



## CULTURE AS INNOVATION IN VOCATIONAL HIGHER EDUCATION

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**Abstract.** Soft System Methodology (SSM) has been used to analyze the innovative information technology related development challenges of organizational learning, work life oriented learning environment, curriculum development, learning, teaching and work life Cooperation in vocational higher education as a cultural innovation process. The use of SSM produces shared understanding of the cultural innovation process as a well-managed process. This process can be described and understood through a multilayer system with layer specific paradigms and resources. SSM guides on each layer to identify the paradigms and resources which affect the synergy related to the cultural innovation process. Layers and paradigms identified here help to understand more deeply this phenomenon. Paradigms related formal and informal features are key factors to understand and control the cultural innovation processes. Cultural innovations are developing through paradigm shifts and development of resources. Resources can have pedagogy related, content related and functional features. If someone uses this model to analyze the state of the university, formulates a vision, he/she also can use this model to determine and achieve the desired future state of the university. In addition it can be determined as well which kind of paradigm shifts and development tasks are needed to achieve the desired future state.

**Keywords.** Culture, innovation, innovative information technology, vocational education, organizational learning.

**Short title of the paper.** Culture as Innovation.

## Introduction

The focus of this paper is to present an approach to obtain shared understanding of the potential and problems related to Culture as Innovation in Higher Vocational Education. The problem area is analyzed through a multilayer model, which is composed of recognized problems or development challenges and relations between them. The paper is based on L. Kurkela's papers „Paradigm Shifts and Learning Resources, Synergy Enablers for eLearning and Blended Learning“ presented at ED-MEDIA 2006 [1], „The Potential of Design Patterns for Vocational Teacher Education in Finland“ presented at Netties 2006 [2] and „eLearning and Organizational Learning in Vocational Educational Institutions“ published by IEEE Computer Society Technical Committee on Learning Technology (LTC) [3].

## 1. Key Concepts

*Innovations* are new, renewed or enhanced processes, services, pedagogical improvements, research & development competencies, learning, practice of work, strategies etc. Innovation means both the creation of novel and useful ideas as well as their implementation. Innovation process consists of discovering of ideas, developing of ideas and implementation of ideas.

*Culture as innovation* consists of paradigm shifts, restructuring of cooperative entities and development of resources.

*eLearning* and Blended Learning are seen here broadly as synonyms. They are involved in the flexible use of information and communication technology in learning, teaching, cooperation and working related situations. They are involved in the cultural innovations of pedagogy or technology enhanced learning. *Learning Resources* can have (see Fig. 1) pedagogical, functional and content-related features.



Fig. 1. Learning Resources.

*Innovative Information Technology*-related learning resources consist of Social Web and R&D-related innovations implemented in vocational higher education and working life. *Learning Objects* are defined as any entity, either digital or non-digital, which can be used, re-used or referenced during technology-supported learning (LOM 2000). Learning Resources are seen here as Learning Objects in a broad sense.

*Paradigm* refers to the functional model which guides a system or its subsystems. Paradigms have *visible* and *invisible features*. The visible formal side of a paradigm consists of processes, roles, tools etc. The invisible informal side (culture) of a paradigm consists of customs, values, beliefs, taboos, stereotypes, traditions, language behaviours etc. [4]. *Paradigm shifts* include both the *formal* and *informal features*. A paradigm shift must be *Technically Possible* and *Culturally Acceptable* [5], [6], [7]. Usually the desired cultural change is more demanding than the technological one [4]. A *successful paradigm shift* requires four elements: (1) pressure for change, (2) a clear shared vision, (3) capacity for change and (4) actionable first steps [8]. If any of these elements is missing, the paradigm shift

will fail. Paradigms affect what kind of learning resources is needed. On the other hand, learning resources affect what kind of paradigms can be used or developed. Paradigm shifts are organizational development tools to improve the quality and purposefulness of vocational higher education.

*Synergy* is related to the benefits and added value gained in fulfilling the needs of different actors, systems or subsystems in the design of paradigms, resources and value chains. *Synergy Enablers* and *Synergy Disablers* are features which facilitate or prevent the growth of synergy. From one point of view, synergy is growing if the (sub)system produces added value for its environment (effectiveness), if the added value is produced using purposeful means (efficacy), if the added value is produced using minimal resources (efficiency) [5], [6], [7]. From another point of view, synergy is growing if an organization shares its well-balanced goals at all levels.

The concept of *Interoperable Competence* (IC) serves our systemic understanding of the target organization and its synergy processes. Interoperable competence guides our attention to: *interoperability between actors* (persons,

organizational levels, networks, levels of the society), *ability to serve other actors* (on the same or different layer), and *ability to utilize services produced by other actors* (on the same or different layer). Interoperability can be *Symmetric* or *Asymmetric* by nature, depending on the fact whether the cooperation is between actors of the same class or different classes [9]. Interoperability can be *Horizontal* or *Vertical* by nature depending if the cooperation is related to resources and services on the same layer or on different layers. Interoperable competence includes the views of different organizational layers, interest groups and individual actors. IC supports the concepts of Learning Organization, Competence Portfolio, Knowledge Management, Distributed Competence and Networked Problem Solving. Interoperable competence includes both Techno-Structural Interoperability and Socio-Cultural Interoperability [10].

## 2. Soft System Methodology

Since the year 1974, *Soft System Methodology (SSM)* developed by Peter Checkland et al. has been successfully used to ensure that the process of inquiry into real world complexity is itself a system for learning. The use of SSM creates Shared Understanding of complex real-world situation and guides organizations in their organizational learning and developing process [5], [6], [7].

Soft System Methodology is often applied as a *multilayered analysis*. A *complex system* is something more than the sum of its components. Components are affecting each others by paradigms, information exchange and resources. A complex system also affects its subsystems and – when it is changed - the subsystems are changed as well. Respectively, by purposeful paradigm shifts and development of resources on subsystem layer the whole system can be coached to the desired direction.

The interaction which affects the functional paradigms of a complex system can be called *Critical Interaction*. Critical interactions are often related to situations in which the organization does not have any pre-planned paradigms. Critical interaction increases the chaotic features and complexity of the system and affects the stability of

the system. A learning organization reacts to critical information by paradigm shifts and/or by developing and implementing new learning resources. Critical information forces vocational higher education to make unexpected rapid changes in its paradigms and utilization of resources. Through Purposeful Paradigm Shifts and development of learning resources an educational institution can seek Internal and External Synergy Benefits.

SSM can be applied through following steps:

- i) analyses of the Current State of the System;
- ii) description of the Major Problem Areas;
- iii) identification of Synergy Enablers and Disablers;
- iv) description of the Desired Future State of the System;
- v) development Steps towards the Desired Future Cultural State of the System.

## 3. Culture as Innovation and Interacting Layers in Vocational Higher Education

In the field of vocational higher education there are several ongoing innovation processes, e.g.: the Bologna Process, Specification of Competencies at National Level, Specification of Competencies at Institutional Level, Learning Process Based Curriculum Design, Concretisation of Course Level Goals.

*The Hierarchy of guiding and interacting layers* includes:

- i) institutional and network cooperation layers;
- ii) curriculum and course layer;
- iii) layer of learning resources;
- iv) media elements and related metadata layer.

SSM guides us to identify the major cultural innovation problem areas and related development challenges and possibilities on every layer. *Cultural innovation processes* consist of paradigm shifts, restructuring of cooperative entities and development and implementation of resources. Vocational higher education institution and its major problem areas as a purposeful system are described in Fig. 2.

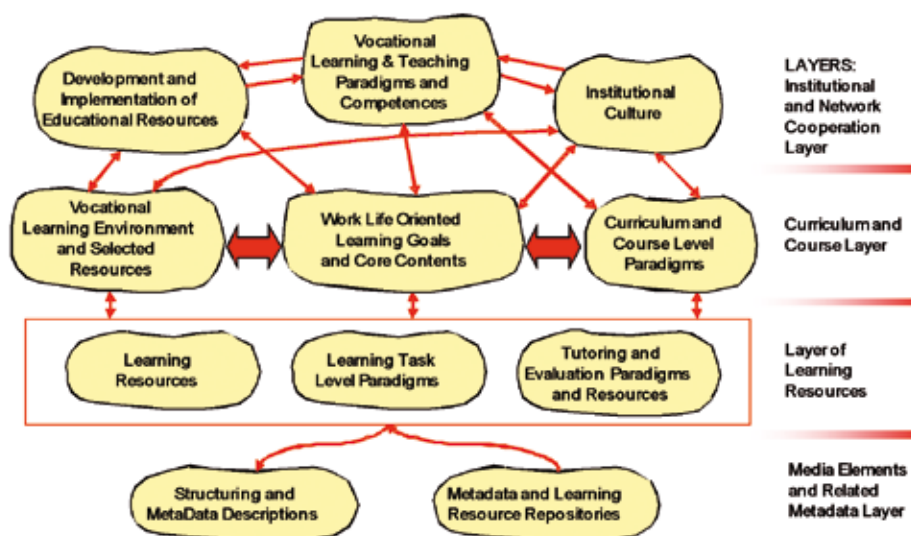


Fig. 2. Vocational Higher Education as a Purposeful System.

**Institutional and Network Cooperation Layer** can be described by using three major problem areas which are in many ways bound together, namely:

1. *Institutional Culture* which reflects, for example, the organisational status in work-life orientation, combination of scientific and practical approaches and role in the regional development. Institutional Culture is based on the needs of the society and work life. It reflects the institution's role in the education system and cooperation with its environment. The role is partly given and partly self-made. Awareness of the current status describes the integrity and level of purposefulness of the organisation. Institutional culture can be changed through paradigm shifts, development of resources and reorganizing of cooperative entities. Paradigm shifts have formal and informal features. The informal side of the paradigm shift is always a very demanding one. It might be very difficult to make changes in the teaching culture which has been dominant for decades.
2. *Teaching and Learning Paradigms and Competencies (TLPCs)* reflect the current pedagogical status of the institution. It is based on the institutional culture, pedagogical competencies and learning competencies and current praxis. On the other hand, TLPCs affect the institutional culture and they depend on the possibilities and restrictions of the educational resources.
3. *Development, Implementation and Use of Educational Resources* is the third major problem on this layer. It specifies what kind of functionality, content and other resources facilitate or restrict the learning and teaching activities in a vocational higher education institution.

#### **Curriculum and Course Layer**

4. *Vocational Learning Environment and Selected Resources* specify the selected learning environment for a course or for a curriculum. The learning environment and how it is used reflects the organisational culture, work life orientation and learning and teaching practices.
5. *Work Life Oriented Learning Goals and Core Contents* are driven from Learning Process Based Curriculum Design and Conception of Learner's Vocational Growth.
6. *Curriculum and Course Level Paradigms* are organisational learning tools for educational institutions. They are promises and agreements of what kind of learning students and instructors are committed to.

#### **Layer of Learning Resources**

7. *Learning Tasks and Learning Task Level Paradigms* facilitate different paths of learning. They respond to the educational needs of different learners and groups of learners. They can be specified or selected by educational designers, teachers, group of students or an individual student.
8. *Learning Resources* facilitate and restrict the fulfilling of learning tasks. Learning resources, learning tasks and tutoring and evaluation paradigms form Institutional and Personal Learning Environments. In personal learning environments, learners or groups of learners can select part of the used learning resources. Learning resources must as well serve the needs of tutoring and evaluation processes.
9. *Tutoring and Evaluation Paradigms and Resources* and activities guide the learning processes.

#### **Media Elements and Related Metadata Layer**

10. *Structuring and Metadata Descriptions*. Educational media elements should be divided in purposeful elements to support use, reuse and maintenance of those resources.
11. *Metadata and Learning Resource Repositories*. Educational media elements must be described and stored in repositories to support their retrieval, use and maintenance.

This SSM related model is a starting point for a vocational educational institution to analyze and guide its cultural innovation processes. The next, organisation-specific, iteration of the SSM analysis should concentrate only on those problems which are relevant to the target organisation and selected approach (Weltanschauung). The approach of this paper was guided by the conception that a vocational higher education institution is a purposeful system which can be understood and guided through a multilayer model consisting of paradigms, resources and cooperative entities. The organisational learning was described through a cultural innovation process where paradigms shifts with formal and informal features, development of resources and reorganisation of cooperative entities are in key role.

#### **Conclusion**

The use of information technology can be divided into professional and general information technology. Innovativeness can occur in both classes. At the moment, especially the development of Social web (Web 2.0) is challenging vocational higher education and working life. On the institutional level this means significant paradigms shifts in institutional culture. Informal learning, learning related cooperation and students as content providers could have a bigger role. Multimedia and social software related competencies are becoming more important. This is a huge challenge for teachers, vocational pedagogy and curriculum development. In our university, we are developing this subject area, for example, in the ViCaDiS Project [11],

Furthermore, the role of Innovative Information Technology (IIT) comes essential in facilitating the transparency of learning, teaching and innovation processes. When the environment changes more rapidly, IIT is needed to support the role of vocational higher education in responding to the developing needs of society.

The focus of this paper has been on the use of Soft System Methodology in order to create shared understanding and transparency of Innovation Processes and Cultural Development Processes in Higher Vocational Education. The problem area was analysed as a multilayered purposeful system. The SSM analysis has been made on general – not on organisation-specific – level. This could be a starting point for organisation-specific cultural innovation processes. An educational institution has to find out what kind of synergy enablers or synergy disablers exists in its case. Paradigm shifts should be made with small steps which are culturally acceptable and technically possible. A new SSM-iteration should be made to find out what the new state of the system is after a couple of paradigm shifts and development activities. The new SSM-iteration means also re-evaluating of the needed development tasks.

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