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THE LEARNING ORGANIZATION ACCORDING TO SENGE: RECORDING AND VALIDATION OF THE PARK RESEARCH TOOL IN PRIMARY EDUCATION SCHOOLS IN THE PREFECTURE OF ILIA

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ABSTRACT: *This paper comes to explore the perceptions of primary school teachers about whether or not schools feature elements of learning organization as they are defined by Senge's five principles are presented at schools. The research tool used to capture their perceptions is the Joo Ho Park questionnaire. The results of the survey show that it is possible to apply the five Senge principles to educational environments and the questionnaire used can be a research tool for capturing and recording organizational data in school units.*

KEYWORDS: Learning Organization, Five Senge Principles, Primary Schools, Park Questionnaire.

INTRODUCTION

The need to connect an organization with a learning community has led to the establishment of organizational learning that enables members to support and empower themselves in a contemporary context of rapid changes and intense uncertainty (Renshaw, 2003). Organizations need to adapt to continual change, to the explosion of knowledge and to the demand for continuous improvement (Senge, 1990). McLaughlin and Talbert (1993) found in their research that although teachers are mainly engaged in teaching, schools themselves are not involved in teacher education. The transformation of organizations into learning organizations is necessary as it focuses on improving people through the support of lifelong learning, encouraging research, dialogue, reflection, professional development and commitment to a common vision with the ultimate goal of achieving the objectives of the organization (Marquardt, 1996; Senge, 1990; Watkins & Marsick, 2003). This demand for transformation is based on the view that schools can develop the ability of learning and thinking, promote innovation and manage the resources available to respond to environmental changes with the best results both for schools and pupils (Williams et al., 2012).

In the last 20 years, especially in the international arena, there is a strong interest in the organizational characteristics of education in the USA, England, Australia, Iran, Jordan, Israel, Korea and Malaysia (Abbasi et al., 2012; Boreham & Reeves, 2008; Christy, 2008 ; Dararat, 2015; Higgins et al., 2011; Khasawneh, 2011; Kurland et al., 2010; Lee, 2006 ; Park, 2008; Silins & Mulford, 2002; Smith, 2007; Vlachadi & Ferla, 2013). On the contrary, in Greece the researches conducted are far fewer. They are mainly identified during the last decade and concern organizational learning issues in the field of primary and secondary education (Alintzis, 2014; Apostolopoulou, 2016; Vassiliadou & Dionοnitou, 2014; Vissa, 2009; Georganta, 2009; Kalatzi, 2017; Papadopoulos, 2017; Papazoglou, 2016; Tagaris, 2017).

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Most of the research undertaken in order to explore organizational characteristics in schools is based on the relevant theoretical background and on the research tools of Marquardt (1996), Pedler et al. (1991) and Watkins & Marsick (1993). However, it is likely that there are only two researches mentioned in the bibliography and based on Park's (LOQS) research tool (2008), which is adapted to the characteristics of the learning organization according to the Senge principles. The first research is the one of Abbasi et al. (2012) in Iran, and the other of Khasawneh (2011) in Jordan and it involves the Doctoral Research Staff at the University. In addition there are no mentioned any similar researches conducted in Greece.

THEORETICAL UNDERPINNING

Learning organization

The term learning organization was first adopted by Carrant in 1987 (a.c. Khadra & Rawabdeh, 2006) to describe organizations seeking new ways of organizing business to survive in times of intense competition in the labor market. The idea of organizational learning began with Argyris and Schön (1978) in an effort to develop a theory of effective administration. As a concept, however, it was mainly disseminated with Senge (1990) when his book "The Fifth Discipline" was published. Although there is no consensus on what a learning organization is, certain characteristics have been identified regarding its nature (Banner, 1987; Garratt, 1987; Gharajedaghi & Ackoff, 1984; Kochan & Useem, 1992; Pedler, et al. Senge, 1990; Watkins & Marsick, 1993) which converge to the view that learning, as a continuous process, plays a decisive role in an organization and with the simultaneous involvement of all workers it contributes to the transformation of the organization and its environment. It takes place at different levels, individual, team and organizational, and results in changes in knowledge and attitudes (Mayo, 2007). In addition, it is part of a strategic process that is integrated into the organization and works in parallel with the job. In fact, the learning organization aims to accelerate individual learning, redefine organizational structure, culture, mental models, and encourage the participation of all members. It also promotes a learning culture, creating coherent relationships between members and different levels of learning. Finally, communication and participation are key aspects of the learning organization (Heath & Brown, 2007).

Learning organization of Senge: The five principles.

Senge, a Lecturer at the Massachusetts Institute of Technology (MIT) and the founder of the Society for Organizational Learning (SOL), published the book: "The Fifth Discipline: The Art & Practice of the Learning Organization" in 1990 which contains a comprehensive theory based on five principles that should be built into an organization in order to be transformed into a learning organization. The publication of the book, which has been released in all developed countries, has been a breakthrough for the theory of organizational learning in the field of business and a precursor to many evolutions in the operation of organizations and in the field of education. Senge (1990) regards the learning organization as an organization that has adopted learning as an integral element. It is the place where people are constantly expanding their ability to achieve their goals, where new models of thinking are being cultivated. Collective ambition is liberated and people are constantly learning how to learn as members of an organization. It is also distinguished for its systematic thinking, vision, personal competence and group learning (Senge, 1990). It also requires a change of mentality and thinking that will

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not be limited to learning new tasks but will extend to the development of "creative tension" based on the vision, namely to bridge the gap between where we are, what we want to do and what we can do in order to cover the gap (Senge, et al., 1999). Change is a necessity and can be made by overcoming outdated thought patterns (Kofman & Senge, 1993).

Organizational learning requires five principles. These principles are not new to researchers, but Senge systemized them by creating a theoretical model where the combination and implementation of all five principles will contribute to organizational learning. Their implementation is a difficult and quite painful process requiring special dedication, persistence and time. That is why Senge called it discipline. The following five principles concern personal mastery, mental models, team learning, shared vision, systems thinking.

a. Personal mastery: People should be aware of the gap between their current situation and the desired situation they want to reach. At this stage a creative tension is created, which in turn provides an incentive for continuous improvement and professional development in order to fill the gap. Individuals present their own vision, use their creative imagination, focus on learning with patience and perseverance, have self-knowledge, and guide themselves through self-control and self-defense.

b. Mental Models: There are differences in perceptions, thoughts, representations, images, mentalities, assumptions and theories adopted by people which in their turn influence the perception and understanding of themselves, the reality around them, their way of thinking and acting. Sometimes this diversity of perceptions among people can lead to disagreements. Thus, through the awareness of diversity and the understanding of these mental models, they should express themselves freely, but with respect to the acceptance of others' mental models, so that common learning patterns are developed.

c. Team learning: The members of an organization through dialogue, exchange of views and knowledge together build new knowledge, understand the mental models of others, create common mental models, learn through mistakes and failures and also develop a kind of collective intelligence.

d. Shared vision: Simultaneously personal vision, dreams and ambitions of all people, progress and achievement of both personal goals and the goals of the organization should be expressed. People are pushed through a creative tension to create the future they desire.

e. Systems thinking: Systems thinking is considered to be the cornerstone of Senge's five principles of discipline. It is also intertwined with the other four principles as it requires the fields of personal competence, group learning, mental models and shared vision. It is the principle that embodies the other principles in a single coherent body of theory and practice (Senge, 1990). In addition, it is the fundamental principle where people do not only focus on individual parts or events but have an overall view of totality. They get able to analyze and understand the interdependencies and interactions between the parts that make up the whole. It provides an in-depth understanding of the causes and relationships between them, with a collective approach to analyzing and synthesizing complex situations and phenomena through a common code of communication.

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The school as a learning organization

International social and economic evolutions, particularly as they have emerged since the 1990s, have a strong impact on education. These evolutions concern programs, teaching methods, schools organization and administration and teachers' professional development. Special attention has been given to the role of the school in terms of effectiveness, quality of education and assessment, and the need for transformation and adaptation to the new knowledge society (Hofman et al., 2005). Sarason (1990) notes that most educational reforms have failed, as many of them have had limited success. It is not widely recognized that change is an evolving process, an evolutionary force with an emphasis on learning and adaptation, and not an end in itself (Dixon, 1994; Fulan, 1991; Fullan & Miles, 1992). In the context of these challenges and efforts to increase and improve pupils' performance, the transformation of schools into struggling organizations is of great interest. Through different theoretical approaches, the idea of learning organization began with Senge (1990), the main founder in the business field.

A key element of an organization is the personal and professional development of teachers. This has a positive impact not only on improving the quality of teaching but also on building a culture of continuous learning (Clement & Vandenberghe, 2001). As an open system, the school should be receptive to the interactions of the internal and external environment in order to be able to respond to challenges by adopting the necessary changes, innovation and new knowledge that will also arise through the school through research, experimentation, feedback and self-evaluation. Teachers should work in learning-community groups, promote the continuous improvement of skills and competences and collaboration, and develop a culture that harmonizes the achievement of teachers' personal goals and aspirations with the aims and vision of the school (Vanhoof et al., 2009). Leadership with its practices should be supportive, strengthen co-operation and free expression, reward creativity, coordinate and direct with clear vision and goals by making stakeholders and educators engage in decision-making and their commitment to their implementation.

When schools operate in terms of organizational learning, pupils' outcomes are better, as all members of the school community are committed to ongoing learning through working groups (Chan, 2009). Learning can create a culture receptive to change and is an important parameter for adopting changes (Kruse, 2003; Silins & Mulford, 2002). In such a context, Senge's five principles could build a learning organization as long as it defines the ways in which this can be completed, the expected results and the role of leadership and teachers (Senge et al., 2000). This view is supported by other writers as well. Geijsel et al. (2001) are of the opinion that innovation and the re-structuring of schools in learning organizations encourage their members to accept change. For Bierenna (1999), the idea of the learning organization provides a regenerative influence on the cultivation and renewal of change to improve schools. Isaacson and Bamburgh (1992) consider it important to examine Senge's five principles for seeking ways to improve education.

METHODOLOGY

Research aim

The purpose of this research is on one hand to investigate the perceptions of primary school teachers about whether their schools have characteristics of a learning organization in

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accordance with the five principles of Senge, and on the other hand to evaluate Park's research tool (2008) as a research tool model suitable to capture the five principles of the Senge in educational environments.

Research sample

The sample of the survey were educators of primary education schools of the prefecture of Ilia. The survey was conducted from 20 April to 30 May 2018. The teachers who took part in the survey were of different ages, length of service and employment relationship (permanent-deputies). Overall, questionnaire responses were provided by 227 people. The sample chosen should be as representative as possible on the basis of common features and characteristics of the respondents in order to make any conclusions applicable to the sample population as a whole (Papanastasiou, 2005). The random sampling method was used. School-based tables were used, according to the records of the Primary Education Directorate of Ilia and numbers were assigned for each school unit. In this way all the school units and teachers had the same chance of being represented (Creswell, 2011). For the purpose of this study, 294 questionnaires were distributed in 31 school units, while 229 were answered back (77.89% response rate). Two (2) questionnaires were not included in the statistical process because they were not sufficiently completed. The total number of teachers serving in schools of Ilia was 833, according to the data collected from the Primary Education Directorate of the Prefecture of Ilia. Therefore, the sample of the survey represents 27% of the population of primary school teachers in Ilia (227/833 = 0.27).

Data collection method and research tool

A quantitative survey was carried out by filling in an anonymous questionnaire. This is a self-referencing method that is considered to be the most appropriate for collecting data about opinions, beliefs and values. According to Robson (2007), the questionnaire is widely used for sample surveys by social scientists. The use of the questionnaire has several advantages. To begin with it offers a simple approach and directness to study attitudes, perceptions, motives, opinions. It can also be adapted to collect information with the ability to generalize almost every human population.

It is worth mentioning that this study is part of a wider survey conducted using a three-section questionnaire of 74 questions. One section of the research, the one referred to in this paper involves the Park's (LOQS) questionnaire (2008) which was created and developed with the help of Jay W. Rojewski (Professor at the University of Georgia, USA) for the needs of his research. Joo Ho Park today is a professor at Hanyang University of the Department of Education (Hanyang University) in Seoul, South Korea. The questionnaire was used after having asked for permission from Mr Joo Ho Park himself, via e-mail. Senge's five principles are: Shared Vision, Personal Mastery, Mental Models, Team Learning and Systems Thinking.

The questionnaire consists of 35 closed-ended questions and aims at investigating the functioning of schools according to the five (5) principles of Senge. The answers are given by the respondents at the base of a five-level Likert scale ranging from 1 (Almost Never), 2 (Rarely), 3 (Sometimes), 4 (Frequently) to 5 (Almost Always). The translation of the questionnaire was done by the researcher and followed by two English language teachers to identify any faults and make some modifications and improvements where needed. The questions, as given in the questionnaire, were without grouping. In this way any orientation of the participants' thought can be avoided (Cohen et al., 1994). The questionnaire was shared

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with the participants after the application of the pilot test of the tool and its finishing. This process was completed in May 2018. Because the research population was scattered in large-scale schools, the questionnaire was distributed to the participants either by physical presence in relatively close to researcher schools or by mail to remote schools. Each envelope delivered contained also an enclosed envelope with completed shipping data (Creswell, 2011: 207). Instructions were provided for the completion of the questionnaire and there was the possibility of clarification by means of live or by electronic mail communication. Standard procedures were applied to avoid bias (Creswell, 2011: 207). Questionnaire questions were formulated so that respondents can understand and respond to them in the form requested by the questionnaire (Robson, 2007: 285).

Data Analysis

After the questionnaires were collected, they were checked for their completeness and correctness of the responses. This was followed by the creation of a database in the statistical software SPSS v 25.0 (Statistical Package for Social Sciences) in order to introduce the encoded questionnaire information. LISREL 8.8 (Linear Structural Relations, Jöreskog & Sörbom, 1996) was also used for Confirmatory Factor Analysis (CFA), which resulted in conclusions, which were then discussed and compared with the existing relevant literature. The internal consistency of the questions (Table 1) for the individual dimensions gave a Cronbach index from 0.844 to 0.893, while for all the five dimensions the Cronbach's alpha was 0.962.

Table 1. Reliability factor (Cronbach's Alpha)

Shared Vision (SV)	7	0.893
Mental Models (MM)	8	0.887
Personal Mastery (PM)	6	0.844
Systems Thinking (ST)	7	0.859
Team Learning (TL)	7	0.889
Learning Organization (LO)	35	0.962

RESEARCH RESULTS

Statistics

As it can be seen from Table 2, the average of the answers of the sample teachers is about 4 for each principle and totally for the learning organization. Specifically for the Shared Vision, Average was 3.9 and Standard Deviation (SD) = 635, for Team Learning, Average =3.9 and SD =, 667 and Systems Thinking Average = 3.9 and SD=, 620. Following are the Mental Models, Average = 3.7 and SD=, 594 and Personal mastery, Average= 3.7 and SD=, 611. Overall, the learning organization emerged Average= 3.8 and SD= 545. According to the respondents, the functioning of the school in primary education often presents features of shared vision, mental models, personal mastery, group learning and systems thinking. Therefore, Senge's organizational learning principles have been satisfactorily developed as the Likert response scale was five-level. The more developed learning principles of the learning organization were the shared vision, team learning and systems thinking.

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Table 2. Aggregate results for the Senge principles

Senge Principles	Total replies (N)	Minimum	Maximum	Average	Standard Deviation SD
Shared Vision (SV)	227	2	5	3,9	,635
Mental Models (MM)	227	2	5	3,7	,594
Personal Mastery (PM)	227	1	5	3,7	,611
Team Learning (TL)	227	1	5	3,9	,667
Systems Thinking (ST)	227	2	5	3,9	,620
Learning Organization (LO)	227	2	5	3,8	,545

Exploratory factor analysis of five learning organization principles

Exploratory factorial analysis of the data (EFA) was done with SPSS v25.0. Existing correlations which could lead to a factorial model of interpretation or a hypothesis for further work according to the Learning Organization measurements were detected (Dafermos, 2013). For the analysis, the Principal Components Analysis method was chosen because it is a practice common to describing the structure of a set (Jolliffe, 1986; Stevens, 2002; Tabachninck & Fidell, 1996) and provides the potential of more complete analyzes and interpretations (Tabachninck & Fidell, 2007). About the credibility of the factorial analysis, a compliance check was performed. The sample was random and its magnitude was N = 227> N = 200, thus sufficient with 35 queries with 5 variables, the measurement of which was done with the Likert five-step scale. Initially, Kaiser-Meyer-Olkin (KMO) sampling was checked (Table 3). According to the analysis, there were not any particular variations regarding the average. The lowest average variable was 21 PM = 3.49 and the highest average was 1 SV = 4.15. Then DeCarlo (1997) was tested for Skewness values that were <| 2.0 | and Kurtosis values that were < 7, so there was a normal distribution (MacCallum, 1999).

Table 3. Verification of sample adequacy and sphericity, based on correlations.

KMO and Bartlett's Test[a]		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**,940**
Bartlett's Test of Sphericity	Approx. Chi-Square	5006,584
	df	595
	Sig.	**,000**

The factorial analysis was calculated in the covariance matrix because all the variables used in the analysis get values from the same Likert quadratic scale (Morrison, 1976). At the same time, the method of rectangular maximal variation (Varimax), (Table 4) was chosen to maximize dispersion in loadings of variables to one factor. For the management of the missing values the listwise method was chosen because it is the usual method and the other two methods (pairwise, replace with mean) may have a problem for the factorial analysis (Norusis, 2006). For the factorial model, the variables for each cluster taken into consideration are as much as 50% loading for a better factor model while each factor has more than 3 variables (Schene et

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al., 1998). As it can be seen from the Rotated Component Matrix, we have the modeling of the factorial model according to the loadings of the variables. There are five (5) clusters of variables that load respectively in 5 factors (Table 4). Other variables load less than 50% and others load more than 50%. As it has been already mentioned, the variables with loads of 50% or more will be used. Loads below 40% did not occur due to the limitation set during factorial analysis. The first cluster variables (SV33, SV5, SV9, SV13, SV17, SV21, SV25) load more than 50% (64.7%, 73.2%, 73.3%, 68.6%, 67.6%, 60.6% and 52.7%) respectively for each variable in the first factor F1 while the other variables load less than 50%. In the second cluster (TL4, TL8, TL12, TL16, TL20, TL24, TL28, TL20, TL24, TL28) 64.2% and 55.8%) respectively for each variable in factor F2. In the third cluster (MM2, MM6, MM10, MM14, MM18) high loads are presented (62.0%, 57.1%, 51.2%, 70.9%, and 66.9%) respectively for each factor variable F3. In the fourth cluster (PM3, PM11, PM19, PM34), the high loadings for each variable are 56.7%, 58.8%, 50.8% and 62.2% respectively in factor F4. In the fifth cluster (ST7, ST15, ST24, ST29, ST32, ST35) there are also high loads (50.3%, 59.9%, 69.2%, 58.9%, 50.2% and 58.5% %) respectively for each variable in factor F5. Variables MM22, MM26, MM30, PM27, PM31, ST23 are not included in the control of internal consistency (Cronbach's Alpha) either because they did not appear because of the limit of 40% set (Table 5) or because the load was not high (<50%) and would not make a remarkable contribution to the factorial model.

Table 4. Rotated Component Matrix

Item	Content	Factor				
		1	2	3	4	5
33. SV	Teachers and staff together build the school's vision and goals.	**,647**				
5. SV	Teachers develop their personal goals to align with the whole school vision or goals	**,732**				
9. SV	Teachers are committed to a shared vision for the future of school.	**,733**				
13. SV	Teachers align personal class or teaching goals with the school vision and goals.	**,686**				
17. SV	Teachers agree on the principles necessary to achieve the school vision.	**,676**				
21. SV	Teachers feel comfortable in sharing ideas with other teachers about the school vision.	**,606**				
25. SV	When changing educational practices, teachers consider the impact on the school vision and goals.	**,527**				
2. MM	Teachers change their old teaching style or pattern to implement new and better approaches in educational practices.			**,620**		

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6. MM	Teachers actively explore assumptions and ideas with each other about educational practices.	**,571**		
10. MM	Teachers are highly aware of how their own beliefs and assumptions affect educational practices.	**,512**		
14. MM	Teachers learn and change as a result of students' reactions during teaching.	**,709**		
18. MM	Teachers often use the significant events of the school or classroom to think about their own beliefs about education.	**,669**		
22. MM	Teachers often reflect on assumptions about schooling activities with other teachers to ensure that they are in line with educational principles.	,466		
26. MM	Teachers at the school can effectively explain their own assumptions underlying their reasoning.	,444		
30. MM	Teachers inquire about the appropriateness of their own course or program with respect to the goals of schooling.	450		
3. PM	Teachers continually work to clarify their professional goals at the school.		**,567**	
11. PM	Teachers engage in continuous learning and reflection activities as to achieve personal growth.		**,588**	
19. PM	Teachers view the current reality more clearly in terms of their career goals.		**,508**	
27. PM	At the school, our teachers continually learn to bridge the gap between their current reality and the desired future		,401	
31. PM	Teachers strive to supplement their lack of skills and knowledge in their teaching and subject area.		,426	
34. PM	Teachers have learning opportunities in their teaching or other professional work.		**,622**	
7. ST	Teachers attentively link the current schooling with students' career pathways.			**,503**
15. ST	When dealing with school challenges, teachers consider the effect on students.			**,599**

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24. ST	When changing and creating school rules, teachers consider consistency with the policy of the governments and educational acts.			**,692**
23. ST	When dealing with a student discipline problem, teachers consider the impact on other teachers.			,420
29. ST	When changing educational practices, teachers consider the impact on their results to the inside and outside of the school.			**,589**
32. ST	When developing lesson plans, teachers consider the different needs and abilities of students.			**,502**
35. ST	At the school, our teachers regard educational issues as a continual process rather than with a snapshot or event.			**,585**
4. TL	Teachers share information across course subjects and grade levels with other colleagues.	**,667**		
8. TL	Teachers participate in open and honest conversations to share their best educational practices.	**,622**		
12. TL	Teachers are treated equally in team or committee activities.	**,651**		
16. TL	Teachers believe that sharing information or knowledge through team activities is useful for solving complex school problems.	**,694**		
20. TL	Teachers respect other colleague's ideas and opinions by viewing them from their colleague's perspective.	**,738**		
24. TL	Teachers feel free to ask questions of other teachers or staff regardless of gender, age, and professional status at the school.	**,642**		
28. TL	At the school, group or team works are used in teacher professional development	**,558**		

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Table 5. Factors & Variables

Senge Principles	Factors	Variables
Shared Vision (SV)	F1	SV33, SV5, SV9, SV13, SV17, SV21, SV25
Team Learning (TL)	F2	TL4, TL8, TL12 ,TL16, TL20, TL24, TL28
Mental Models (MM)	F3	MM2, MM6, MM10, MM14, MM18
Personal Mastery (PM)	F4	PM3, PM11, PM19, PM34
Systems Thinking (ST)	F5	ST7, ST15, ST24, ST29, ST32, ST35

After the exploratory factor analysis for each of the five factors, the internal consistency of the factors was checked (in each factor, grouped variables of the five Senge principles for the learning organization correspond, Table 6.) The Cronbach's Alpha credibility coefficient was from F4 =, 776 and reaches F1 =, 893. The coefficient for all the factors was 942. Based on the results, there is no question of credibility for each of the factors and overall for all factors.

Table 6. Factor Analysis Factor (Cronbach's Alpha)

	Factors	**Variables**	**Cronbach's Alpha**
1	Shared Vision= F1 = (SV33, SV5, SV9, SV13, SV17, SV21, SV25)	7	,893
2	Team Learning = F2 = (TL4, TL8, TL12, TL16, TL20, TL24, TL28)	7	,889
3	Mental Models = F3 = (MM2, MM6, MM10, MM14, MM18)	5	,858
4	Personal Mastery = F4 = (PM3, PM11, PM19, PM34)	4	,776
5	Systems Thinking = F5 = (ST7, ST15, ST24, ST29, ST32, ST35)	6	,852
6	F1+F2+F3+F4+F5	29	,942

Confirmatory Factor Analysis (CFA)

After the Exploratory Factor Analysis, according to the model there have been five components and the Confirmatory Factor Analysis with the LISREL 8.8 program was applied on it in order to verify if its structure as a Factor Model is actually real. Initially, parameter estimates (Table 7) were made to check if they were reasonable (Byrne, 1989; Müller, 1996). According to the results, there were no negative indications and the typical errors ranged from ,02 to ,05, and all the variation matrices were positive. Load values were relatively satisfactory and only in two variables there were loads <,50. The correlation values R2 for the 29 observed variables ranged from ,48 to ,62. The loading values in total for the five factors (latent variables) were higher and they were all greater than ,80. The R2 correlation values for the five factors (latent variables) were higher than ,70.

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Table 7. Confirmatory Factor Analysis Loads

Factor	Item	Factor loading	t-value	Error variance (SE)	R^2
Shared Vision	33	,55	11,15	,32 (,034)	,49
	5	,57	13,55	,21 (,023)	,60
	9	,63	11,92	,39 (,040)	,50
	13	,60	13,23	,26 (,028)	,58
	17	,62	13,61	,25 (,027)	,61
	21	,67	12,99	,34 (,036)	,57
	25	,57	12,39	,29 (,030)	53
Mental Models	2	,59	11,73	,35(,038)	,50
	6	,56	12,94	,23 (,025)	,58
	10	,59	12,61	,28 (,031)	,56
	14	,56	12,20	,28 (,030)	,53
	18	,63	12,92	,30 (,035)	,58
Personal Mastery	3	,61	13,10	,24 (,.031)	,60
	11	,64	12,64	,30 (,038)	,57
	19	,63	13,49	,24(,028)	,63
	34	,51	6,92	,26 (,030)	,49
Systems Thinking	7	,60	13,20	,31 (,.033)	,53
	15	,55	11,58	,28 (,030)	,49
	24	,48	8,21	,51 (,.050)	,28
	29	,57	11,46	,34 (,036)	,49
	32	,65	13,45	,32 (,035)	,61
	35	,66	13,56	,30 (,033)	,62
Team Learning	4	,63	13,17	,28 (,031)	,58
	8	,64	12,78	,32 (,034)	,56
	12	,65	12,67	,36 (,038)	,55
	16	,63	13,38	,27 (,030)	,60
	20	,65	13,36	,29 (,032)	,59
	24	,59	11,49	,38 (,039)	,48
	28	,61	10,53	,39 (0.042)	,51
Learning Organization	ΚΟ	,87	10.07	,23 (,052)	,76
	ΝΜ	,88	10.46	,14 (,039)	,77
	ΠΙ	,85	11.09	,14 (,041)	,73
	ΟΜ	,86	10.45	,28 (,053)	,76
	ΣΣ	,83	11.33	,21 (,049)	,74

Indicators for adapting the model to the data

Following the analysis with LISREL 8.8. we had the indicators on structure, equations and adjustment factors. As it can be seen from Table 8, Chi-square (x2) = 619.99> 1 is high, so there is no indication of a good fit. However, according to Medsker et al. (1994) there is no consensus among the researchers on the interpretation of the x2 values and also that the statistical criterion x2 can be used when the sample is from 100 to 200. In the present study the sample number was 227> 200. On the other hand, p =, 000 <, 05 (5%) Chi-square (x2) indicates that there is no good fit. However, the sample size that was greater than two hundred (N = 227> 200) relative to the degree of freedom, the Chi-Square / df) = 619.99 / 340 = 1.82 with acceptable value ≤ 1.96 which is a very good adaptation (Tabachinik & Fidell, 2007). It is

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worth noting that some researchers (Kelloway, 1998 & Medsker et al., 1994) consider that when the value is of x2 / df <2 then there is a very good fit. Even the values between (2 <x2 / df <5) can be accepted. The Standardized Root Mean Square Residual (SRMR) index was ,048 and it is a desirable value and shows us a good fit since it is <, 08 (Hu & Bentler, 1999) or <, 050 (Sorbom & Joreskog, 1982). The Root Mean Square Error of Approximation (RMSEA) is ,060 with an acceptable value of <0.06 (Hu & Bentler, 1999). However, MacCallum et al. (1996) have the view that values for the RMSEA index from (, 05 -, 08) are accepted. So the value, 05 <, 060 <, 08 shows a relatively good fit. The Non Normed Fit Index (NNFI) Freedom Index was 98 good fit indicator. The Adjusted Goodness of Fit Index (AGFI) = 80, with an acceptable value of ≥ 0.90 (relatively good fit). The Normed Fit Index (NFI) was ,96 with an acceptable value> , 95 so there is a good fit. The Incremental Fit Index (IFI) was , 98, meaning the model was a good fit. The Relative Fit Index (RFI) was 96 with a value of> 90 for a good and adapted model in the data (Marsh et al., 1988).

The Comparative Fit Index (CFI) = , 98 with an acceptable value ≥ 0.95 is indicative of a good fit (Hu & Bentler, 1999. The Goodness of Fit Index (GFI) = ,85, which depends on their size of the GFI for the multiple regression, is similar to the coefficient X2. The economic adjustment index (PGFI) is for example 70 with an acceptable value (0-1). The Akaike Informartion Criterion (AIC) was 751.99. The index is slightly smaller than Saturated AIC = 812.00, though it is a good fit sample. The Consistent Akaike Information Criterion (CAIC) is 1044.03 <Saturated CAIC = 2608.53 and is a good fit for the model. The Expected Cross-Validation Index (ECVI) is 3.33 <3.59 (Joreskog & Sorbon, 1993), so there is a sample of good adaptation to the data. Also, the confidence interval is small 3.04 <ECVI <3.65, so the value of ECVI = 3.33 of the sample is approaching the truth as it is a satisfactory approach to the population price. Based on the presentation of the above indicators on the model of the present survey, one can conclude that there is an indication of a good modeling model for adaptation to the data.

Table 8. Indicators for adapting the model to data

Goodness-of-Fit	Value
Chi-square (x^2)	619,99*
Standardized Root Mean Square Residual (SRMR)	,048
Root Mean Square Residual (RMR)	,033
Root Mean Square Error of Approximation (RMSEA)	,060
Non-Normed Fit Index (NNFI)	,98
Adjusted goodness of fit index (AGFI)	,80
Normed fit index (NFI)	,96
Incremental Fit Index (IFI)	,98
Relative Fit Index (RFI)	,96
Comparative Fit Index (CFI)	,98
Goodness of Fit Index (GFI)	,85
Parismony Goodness-of-Fit index (PGFI)	,70
Akaike informartion Criterio (AIC)	751.99
Consistent Akaike Information Criterio (CAIC)	1044.03
Expected Cross-Validation Index (ECVI)	3.33

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CONCLUSION

The research tool used in the research is the Park LOQS (2008). According to the results of the Exploratory Factor Analysis (Table 4) and the tests, there were positive indications of validity and reliability of a factorial model with five components (factors - five Senge authorities) which, based on the loads (> 50), corresponded to 29 variables of the 35 questionnaire variables that were significantly involved in the interpretation of organizational learning. Thus, in the next phase of the confirmatory factor analysis (Table 5), three (3) variables related to the mental models (MM22, MM26, MM30) and 2 variables related to Personal Mastery (PM27, PM31) and Systems Thinking (ST23). In the factorial model that emerged with the 5 components (factors) after the reliability check (Cronbach's alpha, Table 6), Confirmatory Factor Analysis (CFA) was performed to validate its structure. Based on the results of the adjustment indices (Table 8), there are positive indications of the validity and credibility of the research tool as a model and, at the same time, it is possible to record learning organizational elements in schools according to the five principles of the Senge learning organization.

According to the results of the analyzes, it is confirmed that Park's research tool (2008) actually records organizational learning in educational environments and it could be used as a research model instrument and for the Greek data in the field of education. The ability to capture learning organization elements based on Senge's five principles in educational environments with Park's research tool (2008) is also confirmed by the results of the research by Abbasi et al. (2012) and Khasawneh (2011). Concerning the small variation with the number of 29 variables confirmed for the mapping of organizational learning in relation to the 35 variables of the Park questionnaire (2008), it should be noted:

a. There was a variation in the sample of the survey. Specifically, the sample of the present study was 227 compared to the 976 participants in Park's research (2008), and this may affect the exploratory analysis of the factors (Comrey and Lee, 1992 a.c.Dafermos, 2013).

b. Different method of exploratory factorial analysis was followed. In the present study, the Principal Components Analysis method was used to rotate the maximum variation of rotation (Varimax) in relation to the Principal Axis Factoring method and the indirect side rotation method (Promax - Kappa = 5)) in the Park research (2008). The choice of each method has its own advantages and disadvantages (Dafermos, 2013).

c. The confirmatory factor analysis involved the variables whose loadings in the exploratory factor analysis were ≥50, while the confirmatory factor analysis carried out by Park (2008) involved the variables the loads of which were ≥40 in the exploratory factor analysis.

d. The cultural and educational environments of Greece and South Korea where the investigations were conducted are different and this event could have influenced the respondents' answers.

However, it should be stressed out that the combined use of exploratory and confirmatory factorial analysis, despite the positive indications of the factorial structure of the research tool, suggests the need for further research and applications of many statistical methods and analyzes to check the validity and reliability of the scales as a model of a research tool (questionnaire) for organizational learning in the field of education according to Senge's five principles. It may be necessary to process and enrich the questionnaire variables.

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Consequences for Research and Practice

As a result of the literature review and the researches conducted at national and international level, the need to redefine the function and the role of the school becomes imperative. In emerging changes, the school should acquire those organizational features and learning culture that will enable it to continue to function efficiently and successfully in a society of knowledge. This research contributes with any limitations to a further understanding of school reality and highlights the possibilities and necessity of running the school with organizational characteristics and highlights the need for further investigation with the necessary research tools tailored to the specificities of schools as educational institutions.

CONCLUSIONS

Regarding the functioning of primary schools as learning organizations, the majority of sample educators argue that they have sufficiently incorporated the five principles/dimensions of organizational learning, according to Senge. Therefore, the results contribute positively to Senge's five principles of school education as a learning organization. At the same time, the questionnaires used seem to be a model of a research tool that could be applied and tested in further research in order to give us not only more insights into the understanding of the existing reality in the field of education but also to be enriched or further adapted to the credibility and its validity.

Future Research

The sample of this survey derived from primary school teachers in the Prefecture of Ilia. In addition, the research findings were based on teachers' perceptions. Research constraints with the methodological approach as well as the small literature combined with the small number of surveys conducted in Greece on the functioning of schools in terms of organizational learning make it necessary to further examine organizational learning of schools in other areas Greece and other countries with the possibility of comparative study, research and results. Also, the research approach should not be limited to teachers' perceptions, but should also focus on other factors and variables of the schools that influence and define organizational learning, such as students, parents, local actors, and formal education policy so that there is a fuller picture of how schools operate and whether and to what extent organizational features are actually identified, what their content is and at the same time detecting the conditions that favor or not organizational learning. The research tool of this research to map organizational features based on Senge's five principles in schools could also be used and further tested for its validity and credibility as a research tool model.

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