

THE LEARNING ORGANIZATION - AN INFORMATION SYSTEMS PERSPECTIVE

Mijalce Santa

Ss Cyril and Methodius University, Skopje, Macedonia

Abstract

This paper aims to explore and evaluate the learning organization characteristics and models from an information systems perspective in order to gain a better understanding how a learning organization information system can be developed. Based on the analysis a learning organization 'four worlds' framework was developed. This framework contains the properties, facets and attributes of the learning organization in the subject, usage, system and development world. Than the LO 'four worlds' framework was used to evaluate the three most used learning organization models and their appropriateness for development of LO information system. Our findings indicate that the in the models is used non-formal language, they are not sufficiently detail, are weak in the system and development world and do not embed the needed flexibility and change. In order to develop learning organization information system we suggest to develop learning organization ontology.

Key words: Learning organization, Information systems, Four worlds, Learning organization models

1. INTRODUCTION

A learning organization is an organization that facilitates the learning of all its members and consciously transforms itself and its context (Pedler et al., 1991). It is an organization skilled at creating, acquiring, interpreting, transferring, and retaining knowledge, and at purposefully modifying its behavior to reflect new knowledge and insights (Garvin, 2000, p. 11). Characteristics of these organizations are:

- organic, networked, decentralized, flat, team-based structure
- culture that supports experiments, risk taking, and open dialogue
- open and continuous communication and information exchange with the environment
- supports learning through infrastructure, rewards and technology

According to The Boston Consulting Group (2010, 2008) in a world driven by innovation and rapid change, becoming a learning organization from top to bottom—provides a clear competitive advantage and will become more important in the future.

After the publication of Senge's (1990) highly cited book "The Fifth Discipline: The Art and Practice of the Learning Organization" the research regarding the learning organization has proliferated. A huge number of definitions have been developed and presented in the literature. This has been followed by a number of models that represent the learning organization. The most notable being: Energy flow model (Pedler et al., 1991) and seven dimensions model (Watkins and Marsick, 1993). Also a lot of diagnostics instruments have been developed like Learning company blueprint (Pedler et al., 1991), Dimensions of the Learning Organization Questionnaire (Watkins and Marsick, 1993; Yang et al., 2004), Learning organization profile (Marquardt, 1996), Organizational Learning Survey (Goh and Richards, 1997), and the Learning organization survey (Garvin et al., 2008).

Although it has been identified that successful learning organizations elicit, code, store, and create knowledge (Marquardt and Reynolds, 1994), research from information systems perspective is missing. The information systems research is important because as King (2001) has identified the information systems infrastructure strategy is the first strategy that should be started for development

of the learning organization. Furthermore the information systems and the appropriate technologies are at the center of the learning organization (Thomas and Allen, 2006).

The purpose of this paper is to (1) analyze the LO literature from information systems perspective; (2) evaluate the LO models through the LO information systems framework; and (3) provide future avenues for development of LO information systems.

2. METHODOLOGY

The literature was analyzed by using the “four worlds” framework developed by (Jarke et al., 1993; Rolland, 1998). This framework has been successfully used for requirements engineering (Jarke et al., 1993), process engineering (Rolland, 1998) and change engineering (Nurcan and Rolland, 2003). The framework consists of four worlds: subject, usage, system and development world.

The subject world contains the knowledge about the domain for which the system needs to supply information. In this world, the definition and the characteristics of the Learning organization are evaluated.

In usage world the goals that the actors want to achieve through the concept of the Learning organization are identified and presented. It determines the reasons why they use the system and the range of facilities they require for it usage.

The system world is about the representation of the subject world. It contains the models that are based on the system world. Questions that need to be answered in this world are:

- what is to be represented?
- at what level of abstraction?
- how is it represented?
- what properties should the representation have?

The development world concerns the process that allows us to build the various models of the learning organization and the enactment of the learning organization.

For each world properties are identified and for them appropriate facets are identified. The facet defines a particular aspect of the property. Each facet contains a set of attributes through which that particular aspect is clarified. Furthermore each attributes has values through we are able to compare and position the approaches among them. The values of attributes can be of a predefined type (integer, boolean ...) or an enumerated type (Enum {x,y}). These relations are presented in Figure 1.

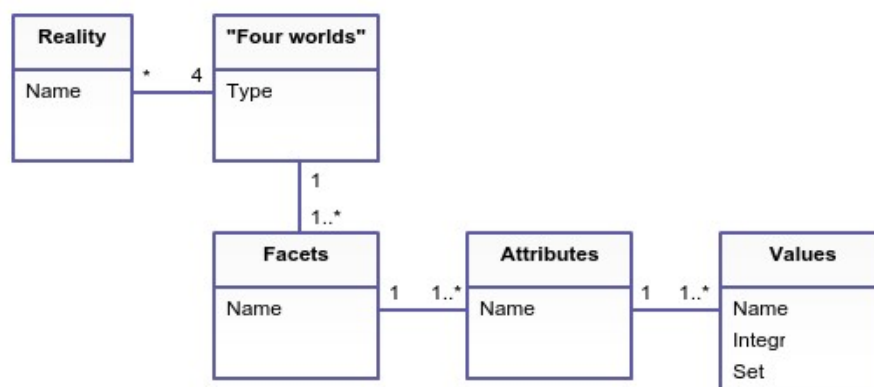


Fig 1. Learning organization 'four worlds' meta model

The literature used in this paper was identified and selected through a two level process. First, a pool of articles was created through a broad search in several online database (ProQuest, Sage, Springer link, Jstor and Science Direct) by using the keywords: LO concept, LO definition and LO characteristics. The results in each database were sorted by relevance and by applying a confidence level of 95% and confidence interval of ten a sample size of 1037 items were identified. All the duplicates, book reviews, editorials, posters and non-english papers were eliminated. As a result a population of 623 articles was created. By using a confidence level of 95% and confidence interval of ten, on the population of 623 selected articles, a sample size of 83 articles was sufficient. By using random numbers the 83 articles were identified. Through the same procedure from the journal "The Learning Organisation" as a journal devoted to LO issues additional 54 papers were identified. All the articles in both of samples were reviewed and definitions, characteristics, models, methods and methodologies were identified. Then through second level of analysis the original articles and books in which the identified definitions, characteristics, models, methods and methodologies are mentioned for the first time were reviewed and the original text was extracted. The extracted text was then analyzed through the 'four worlds' framework for the learning organization.

3. 'FOUR WORLDS' FRAMEWORK FOR THE LEARNING ORGANIZATION

The learning organization is a multidimensional construct (Yang et al., 2004). To be able to create a learning organization information system for such a concept a useful approach is to employ Wittgenstein's notion of the family-resemblance concept. A classic example is the concept of games. Not all games share the same conceptual features, some are competitive, others are not. Some are team events, others are not, but they share enough constellations or families of features to enable us to call them games (Pearn et al., 1994). By looking on the learning organization literature through the 'four-worlds' framework we can ensure that we have identified all the necessary elements for creation of the learning organization information system. The specific learning organization 'four-worlds' framework is presented in table 1.

Learning organization	World	Property	Facet	Attributes
	Subject	Learning	Type of learning	single-loop, double-loop, deutro learning
			Styles of learning	on the job learning, training, formal, informal
			Learning support	conscious learning, resources
			Learning stakeholders	individual, team, organization
			Unlearning	individual, organization
		Culture	Openness	openness, disclosure, sharing, trust
			Experimentation	experimentation, curiosity, take risks, accept mistakes, accept uncertainty
			Participation	no barriers, egalitarian
			Dialogue	dialogue and inquiry, questioning, feedback, time for reflection
			Type of culture	weak, middle, strong
			Level of culture	specialist, organizational, national, international
	Change	Change	Becoming LO	Transformation, adaptation
			Staying LO	Adaptation, transformation

		Leadership	Leadership type	Distributed, servant, collective
			Leaders role	Create and share vision, be a role model, provide support, be a teacher, be designer
			Leadership style	Transformational, transactional
		Strategy	Strategy development	Earning-based, emergent
			Stakeholders	Employees, managers, executives
			Vision	Shared, understood, support, open-ended
			Strategy output	Organizational learning, continuous development
		Structure	Type of structure	Non-hierarchical, networked, team-based
			Structure change	Stable/flexible, self-renewal
		Stakeholders	Stakeholder belonging	Internal: employees, managers, senior managers, leaders External: customers, competitors, suppliers, owners, other members
			Stakeholder role	Employees: learn, work with information, commit; Managers: supporter, promoter, encourager; Senior managers: direction provider
		Environment	Openness to the environment.	Minimum boundaries, collect information from the environment, workers as boundary scanners
		Politics	Type of politics	Abusive, democratic
		Power	Empowerment	Distributed, inclusive, contextual
		Systems	Systemic view	Interrelationships and interdependence, process than snapshot, delay
			Systemic preconditions	Commitment to long term, mental models, thinking in systems archetypes
		Process	Process	Input, output
		Technology	Technology	Advance, actor concrete, adjunct
	Usage	Goal	Performance	Continuous improvement, excellence, quality, effectiveness
			Competitiveness	Better service, flexible action, innovation
			Knowledge	New, intermediate
		Application	Countries	Developing, developed
			Industries	Services, manufacturing, public
			Respondent's position	Top executives, middle managers, employees
			Respondents' demographics	Age, gender, experience, education

	System	Content	Layers	Hard aspects, soft aspects, interaction between them
			Ecology	Individual, team, unit, organization, environment
			Stakeholders	Employee, manager, executives, customers, suppliers, competitors, government
			Development	Levels, change, flexibility, modularization, embedding
		Model	Structural	Actor, object, relations
			Behavioural	Events, states, processes
			Scenario	Goals, rules, decisions
			Flexibility	Modularization, capability to reuse existing components, identify triggers, embed change
	Development	Metrics	Performance	Planned, realized, financial
			Knowledge	Existing, new, used
			Change	Planned, ad-hock, incremental, transformative
		Development approach	Languages	Formal, non-formal
			Instantiation	Yes, no
			Guidelines	Yes, no, formal, non-formal

Table 1. Learning organization 'four worlds' framework

4. LEARNING ORGANIZATION MODELS' EVALUATION

The literature does not see the learning organization as a state that can be achieved, but as the holy grail (Jashapara, 1993), “snark” (Tosey, 2005), a continuous journey. A journey on which the organization will continuously learn and change to stay on the edge of chaos (Waldrop, 1992).

According to DiBella (1995) there are three perspectives to the learning organization: normative, developmental and capability perspective.

- Normative perspective – learning can occur under certain conditions. The leaders and the organization needs to create those conditions through disciplined action or intervention.
- Developmental perspective – learning organization is a stage in the organization's development. There are different styles and processes for different stage.
- Capability perspective – each organization learns through its own learning processes embedded in the organization's culture and structure.

Large majority of the models are following the normative perspective. In the normative perspective two most used models through which the learning organization is represented are the Energy flow model (Pedler et al., 1991) and the Seven dimensions of a learning organization (Watkins and Marsick, 1993). Senge (1990) does not construct a model of the learning organization, but based on his writings the elements and the relations are identified. These three models will be evaluated through the learning organization 'four-worlds' framework.

4.1. *Energy flow model*

Pedler (Pedler et al., 1991) identifies:

- vertical movement of the energy from individual to collective and vice versa that links ideas and policy and
- horizontal movement of the energy from vision to action and vice versa that links actions and operations.

Characteristics of a learning organization are (Pedler et al., 1991):

- The learning approach to strategy
- Participative policy making
- Informing
- Formative accounting and control
- Internal exchange
- Reward flexibility
- Enabling structures
- Boundary workers as environment scanners
- Inter-company learning
- Learning climate
- Self-development opportunities for all

This model is very general and does not help to identify the relations between the elements. Even Pedler et al. in the same book say that there is still a lot of work in this model and there is a need for additional considerable research in order to answer the following questions:

- where does the energy start to flow and where it is best place to make a start?
- can energy flow directly from operations to ideas, or from policy into action or vice versa?
- what happens when you get stuck in one lobe?
- what is the significance of the cross-over points or slips?

4.2. *Seven dimensions of a learning organization*

The seven dimensions of a learning organization identified by Watkins and Marsick (1993) were structured in a model of an individual, team, organizational and global level. On the individual level there is a need to create continuous learning opportunities and promote inquire and dialogue. Through the teams the collaboration and team learning should be encouraged. On organizational level people should be empowered towards collective vision and create systems that will capture and share learning. At the top, on global level, a strategic leadership for learning should be provided and the organization should be connected to its environment. All this should enable the organization move towards continuous learning and transformation.

4.3. *Senge's model*

Senge identifies the core competencies of the learning organization which the organization should develop: building shared vision, personal mastery, working with mental models, team learning and systems thinking. Furthermore based on his work (Senge, 1990) the following relations can be identified:

- Systems thinking underlies all the other elements
- Leadership capabilities appropriate for the learning organization need to be developed before the start of the other activities (for example distributed leadership).

- Personal mastery needs to exist
- Creation of shared vision and shared mental models should be the next step
- When alignment is achieved than the employees should be empowered
- Team learning is important for the transfer of learning from individuals to the organization

The learning organization 'four worlds' framework developed above enables us to highlight the main characteristics of these approaches and evaluate them from an information systems perspective. The results are present in table 2.

Property	Facet	Attributes
Learning	Type of learning	Single-loop: 1,2,3; double-loop 1,2,3; deutro learning:2,3
	Styles of learning	on the job learning: 1,2,3; training:1,2,3; formal:1,2,3; informal:1,2,3;
	Learning support	conscious learning:1,2,3,, resources: 1,2,3;
	Learning stakeholders	Individual:1,2,3; team:1,2,3; organization: 1,2,3
	Unlearning	Individual: NR; organization: NR
Culture	Openness	Openness:1,2,3; disclosure 1,2,3; sharing: 1,2,3; trust: 1,2,3
	Experimentation	experimentation:1,2,3; curiosity:1,2,3; take risks:1,2,3; accept mistakes:1,2,3; accept uncertainty:1,2,3;
	Participation	no barriers:1,2,3; egalitarian:1,2,3;
	Dialogue	dialogue and inquiry:1,2,3; questioning:1,2,3; feedback:1,2,3; time for reflection:1,2,3;
	Type of culture	Weak: NR; middle: NR; strong:1,2,3;
	Level of culture	Specialist: NR; organizational:1,2,3; national: NR; international: NR;
Change	Becoming LO	Transformation:1,2,3,, adaptation: NR;
	Staying LO	Adaptation:1,2,3,, transformation:1,2,3;
Leadership	Leadership type	Distributed:1,2,3; servant: 3; collective:1,2,3;
	Leaders role	Create and share vision:1,2,3; be a role model:1,2,3; provide support:1,2,3; be a teacher:1,2,3; be designer:3;
	Leadership style	Transformational:1,2,3,, transactional: NR
Strategy	Strategy development	Learning-based:1,2,3; emergent: NR;
	Stakeholders	Employees:1,2,3; managers:1,2,3; executives:1,2,3;
	Vision	Shared:1,2,3; understood:1,2,3; support:1,2,3; open-ended: NR;
	Strategy output	Organizational learning: NR; continuous development:1,2,3;
Structure	Type of structure	Non-hierarchical:1,2,3; networked:1; team-based: 2;
	Structure change	Stable/flexible: NR; self-renewal: NR;
Stakeholders	Stakeholder belonging	Internal: employees, managers, senior managers, leaders :1,2,3; External: customers, competitors, suppliers, owners, other members:1,2,3;

	Stakeholder role	Employees: learn, work with information, commit:1,2,3; Managers: supporter, promoter, encourager:1,2,3; Senior managers: direction provider:1,2,3;
Environment	Openness to the environment.	Minimum boundaries:1,2,3; collect information from the environment:1,2,3; workers as boundary scanners:1,2,3;
Politics	Type of politics	Abusive:1,2,3; democratic: NR;
Power	Empowerment	Distributed:1,2,3; inclusive:1,2,3; contextual: 2;
Systems	Systemic view	Interrelationships and interdependence, process than snapshot, delay
	Systemic preconditions	Commitment to long term: 3; mental models: 2,3; thinking in systems archetypes: 3;
Process	Process	Input:1,2; output:1,2;
Technology	Technology	Advance:1,2; actor concrete: NR; adjunct:1,2;
Goal	Performance	Continuous improvement:1,2,3; excellence:1,2,3; quality:1,2,3; effectiveness:1,2,3;
	Competitiveness	Better service:1,2,3; flexible action:1,2,3; innovation:1,2,3;
	Knowledge	New: NR; intermediate: 1;
Application	Countries	Developing: NR; developed: 1,2,3;
	Industries	Services:1,2,3; manufacturing:1,2,3; public:1,2,3;
	Respondent's position	Top executives:1,2,3; middle managers:1,2,3; employees:1,2,3;
	Respondents' demographics	Age: NR;, gender: NR; experience: NR; education: NR;
Content	Layers	Hard aspects: 1,2; soft aspects:1,2,3; interaction between them: 1,2;
	Ecology	Individual:1,2,3; team:1,2,3; unit: NR;, organization:1,2,3; environment:1,2,3;
	Stakeholders	Employee:1,2,3; manager:1,2,3; executives:1,2,3; customers:1,2,3; suppliers:1,2,3; competitors:1,2,3; government: NR;
	Development	Levels: NR; change:1,2,3; flexibility:1,2,3; modularization: NR; embedding: NR;
Model	Structural	Actor:1,2,3; object:1,2,3; relations:1,2,3;
	Behavioral	Events:1,2,3; states: NR; processes: NR;
	Scenario	Goals:1,2,3; rules: NR; decisions: NR;
	Flexibility	Modularization: NR; capability to reuse existing components: NR; identify triggers:1,2,3; embed change: NR
Metrics	Performance	Planned:1,2,3; realized: NR; financial: NR;
	Knowledge	Existing:1,2,3; new:1,2,3; used: NR;
	Change	Planned:1,2,3; ad-hock: NR; incremental:1,2,3; transformative:1,2,3;

Development approach	Languages	Formal: NR; non-formal:1,2,3;
	Instantiation	Yes: NR, no: 1,2,3;
	Guidelines	Yes:1,2,3; no: NR; formal: NR; non-formal: 1,2,3;
Legend: (1) Energy flow model; (2) Seven dimensions of learning organization; (3) Senge's model; (NR) Not recognized		

Table 2. Learning organization models' evaluation

5. DISCUSSION

The need for development of a tailored information system for the learning organization has been recognized by Williamson and Iliopoulos (2001). They suggest that this information system should integrate diverse human, organizational and information system requirements, and different modalities of learning to be supported. Through the four-worlds framework we get a better understanding to how far we have come to this goal.

The four worlds framework shows that the learning organization is a complex concept. This complexity is clearly present in the subject and usage world. The subject world is mainly discussed through the soft properties of the organization like culture, learning, strategy, leadership etc. Although some critical aspects that lay the ground for information systems like systems, processes, and technology are poorly discussed in the models. Furthermore the issues of power and politics are not present in the models.

The models, looked through the usage world, also show a clear similarity. All the models propose a positive goal and wide application. However, there is lack of presence of instances when the goal is not realized, and presentation of customization options of the models for implementation in various contexts.

The weaknesses of these models are also present on system and development level. In the model property we can see that for the behavioural, scenario and flexibility facet the evaluated models do not have the respective attributes. For example the models although have events they do not propose states that results from these events and processes through which the states are achieved. Further more there is no option for scenarios through which the goals will be achieved, or options presented how these scenarios can be developed. At the end, although at the core of the learning organization is to change continuously; this is not represented in the models. The models are fixed and do not provide the opportunity to change in the future by incorporating the flexibility facet's attributes of modularization, capability to reuse existing components and embed change.

The weaknesses of the models are clearly evident in the development world. First, the language that is used to develop these models is non-formal and full with ambiguous and vague terms. By attaching different meanings to the terms the development of the system can be neglected. The non-formal language is also used in the guidelines. This can add further confusion to the information system development. At the end the identified models lack their instantiation through which it can be shown that the models can be realized.

The four worlds framework has shown that the subject and usage world of the learning organization are well covered by the research and the literature. Sufficient information is provided for the system and development world. On the other hand there is lack of such clearness and specification for the system and development world. Based on the above the following suggestions for further research can be made:

- There is a need for development of learning organization ontology. The ontology will enable creation of a clearer picture of the learning organization. The properties, facets and attributes of the subject and usage world can be used to achieve this.

- The models should also incorporate the behavioral, scenario and flexibility aspects. This will ensure that they will change as a result of the internal and external changes and be used in different contexts.
- Development of the models by using formal languages, for example UML. By using a shared language the gap between the users and the developers could be overcome. Furthermore, this will enable usage of the models by different groups with different background and countries.
- Model instantiations. An important aspect for the learning organization information system is to create instantiations of it. Through the instantiations the information system could be evaluated and improved.

6. CONCLUSION

In this study we have used the 'four-worlds' framework to analyse the learning organization literature. We have examined more than 130 papers and books. As a result of it we have created the Learning organization 'four-worlds' framework. Through this framework we have identified the properties, facets and attributes of the learning organization for each world. Then we have identified the three most widely used learning organization models and evaluated them by using the Learning organization 'four-worlds' framework. The findings indicate that the models do not provide sufficient details and elements that will enable creation of learning organization information system. Furthermore we have identified that in order to start the development of learning organization information system it is necessary to create a learning organization ontology, add the options for changes of the model, use formal language and create instantiations of the information system.

Limitation of this study is the number of the models that were evaluated. However this is the first study that looks on the learning organization through the 'four-worlds' framework so it can be considered as a starting point for a future research with more models. Furthermore the framework itself can be improved by identifying additional properties, facets and attributes for the system and development world. This improvement can be a result of the attempts to develop learning organization information systems.

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