higham et al., 2009). Hoban (2002) concentrated on systems thinking and teachers' learning, claiming that one of the reasons for the disappointing results seen for many efforts toward educational change is an overly simplistic view of teachers' own learning, which is incompatible with its complex nature. Zmuda and her colleagues (2004) claimed that systems thinking is the ''door'' to school staff members' continuous improvement, aiming to make schools a place where all staff can constantly improve their teaching, learn, and work to increase students' achievements.

One of the branches of systems thinking is complexity theory, which focuses on how order appears in complex systems. It argues that systems are complex interactions of many parts that cannot be predicted by accepted linear equations. Morrison (2002) presented the implications of

complexity theory for school leadership, claiming that schools are greatly influenced by the fact that they are complex, nonlinear, and unpredictable systems. As schools race to keep up with change and innovation, he suggests that it is possible to find order without control and to lead without coercion.

In our previous study (Shaked and Schechter, 2014), we called school leadership that is characterized by systems thinking *Systems School Leadership*, defining the approach whereby educational leaders lead schools through the systems thinking concepts and procedures, applying the systems view and performing at the systems level. Four characteristics of *Systems School Leadership* were identified. These characteristics are the practical ways in which school leaders implement systems thinking in educational leadership. The four characteristics are as follows. (1) *Leading wholes* – a holistic view of the big picture and not only its separate parts. (2) *Adopting a multidimensional view* – seeing several aspects of a given issue simultaneously. (3) *Influencing indirectly* – the ability to address the school's tasks and challenges circuitously. (4) *Evaluating significance* – the ability to consider elements of school life according to their significance for the entire system, distinguishing between important and less important issues to be resolved, and identifying patterns.

Research context

The current study investigated Israeli school middle leaders. 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. The Jewish sector consists of state schools (58%), state-religious schools (19%), and separate independent ultra-orthodox religious schools (23%). The Arab sector consists of Arab schools (71%), Bedouin schools (22%), and Druze schools (7%). About 1% of the total student population is enrolled in special-education settings (Israeli Central Bureau of Statistics, 2013).

The Israeli educational system has been traditionally highly centralized both structurally and procedurally. The Ministry of Education has controlled schools in areas such as writing and distribution of curriculum materials, standards, testing, and hiring and firing of school staff (Volansky, 2007). Schools have to follow a basic national curriculum although they are allowed to conduct ''experiments'' under administrative direction from the Ministry. However, in recent years, the tendency toward neo-liberal ideas of competition and privatization has resulted in more open and flexible registration opportunities for urban schools (with weaker links between residential location and school attendance zones). These processes (open enrollment zones, school choices, increased strength of local education authorities in municipalities) have transpired much more in the urban schools, which operate in a competitive environment, whereas suburban and rural schools operate in a less competitive environment. This tendency toward flexible registration opportunities has been coupled with attempts (since late1980s) to decentralize the school system through efforts such as school-based management, autonomous schools, and so forth (Inbar, 2009).

Method

Like most research on systems thinking (e.g., Frank, 2012; Hung, 2008; Taber, 2007; Zulauf, 2007), the present study was qualitative in nature in order to provide rich textual descriptions of the complexities of how people experience a given issue or situation. Participants were 93 coordinators, among them year heads, heads of departments, evaluation coordinators, instruction coordinators, information and communications technology (ICT) coordinators, and educational climate

coordinators. All study participants teach as part of their work at school. The diversity of study participants increases the study's trustworthiness (Creswell, 2013). Thus, we sought to maximize the sample diversity regarding demographic characteristics, including gender, work experience, geographical district, level of the school where they worked, sector or type of educational system in which they worked, and their education. Participants were 67 females and 26 males, 85 Jews and 8 Arabs, with a mean of 16 years of teaching experience (range: 3–33), from all six school districts in Israel. They worked in elementary schools ($n = 42$), middle schools ($n = 6$), and high schools ($n = 45$). They taught in the State Education System ($n = 58$) and the Religious State Education System ($n = 35$). About half of them hold an MA degree. For ethical reasons, all participants were informed that their participation was voluntary and that they could leave the study at will. They were assured of anonymity and confidentiality (pseudo-names were assigned) and were asked to provide written consent based on understanding of the research purpose.

Data were collected through interviews. The interviews 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: 90). Although the key questions were preplanned, the interviews were conversational, with questions flowing from previous responses when possible. Interviews generally lasted one hour. During the interviews, we intentionally avoided mentioning the term "systems thinking" to prevent priming interviewees to frame their discussions in this light. Without saying so explicitly, we tried to bring interviewees to talk about systems thinking, by questions pertained to 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."

Data analysis was a four-stage process – condensing, coding, categorizing, and theorizing. Once data were collected, we found that not all the material collected could serve the purpose of the study, and a sorting process was necessary (Miles et al., 2014). Thus, in the first stage of analysis (condensing), we looked for the portions of data that in any way related to systems thinking, which was the topic of this study. In the second stage (coding), each segment of data (utterance) was coded by the aspect of systems thinking it expressed (Gibbs, 2007). After capturing the essence of utterances in the second stage, in the third stage (categorizing), we clustered similar utterances to generalize their meanings and derive categories. At this point, we reworked categories to reconcile disconfirming data with the emerging analysis. Finally, in the theorizing stage, we 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 and Morse, 2013).

In order to ensure trustworthiness, a member check was held, giving the descriptive data to participants and asking for their feedback (Schwartz-Shea, 2006). Using this strategy allowed for an examination of the descriptive data versus the participants' reactions, thus endorsing and solidifying participants' utterances regarding systems thinking. In addition, as reflective journals have been recognized as an important aspect of qualitative research (Etherington, 2004; Ortlipp, 2008), throughout the study period we used reflective journals, making our experiences, opinions, thoughts, and feelings visible and an acknowledged part of the study, to ensure critical thinking during the research process.

Findings

The findings revealed four characteristics of systems thinking among school middle leaders: (1) seeing wholes; (2) using a multidimensional view; (3) influencing indirectly; and (4) assessing significance. These should not be viewed as a linear series but as overlapping, interconnected, and interrelated capacities of systems thinking.

Seeing wholes

Participants' voice revealed that the first and primary characteristic of systems thinking among school middle leaders is a holistic point of view, oriented toward seeing the big picture and not only its separate parts. As mentioned, rising above the separate components to see the entire system is one of the two main complementary meanings of systems thinking. Thirty-nine interviewees expressed this characteristic.

When it comes to understanding an entire school, those school middle leaders who espouse systems thinking understand it as a whole system. They have an overview of its subsystems and components, and recognize how each functions as part of the entire system. They view all the parts of the school in the context of and in relation to the other parts, and recognize that the whole emerges from the relationships between the parts. For example, Naomi, a year head in an elementary school with 18 years of teaching experience, believes that every teacher should know the curriculum not only of the age group where s/he teaches but of all ages in school:

> The syllabus for all age levels is spiral, so that the previous material is always repeated when we teach the new subject. The problem is that there's a break between every two levels. The first and second grades are one unit, third and fourth are one unit, as are fifth-sixth, and not much is known about what happens in the other levels. I think that teachers should know a bit more about what happens outside their classroom. I'd like to start an arrangement for observing lessons, not just sixth-grade teachers observing sixth-grade teachers, but to open it lengthwise. From what I saw, teachers who worked with older ages – I don't know if it's possible in the opposite direction – but teachers who moved from the young ages to the older ones, suddenly discovered other worlds, and it was very successful. I don't know if it's possible in the other direction. But I have no doubt that there should be mobility so that we can become familiar with the school arrangement.

Naomi claimed that teachers should be familiar with the curricula of all classes. Instead of seeing teachers as working in a particular age group only, her view is holistic, as she sees teachers as working in the school as one big entity. Similarly, Natasha, a high-school mathematics coordinator with 20 years of teaching experience, recommends uniting the two parts of her school:

> Our school has a middle school and a high school. The school should be viewed as a harmonious, unified system. The aims of the middle school and the high school should be unified for continuity and construction, we have to work on consolidation and setting paths for both the middle school and the high school levels.

More broadly, Evelyn, a high-school year head with 26 years of teaching experience, noted that she saw the connections and the implications, considering the whole system, even beyond the school's boundaries:

I'm a year head and am identified with my grade, but beyond this there is an entire school, education administrator, Ministry of Education and an entire universe. The connections and future implications of everything must be seen! Everything has to be taken into account!

Similarly, Ana, a high-school schedule coordinator with 17 years of teaching experience, elucidated that systems thinking means rising above mundane tasks and considering all factors as well as the long term:

You have to make the connections, we can't just be busy with the here and now and immediate work. This is a long-term perception and understanding of who I'm facing, all the factors, and how I activate different people. [I have to] plan and understand where the bugs are and not only on my front. This is a birds-eye view.

Gamal, an elementary-school activities coordinator with 16 years of teaching experience, demonstrated *leading wholes* when he expected all school staff to work toward a common goal. He likened it to a soccer player with a broad view of game:

Teachers' affinity to the school have to be strengthened, they all have to act toward the same goal. [This means] not only the teachers but also the other staff, including the janitor, getting on the field and seeing the four sides, like an outstanding soccer player who reads the plays before they happen and foresees them plays and really understands the system within which he works.

Gamal's holistic point of view was also expressed in his willingness to work without knowing all the details involved in a given situation. Some of his colleagues found it difficult to work without knowing everything. For example, Tahir, a year head at the same school with 12 years of teaching experience, said: "I don't want to disappoint anyone so I don't make any decision until I have all the information. The pressure makes no difference, I have to clarify everything, and only afterwards make a decision." Gamal, on the other hand, recommended skipping over the lack of information:

When I'm missing information, I try to get as much of it as possible within the time frame at my disposal. I then analyze all the information and filter it and make a decision according to what I view as correct and important. There isn't enough time on this job to clarify everything. You'll waste all your time just getting information. I see part of the picture and this should suffice to understand the whole picture.

While Tahir felt he had to thoroughly understand all the details involved in a given problem in order to come up with a solution, Gamal felt that he has the ability to function under uncertain conditions. The tolerance for uncertainty stems from the ability to see the whole – which Gamal called "the big picture" – even when only some of the details are known. Shirley, an elementary-school science coordinator with 8 years of teaching experience, claimed that school improvement depends on a holistic view as well as joint work of all partners. This way, interactions and cooperation will replace disconnection and lack of communication:

I think it's difficult to lead change as long as the interactions are separated: principal-supervisor, principal-teachers, classroom teacher-subject teacher, and there is no inclusive overview and no joint meeting of all in order to find a way to deal with this. Everyone's busy with their own matters, like a

worker ant, and there is no welding or joining among all, and therefore there is disconnection and lack of communication, which make it difficult to find a solution. Sometimes there's an impression that the school is divided into separate units and divisions, both pedagogically and socially. There isn't enough discourse or cooperation.

Lisa, a high-school English coordinator with 21 years of teaching experience, explained that systems thinking means striving for the success of the whole school, not just one's personal success. In her view, one of the implications of this approach is a willingness to contribute to school projects, even when these are not related to their specific role:

> Ultimately, we have to see how all the middle leaders can do the best for the school as a whole, not only for my specific function and my success, but to see how the school succeeds and grows, and you become part of this – for example, the 12th-grade graduation. Even if it's not your responsibility, how you help and take charge and support, even though it's not you who'll receive the feedback. Support both behind the scenes and up front, help produce the event, even if it isn't your responsibility, it's a system overview to do everything so that in the end it's the students and the staff who succeed.

The *leading wholes* characteristic may also be applied to a class or even a student, when seeing his or her whole picture and not only its separate parts. Karen, an elementary-school reading coordinator with 22 years of teaching experience, wanted such a way of thinking to be at her school, seeing all the staff members associated with the class or with student as a system that must operate as a whole:

> I'd be happy if there were a more comprehensive view in my school, because I think there's not enough. I mean, for example, that there should be a multi-system staff meeting for the class, where each teacher gives his own view and opinion, and even if the meeting is about a single child, every one working with that child is present – counselor, psychologist, parents and teachers. This holistic perception, where the pathways are open and the subject is seen as a whole, can express a wider view of needs and better treatment.

In essence, this characteristic of seeing the whole picture is important with regard to the entire school as well as to various issues transpiring within it. This knowledge about how numerous separate details combine to create the entire school may result in strengthening professional relationships, increasing collaboration, leading comprehensive processes and tolerance for ambiguity.

Using a multidimensional view

An additional characteristic of systems thinking among school middle leaders is adopting a multidimensional view, thus understanding that because each element is a part of the large and complex school system it necessarily has more than one reason, one explanation, one implication, or one answer, and therefore one must take various aspects into consideration simultaneously. This multidimensional view, expressed by 26 interviewees, is part of systems thinking because it is a result of seeing the whole beyond the parts, which is one of the two major meanings of systems thinking. Gamal, for example, considered absences of teachers at his school to have several causes, several possible solutions, and several implications:

We have a problem of much teacher absenteeism. In my opinion, there are several reasons for this, for example, the stress of New Horizons [a national reform in the education system] and the pressure that the principal always puts on the teachers when he requests results and more results in all areas, but there are other reasons, too. How do we contend with the problem? There are several options, beginning with giving a bonus to those who aren't absent to penalizing those who are. In my opinion, there should be a staff meeting of all the teachers in the school to discuss this issue together, to put it all on the table and together maybe come up with a fair solution. There were several implications to this problem, the main one being the great damage to the students' learning.

Debbie, a high-school history coordinator with 24 years of teaching experience, sees beyond pedagogical considerations only:

I have the ability to see a wide range of additional consideration beyond my narrow field. For example, there are students who're members of youth movements, and because of these activities they miss studies or an exam. I'm very understanding and supportive, and given proper authorization I let them take exams at another time. This flexibility is important and it looks at the system as an educational system measured not only by grades but by what kind of people we raise.

Sylvia, an elementary-school mathematics coordinator with 18 years of teaching experience, wanted to be in contact with other schools, in order to hear additional professional points of view:

We have no contact with other schools. There are similarities and differences, and we have to open up a bit. It bothers me. We are closed in our teachers' lounge, without any idea of what goes on in other teachers' lounges or in other schools. I miss having some cooperation between the teachers' lounges and the subject teachers – discussions of what works, and what doesn't. This will give us more perspectives on our work and enrich us.

Maya, an elementary-school discipline coordinator with 15 years of teaching experience, uses a multidimensional look during discussions on teachers' difficulties:

In the staff meetings we hold one of the teachers raises a certain difficulty, and I'm sitting there with a therapist and a psychologist and an inclusion coordinator and an inclusion teacher and together we're trying to find a solution to the difficulty, each one from her side. Each one gives her viewpoint and together we formulate a successful solution.

Bella, a high-school ICT coordinator with 27 years of teaching experience, examined various options to resolve the problem of school dropout, trying to look at it a little differently and recruit more partners:

Maybe it's worthwhile to view this difficulty in a slightly different way, to factorize the components related to 12 years of study and think about what solutions are at our disposal. Because we're really limited, but maybe we can get the municipality and the supervision to set up a larger and wider treatment system, or even set up a committee from within the teaching staff to have this function.

Ethan, a high-school physical education coordinator with 13 years of teaching experience, who works in the same school as Bella, recommended ways to deal with discipline problems:

There are times when not all the students should be treated the same way. Strictness will not succeed with all of them, and sometimes we choose the easy way of summoning the parents, letters, and expulsion. We have to understand that there are also other ways.

In summary, this characteristic of systems thinking considers various issues from multiple relevant perspectives and viewpoints, as well as cognitively switching among perspectives in order to overcome problematic issues.

Influencing indirectly

Another characteristic of systems thinking that emerged from the middle leaders' interviews is the use of an indirect approach when dealing with tasks and challenges, as expressed by 24 interviewees. Accordingly, each issue at hand is part of a large system and therefore staff members do not have to deal directly with every issue but rather can influence it circuitously. Addressing the school's separate components and subsystems as parts of one whole system characterized by mutual, reciprocal effects is a view that falls under one of the two major meanings of system thinking, that of seeing the parts in the context of the whole. Sabirah, an elementary-school Arabic coordinator with 9 years of teaching experience, argues that teachers will become active and involved because of the indirect impact:

In my opinion, staff members are influenced by each other and by the atmosphere in the school in general. Therefore, teachers who aren't active in a certain area, and who we want them to be actively involved, can be influenced by what happens around them. In the end, what other teachers do will cause them to join in.

Muhammad, an elementary-school road safety coordinator with 11 years of teaching experience, advocated using the indirect approach toward teachers' absenteeism:

In handling teacher absenteeism, it's possible to create a program aimed at strengthening the teachers' relation to the school and making them happier, and this could definitely reduce the level of teacher absenteeism. We'll simply not reach our goal directly unless we turn from the other side and reach it a bit later but in the end we will reach it.

Deborah, an elementary-school language coordinator with 15 years of teaching experience, described how she, along with the school principal, try to improve their school's achievements in several fields taught indirectly. They do so by improving the language learning and seeing the mutual influences between different subjects:

In the last school year the principal and I decided on language as the central axis. We understood that language is important for all the core subjects, and that when there is difficulty with language, there is also difficulty in other disciplines. For example - in the growth and effectiveness measures for science we discovered that there's a problem with language literacy. Students lacked language strategies for analyzing science questions. There were students who understood the scientific principles, but didn't succeed in answering the questions because of language strategy problems. In the growth and effectiveness measures for mathematics we encountered problems in arithmetic stories, the subject language is defined in an overview, and the aim was to advance each and every student according to his needs.

Eva, a middle-school science coordinator with 21 years of teaching experience, supported the indirect way regarding school violence:

> I think the problems can be dealt with by circumvention. See for example how the principal invests in how the school looks, how she puts effort into beautifying the school, and we also see that violence is reduced, surely not only because of this but also because of it. The students feel better and have a greater feeling of belonging.

To summarize, this characteristic of systems thinking comprises a realization that each entity in the school functions as an interconnected part of an entire system, with implications for the system's other parts. School middle leaders who revealed this point of view advocate affecting things indirectly.

Assessing significance

The fourth characteristic of systems thinking that emerged from the current middle leaders' qualitative data is the ability to figure out the significance of the components of school life to the whole system – identifying the role, importance, and relevance of each element. This is consistent with one of the two major meanings of systems thinking, that is, thinking about each separate component as a part of the whole system, and was expressed by 19 interviewees. For example, David, an elementary-school year head with 5 years of teaching experience, described how he identified a small occurrence – three students who transferred to another school – that was of great significance:

> So only three students left, but I understood immediately that this is a difficulty. This is a problem. Why do three students leave the school? At first, it seems irrelevant. However, it seems there's a reason. This affects their friends, today everyone works with WhatsApp, Facebook, emails, and therefore immediately everyone knows that three children left for another school. And the three became five. I'm telling you that by now six children have already left.

Jibril, an elementary-school special needs coordinator with 16 years of teaching experience, recommended that staff members "filter out" the nonessential elements of the school's complex and dynamic reality and analyze the most important issues that need addressing:

> In my opinion, we invest too much in minutiae, there are a million things in the system, and you have to know what's important and what isn't. It's not important to deal with everything, it only causes burnout and wastes time.

Ella, a high-school year head, with 13 years of teaching experience, learned from seemingly insignificant conduct about a significant problem:

> Discipline problems are often dealt with directly by the administrative staff, without the homeroom teacher. This may seem to be a small point, but to me this demonstrates something important and more profound in that everything has to go by the administration directly, from the students to the administration. This is problematic because in the middle there's a homeroom teacher and the subject teachers who are simply skipped over, and this is very problematic for the school and the teachers'

feelings and status, and again the cycle repeats that the teachers become small-minded, since anyway everything goes to the administration and it decides.

Lillie, an elementary-school ICT coordinator with 9 years of teaching experience, learned from her experience that handling parents' complaints is more important than handling other issues:

I learned from experience that dealing with parents' complaints shouldn't be postponed. Even if there are lots of other things to deal with at that moment, this can't be postponed. If you deal with this at that moment, then you can relax, you can quell, prevent developments. If you don't give the immediate response, things can go to bad places, when the parents involve other parents and then they have already clarified the issue without you. When you respond it helps a lot.

Sabirah appreciates any contribution of parents to the school, even if it is something small:

When a student's mother comes voluntarily and gives her time to her son's class and does something small for the children in coordination with the teacher, I think this is very important. Even if it's something small, because our school is located in a small neighborhood, and if that mother gets suitable feedback more mothers will also want to take part and help and contribute.

Tania, a high-school year head with 8 years of teaching experience, evaluates the significance of the entry of students into the teachers' room, seeing it as a sign of disrespect:

For example, children who enter the teachers' lounge, photocopy there, taking cups from the lounge, things like that. There are teachers who are cool with it – take, photocopy, why not. To me this is a symptom of something much more vast, this is crossing a kind of border, that points to something much more basic of lack of respect. This is a small example but I think it's acute.

Bella noted that students did not respect her:

There were two incidents when the students didn't respect my authority. They weren't big things, but things like this hadn't happened in the past, and I definitely can conclude from this that the authority of the teachers at the school has been damaged. My problem is not these two incidents, but what they indicate. It is the small things that indicate something much larger.

In summary, evaluating significance includes the capability to evaluate components of school life according to their significance for the entire system. Thus, it consists of the ability to "filter" information and prioritize requirements and tasks, distinguishing between important and less important issues to be resolved, and identifying patterns.

Discussion

This article presents four characteristics of systems thinking among school middle leaders. These characteristics are the practical ways in which school middle leaders do their jobs through systems-thinking concepts and procedures: (1) *seeing wholes* – a holistic point of view oriented toward seeing the big picture and not only its separate parts, conceptualizing all aspects of school life as one large system; (2) *using a multidimensional view* – the ability to juggle between several aspects of a given issue simultaneously, noticing a wide range of
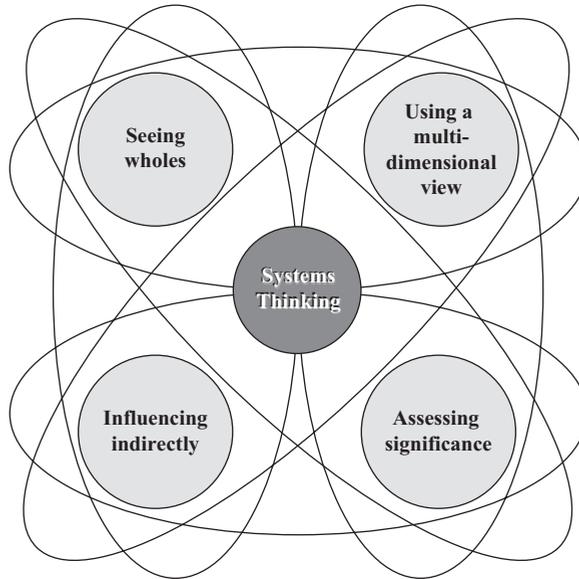
Figure 1. Characteristics of systems thinking among school middle leaders.

reasons for an issue's emergence and existence, taking into account a variety of its consequences, and predicting various options for its future development; (3) *influencing indirectly* – addressing the school's tasks and challenges circuitously, based on the awareness that countless reciprocal influences are at play among various elements within the school, each of which is connected to others, affecting them and being affected by them; and (4) *assessing significance* – the ability to evaluate components of school life according to their significance for the entire system, distinguishing between important and less important issues to be resolved. In line with the holistic essence of the systems-thinking perspective, these four characteristics should not be viewed as a linear series but as overlapping, interconnected, and interrelated capacities (see Figure 1).

Similar characteristics were found in an earlier study as characterizing systems thinking among school principals (Shaked and Schechter, 2014). The findings of this study corroborate the identification of these characteristics, expanding their meaning; henceforth, these may characterize systems thinking not only among school principals, but among educational leaders at various levels. However, systems thinking among school middle leaders differs from systems thinking among school principals. For middle leaders, systems thinking more often seems an aspiration rather than reality. As explained in the *Method* section, during the first part of the interviews we intentionally avoided mentioning the term "systems thinking," to prevent priming participants framing their utterances in this light. From their discussions on school issues, such as school situations, needs, and challenges, we extracted the characteristics of their systems thinking. When we mentioned the term "systems thinking" toward the end of the interview, the majority of interviewees contended that a systems approach is fairly important to their roles and even stated that they often apply such an approach. However, despite the rhetoric, some of them were not sufficiently knowledgeable about the full meaning of systems thinking and were not entirely aware of its possible impact on their practices.

In recent decades, the pressure on school middle leaders has increased significantly. The current era of accountability, which involves high standards for student achievement, sets high expectations from schools. In education policy today, accountability means that schools should be held accountable for the progress, or lack of progress, in every student's achievement (Cordeiro and Cunningham, 2014; Hunt, 2013). The Program for International Student Assessment (PISA) also increased the requirement for schools to raise student achievement. Schools are expected to use PISA results to reflect on their own practice, acting accordingly to improve their performance (Hanberger, 2014). These pressures on schools to produce year-on-year improvements in student achievement lead to inevitable demands on middle leaders to ensure that their practices contribute to the achievement of school objectives and externally imposed targets. Middle leaders are required to support teachers in doing their work effectively and to bring about improvements in examination performance (Hammersley-Fletcher and Strain, 2011). In light of the new expectations from them, school middle leaders need to change the perception of their role, thus developing a leadership perspective of seeing the school holistically. However, as long as their professional identity is primarily that of a classroom teacher, they may find it difficult to adopt a whole-school perspective.

Middle leaders who perform at the systems level may take up their duties in a different way. When it comes to decisions on curriculum, resources, and pupil discipline, for example, middle leaders are often in the uncomfortable position of being sandwiched between the conflicting requirements of the senior leadership team and their departmental colleagues (Bentley-Davies, 2012). The tension between horizontal and vertical relationships may be seen as a tension between expectations that the middle leader would acquire a whole-school perspective, implementing policies that take into account the considerations of the entire system, and their loyalty to their department (Bennett et al., 2007). Thus, systems thinking may affect middle leaders' course of action in such situations, enabling them to see the big picture.

The relationships of middle leaders with their departmental colleagues may also be different when they possess systems thinking. Becoming a middle leader often involves dealing with changes in relationships as middle leaders find themselves accountable for the professional development of their colleagues (Cardno, 2007). Middle leaders are more likely to use a top-down approach – a traditional organizational style that emphasizes the imperatives and vision of higher rank. When they meet resistance, they tend to be authoritative and coercive (Moore, 2007). Systems thinking, which is associated with cooperative approach (Shaked and Schechter, 2014), may lead them to adopt a more collaborative management style.

Developing a systemic approach may contribute also to intensification of cooperation with other middle leaders at school. Unlike other bureaucracies, schools do not consist of hierarchical units, but are characterized by structural looseness (Owens and Valesky, 2007), which precludes faculty members from integrating meaningful feedback about core instructional and organizational processes across a school's sub-units (Halverson et al., 2005). Usually, middle leaders are connected to each other but still function independently. This may be one more explanation to the findings of this study, which indicate that middle leaders find it difficult to develop systems thinking.

Developing middle leaders' systems thinking may increase their collaborative work, and thus may reduce within-school variation, which is considered a significant management problem (Hannaway, 2009). Middle leaders can support and mentor other middle leaders at school who find it difficult to fulfill their duties. In addition, middle leaders from neighboring schools can collaborate and act as peer mentors. Thus, when they receive adequate training, middle leaders can expand their influence within the school and beyond (Bentley-Davies, 2012).

Being a middle leader may be seen as an initial stage of a school principalship career (Earley and Weindling, 2004). Thus, developing systems thinking when serving as middle leader may increase the chances of performing at the systems level in due course in the role of school principal. Put differently, systems thinking can be helpful in developing middle leaders' holistic organizational perspective as they gradually make the transition from a teacher to a school leader.

Seeing school middle leaders as potential future principals increases the importance of their professional development. Collaborative analysis (e.g., case-based analysis) of school practices and processes through the prism of systems thinking may enable them to expand their systemic view in their current position as well as when they will become school leaders in the future. For this end, it is advisable to construct school practice fields, or virtual worlds, for the sole use of experimentation. Although this communal deliberative practice field resembles the real action domain, it facilitates considering how variables existing in the system are causally related in feedback loops, as part of a circuit of cause-and-effect processes. This "reflective practicum" (Bannink and Van Dam, 2007) provides a safe arena for school middle leaders (e.g., year heads, heads of departments) to gain insights into the underlying structures from which the system's behavior changes stem over time. Expanding school middle leaders' prism of only performing – overcoming daily ("real") school problems – into a process of rehearsing, experimenting, and simulating can nurture a systemic outlook by future school leaders.

The current study is, to the best of our knowledge, the first empirical research investigating systems thinking among school middle leaders. Inasmuch as the findings were collected in a particular context, their cross-cultural validity is not proven. This study should be replicated elsewhere in various sociocultural contexts, enabling generalization of the findings to a broader population and substantiating their international validity. Further research should complement participants' verbally expressed perceptions with more objective measures like direct observations to evaluate actual implementation of systems thinking in diverse school settings. Further research should also explore to what extent and how often school middle leaders use systems thinking and what are the stages of its development. This would enable the evaluation of systems thinking development over time, and more importantly, would help identify ways to support, enhance, and accelerate systems thinking among school middle leaders.

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