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**Systems Thinking in Educational Leadership:
Structure Validation**

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Abstract

Effective school leadership is essential for ensuring optimal learning and continuous school improvement. Moreover, it affects the school climate, teaching practices and students' achievement level. However, research findings indicate that although school leadership has always been challenging, today school leaders face many more difficulties and challenges than they faced in the past. There is much literature describing current expectations from school principals worldwide. The dominant modern myth portrays school principals as underpaid workhorses tangling with the conflicting demands of instructional leadership, bureaucracy, official mandates and adverse interest groups. The principal's complex work environment requires new management strategies to help him / her succeed in his /her challenging task and overcome the complexities involved in it. In this study we offer the systems thinking approach as a tool for dealing with increasing complexity.

Systems thinking is a holistic approach viewing the issue at hand as a whole. This approach regards problems and goals as components of large structures rather than as isolated events. The focus in systems thinking is on the way in which all the components work together in a networks of interrelationships and interactions, with special attention paid to repeated patterns that indicate changes and trends occurring over time. In the research literature there are diverse definitions for systems thinking. This variance is due to the many different disciplines in which the approach is applied. Despite the differences, there is a clear consensus that the system-thinking approach perceives any given system as a whole and assumes that all system components are interrelated in reciprocal relationships, so that each action relating to one component of the system affects its other components. This approach is contrary to the reductionist point of view, which posits that complex problems are solvable by dividing them into basic components and recognizing these components' properties.

The research literature in this field suggests that systems thinking has been implemented as a means of dealing with local or specific domains within the school, such as

curriculum evaluation, implementation of the concept of a professional learning community, process management, implementation of reforms, retention of teachers, and relationships within the school. However, Shaked and Schechter believe that being a holistic approach, systems thinking would be better utilized by school principals on a regular basis, observing through its lens all events, people and processes, as this would greatly facilitate their understanding of nearly everything that transpires in the school setting.

System thinking characteristics were also reviewed, but no general agreement as to their identity has seemed to exist in the various fields. For this reason, we reviewed the core characteristics derived from Shaked and Schechter's qualitative research, as they were found to be pioneers in the field of educational leadership through systems thinking. In their study they present four characteristics of holistic school leadership: (1) Leading wholes – observing the overall picture of the school, above and beyond its various components; (2) Adopting a multidimensional view – simultaneous multidimensional consideration of various aspects of a given subject, as well as reference to a wide range of reasons for the appearance and existence of a particular event or phenomenon, including a range of possibilities for future potential influence and development. (3) Influencing Indirectly – i.e., using an indirect approach when dealing with tasks and challenges in school; (4) Evaluating significance – involving the ability to appreciate the levels of importance and relevance of various elements of school life, and to understand their meaning in relation to the whole system.

The purpose of this study is to discover and validate the characteristics of system thinking in educational leadership. These characteristics are the practical ways of implementing system thinking among educational leaders, and their discovery will facilitate the instilment of systems thinking among school principals at the various stages of their educational careers. In addition, this study attempts to propose, develop and validate a new tool for measuring system thinking among educational leaders. This tool will allow us to examine the effectiveness of any

course or program incorporating the values of systems thinking, and assist in the assessment of principals as well as in the classification of candidates for management.

Instrument validation carried out using a quantitative method included two main phases and was based on data from three independent samples of 414 middle leaders from 108 primary schools throughout the country. Middle leaders are teachers who, in addition to their work as teachers, have responsibilities for a particular area of school life or a distinct group of teachers, and thus serve as partners in making managerial decisions together with their school principals. The first phase included content validation by 17 experts of systems thinking and educational leadership, as well as a pilot study of 60 primary school teachers in Israel. In addition, a principal component analysis was conducted on a pilot sample of 185 middle leaders from 43 primary schools in Israel. These leaders filled out a systems-thinking questionnaire based on the structure proposed by Shaked and Schechter and including the four abovementioned dimensions: leading wholes, adopting a multidimensional view, influencing indirectly, and evaluating significance. In the second phase of the study, data were collected from a sample of 129 middle leaders from 43 primary schools in Israel for exploratory factor analysis. Participants completed a systems-thinking questionnaire derived from the analysis of main components of a pilot sample. In order to confirm the structure predicted according to the aforementioned theory and the EFA (exploratory factor analysis), a confirmatory factor analysis was performed using the AMOS 21 software. This analysis was conducted on a new sample of 100 middle leaders from 22 primary schools in Israel. The last step of validating a tool is checking criterion validity. To examine the validity of the tool we have created, correlations between the characteristics of systems thinking and two established measures were examined: the instructional leadership of a school principal, and the organizational commitment of school middle leaders. Instructional leadership was examined using the PIMRS questionnaire developed by Hallinger and Murphy, while organizational commitment was measured via the Mowday et al. The sample of middle leaders

who completed the systems thinking questionnaire used in the CFA (confirmatory factor analysis) analysis also completed these questionnaires.

The findings of the overall study indicated a systems thinking questionnaire consisting of 17 items, with a structure of four factors explaining 56.915% of the explained variance. Goodness of fit indices indicated a four-factor model of second-order ($\chi^2(110) = 139.921$; NFI=.829; IFI=.958; TLI=.946; CFI=.956; RMSEA=.052). This model produced the best fit compared to the alternative models. These findings support the hypothesis of the study, which proposes a multidimensional conceptualization of the structure of systems thinking and identifies four distinct characteristics within it: evaluating significance, openness to a variety of opinions, leading wholes, and adopting a multidimensional view. Specifically, the findings pointed to a tool that includes four characteristics: "evaluating significance" – the ability to examine the importance and relevance of each element to the entire system, filtering events of low significance to the system and identifying events that signal a particular problem; "Openness to a variety of opinions" – the principal's awareness of his / her own limitations and considering a variety of opinions emanating from the people surrounding him / her. This recognition stems from an administrator's understanding that each situation has a wide array of possible roots and implications, thus he /she seeks to understand the full picture by listening to different points of view from those around him / her; "Leading wholes" – the observation of any given subject as a complete system above and beyond its various components. Hence before deciding on any specific action, the principal will take into account a large number of interdependent factors; "Adopting a multidimensional view" – looking at any given subject through multiple perspectives stemming from the insight that each particular event has a number of motives, reasons and factors that have led to it. For this reason there are also many possible methods and responses to any event or phenomenon.

A number of conclusions emerge from this study. First, the ability to evaluate and distinguish between the meanings of all the elements that make up school life is fundamental and significant to

leading the school in accordance with the systems-thinking approach. Second, Influencing indirectly is not a specific characteristic of system thinking, but it should be noted that there is a variety of modes of action and response in dealing with a particular event, including "Influencing indirectly". Third, a view of the parts in the context of an integer is only possible when one comes to the realization that all components together form the whole. Finally, the last and most important conclusion is that systems thinking does not manifest in the same way in different disciplines and fields, and thus in education administration it appears in different forms than its appearances in other fields.

The present study has theoretical and practical contributions. One of its important theoretical contributions is its development of a tool for measuring systems thinking that was not available before. This tool can be used to measure principals' systems thinking, and to compare different populations, different personal characteristics, ethnic populations, and different sectors. In addition, this tool can also be used to examine systems thinking's impacts on various organizational characteristics.

Regarding practical contributions, the findings have shown four characteristics of systems thinking: evaluating significance; openness to a variety of opinions; leading wholes; and adopting a multidimensional view. These four characteristics constitute the practical ways in which principals lead their schools through systems thinking. Once we have found the predominant characteristics of a principal who works according to this approach, other principals can be guided at various stages of their careers to become systems-thinking leaders as well. Adopting the conceptual framework suggested here can help principals deal with complexity. In addition, the systems-thinking tool can be employed when choosing appropriate candidates for school leadership. It is also possible to evaluate principals at various stages of their career development by means of this tool. In addition, it is suggested to examine the effectiveness of a course, study sequence or program that incorporate the conceptual framework of systems thinking. Collecting data using this developed tool at various points in time regarding participants' system thinking level can provide feedback regarding the program's effectiveness.