

Multilingual Virtual Quality Center Providing e-Learning Facilities for e-Health and Modern Healthcare Management Education and Training

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BIOGRAPHICAL NOTES

Ljudmil A. Golemanov, Professor, Dr. Sci. is an Academician Professor of Informatization of Multi-National Corporations and Doctor of Technology in Systems Theory application in Industrial Production Systems. He served as visiting professor in the field of Systems and Control Engineering at the Helsinki University of Technology, Docent at the Oulu University in the field of Production, Planning and Management of Multinational Corporations and Professor at the University of Vaasa in the field of Automation Technology and Control Systems Engineering. He is author of several monographs and more than hundred articles in these areas as well as editor of several Multi-Lingual and Multi-National glossaries in Control Systems Engineering. Presently working as Head of LAGontrols Oy, Finland private company and specializes in the theory and methodology of the Glossary Based Learning for local and global platforms integrating natural and artificial intelligence.

Aleš Bourek MD, PhD. is the Head of University Center for Healthcare Quality (Masaryk University, Brno, Czech Republic and advisor to Czech Ministry of Health on standards and quality assurance in health care. He also acts as Deputy Leader DG SANCO Health Systems Working Party, Active Member EFQM Health CoP (European Foundation for Quality Management Health Community of Practice) and served as WHO and ESQH collaborator in the field of healthcare quality management and HC quality improvement education. Dr. Bourek devised and evaluated the methodology for creating Standards of Effective Medical Care. Introduced HTA in the Czech Republic and is active in healthcare performance assessment in the Czech Republic. Currently he is working as Senior lecturer in health informatics, Brno Faculty of Medicine, Masaryk University. He also heads a private facility offering the complete range of infertility diagnostics and treatment as well as full range outpatient based gynecology and obstetrics. He is vice-president of the Czech Society for Quality in Healthcare (<http://www.cskz.cz>) and for five years headed the Center for Healthcare Quality of the National Institute of Public Health. He is the author of monographs and articles dealing with healthcare quality management, health informatics, machine learning and textual information analysis for healthcare use and for support of assisted reproductive technologies.

prof. Kristína Zgodavová, PhD. is one of the renowned Slovak specialists in the field of quality engineering and management. After graduating at the Faculty of Mechanic-

cal Engineering of the Technical University (TU) in Košice worked at the INPRO TST Praha, Košice Division, an engineering organization focusing on designing automated manufacturing systems, surface treatments, metrological support of production and quality management systems. Since 1980 she was externally collaborating with the Technical University of Košice in researching and lecturing quality of production; in 1991 started working with the University on full time basis first as assistant professor and later as Head of the Marketing Management Department of the TU in Košice. She participated in forming of the study program of Production Quality Engineering at the Faculty of Mechanical Engineering of the TU Košice. She was acting as visiting professor at the University of Vaasa, Finland and since 2007 was holding the position of Vice Rector of the Alexander Dubček University of Trenčín where she is recently working. She is the author of three monographs, numerous university textbooks, and teaching aids. Was heading multiple domestic and international projects and participated on developing curriculums and study texts for courses in quality management and engineering pertaining to a variety of fields of industry and service providing. Participated in a host of lectured given on request and had numerous appearances at international conferences, symposiums and seminars.

KEY WORDS

e-Learning, e-Health, Healthcare, Management

ABSTRACT

The complete methodology of design, functions and first feedback based on the pilot use of the multilingual Virtual Healthcare Quality Centre designed to educate healthcare managers, caregivers and researchers in understanding how to achieve quality, efficiency and economic effectiveness of services provided by modern healthcare organizations is presented for discussion and possible improvements. Currently Virtual Healthcare Quality Centre offers glossary centred e-learning courses for modern healthcare organization change management, human resource management, quality management, performance management, customer satisfaction and decision making, healthcare economics, e-Health and quality of life and well-being. Management and organizations e-manuals and e-consultation with frequently asked questions fo-

cused on use of obtained information and knowledge accumulated for the design and implementation of a new quality management system and a set of tools for follow-up improvement of quality, efficiency and effectiveness of healthcare organizations. Discussion will also be targeted at further development of specific areas as seen from the perspective of users in health care systems in EU countries and EU candidate countries that have not participated in the presented initial pilot projects.

INTRODUCTION

There is a sound reason for using systems of quality management in the health care environment. This reason is the growing complexity of the provision of health care services. Today's complex teams of professionals, in order to perform optimally, must understand the fundamental principles and logics of management. In order to do anything we need to have a thorough understanding of what is to be done. The challenge of systemic quality management within the framework of traditional healthcare and new age of e-health requires basic semantic definition of terms used and the provision of educational resources accessible to the widest interested public in a form much less time consuming than traditional learning in the academic environment. After initial "priming" many managers need continuous support and guidance. The dynamics in the provision of quality health services requires the formation and growth of virtual communities of professionals able to react quickly and help in the process of harmonization of health care services across wide geographical areas (all Europe) in order to address today's patient and professional mobility and assure standardized quality of services. Since often education is a starting point of progress, we aim to improve the current situation through the Virtual Healthcare Quality Center [VHCQC] project. Two Leonardo da Vinci projects SK 03/B/F/PP-177014 „IMPROHEALTH“ [11] and SK/06/B/F/PP-177443 „IMPROHEALTH-COLLABORATIVE“ [12] mission was to broaden access to the Vocational Managerial Education and Training in order to improve quality, effectiveness and efficiency of the healthcare organization services. [14] The example of Healthcare Management course "Contemporary Healthcare Quality Management" module developed within the frame of two Leonardo da Vinci pilot projects and application of Role-Play Simulation developed within the frame

of Slovak Ministry of Education KEGA project [13] is presented in detail. Presented courseware and simulation can be embedded into different web learning environments as they are produced in the form of web applications.

EDUCATIONAL MODELS

According to [2] there are three prototypical models of education:

- *to transfer knowledge;*
- *to acquire, compile, gather knowledge,*
- *to develop, to invent, to construct knowledge.*

Under such pedagogical motivation four stages of quality system deployment in healthcare organization through VHCQC support were identified:

a) Educational model: To transfer knowledge

In this model the origin of students' knowledge is based on knowledge possessed by the teacher. Teachers know what students need to learn and it is the teachers' responsibility to transfer this knowledge into the student's "mind" as easily as possible. The transferred knowledge is abstracted knowledge prepared in a special way (the so-called didactical preparation), so that students are able to capture the content not only fast, but also to memorize it on a long-term basis. There are some links and relations of this model with behaviorism, so that students are able to capture the content not only fast, but also to memorize it on a longer-term basis. [9]

b) Educational model: To acquire, compile, gather knowledge

This teaching model assumes that learning is an active process, which has to be planned, revised and reflected by the learner. The learner itself is an active entity and it is his/her activity, which supports or even is a necessary condition for the learning process. The whole learning process with all its intermediate steps, its difficulties and provisional results are under surveillance by the teacher. This form of teaching is related to cognitivism. [4]

c) Educational model: To develop, to invent, to construct knowledge

In this teaching model teachers and learners alike have to immerse into a situation where the outcome is not predetermined. They both have to master situations at hand and the potential differences between teachers and learners may result in more experiences and more meta knowledge on how to reflect on complex situations (e.g. how to design experiments, how to analyze failure and risk, how to

develop a new services etc.) on the teacher's side. This form of teaching has strong links to constructivism. [4]

Theoretical background for VHCQC development was a Bacsich three-phase course lifecycle model [1]:

- *Development and planning*
- *Evaluation and maintenance*
- *Production and piloting*

A new Virtual Education & Training Framework is shown in (Fig. 1).

It is anticipated, that in various settings in different European countries there will be "culture based" preferences regarding the three above described educational models. Discussion with healthcare professionals will serve in defining these possible country based preferences and final tailoring of the project output to the needs of various countries across Europe.

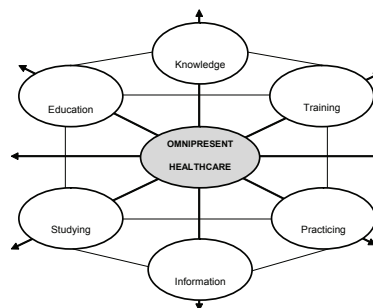


Fig. 1 A new Virtual Education & Training Framework

VIRTUAL HEALTHCARE QUALITY CENTER

The multilingual VHCQC (Fig. 2) allows students to attain the fundamental knowledge and skills of certified managers via the availability of detailed omnipresent managerial healthcare e-glossary, e-learning, e-implementation and e-improvement services, aiming to give them a strong incentive and special abilities to markedly improve the quality, efficiency and effectiveness of patient/client oriented healthcare organizational services.

New knowledge and skills will show-up in:

- *recognition and maintaining of your health;*
- *activities and mental perceptions of your satisfaction;*
- *perceptions of economic, ecological and social aspects of your being and in applying the latest knowledge in your general conduct.*

VHCQC is divided into five "rooms":

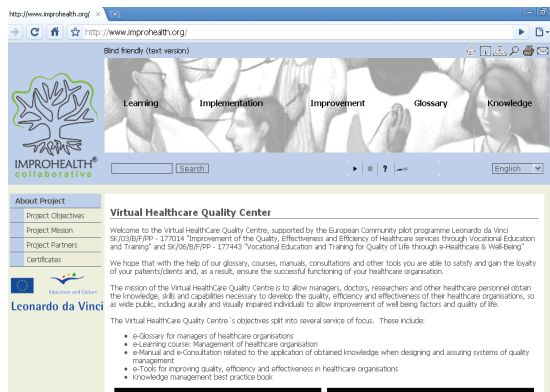


Fig. 2 An example of main VHCQC screen

1st ROOM OF THE VHCQC: Multilingual e-Glossary

Multi-lingual and multi-national professional terms and concepts definition in Glossary-Based Learning [GBL] is a thesaurus or ontology defined over a specialized vocabulary, representing a repository of knowledge of a particular field, such as medicine, health, quality, management, and information and communication. It contains selected words, terms and concepts with their semantic relations in a hierarchical structure and therefore can also contain synonyms and homonyms. The use of thesaurus allows identifying the concepts included in the e-Glossary with multiple different forms, but which represent also the same idea in a given field of study. As an example, in medicine the concept "drug" may also be called a Prescription, a Narcotic, a Pharmaceutical, a Pill, etc.

Since there is no deep knowledge without terminology, both local and global, the mission of Health Care Quality Glossary [HCQG] is to help VHCQC customers use basic correctly related terminology and to avoid misunderstanding when managing a healthcare organization.

Objectives:

- to facilitate the use of correct terms and their precise internationally accepted definitions;
- to enable users interlinking of terms used in education materials;
- to allow for competent translation and presentation of a manager's knowledge in healthcare in general.

All sub-glossaries are based on specific and approved multi-lingual and multi-national (according to national norms and standards) that is multi-domestic terminology.

Profound knowledge for VHCQC was updated with

periodical communication between experts on local, regional and global levels.

Final glossary version is omnipresent that is a mobilized version for all platforms operating anywhere, anytime and for anybody world-wide. Definitions are expertly selected from trusted public and proprietary sources, semantically edited, and reviewed by experts and e-Glossary contains about 1,000 terms and definition.

2nd ROOM OF THE VHCQC: e-Learning course

The mission of the e-Learning course is to offer managers, doctors, researchers and other healthcare personnel the possibility to obtain certified knowledge in eight areas: quality management, change management, performance management, human resource management, healthcare economy, customer satisfaction and decision making, e-health and quality of life and well-being.

Objective of the e-Learning course is to develop the abilities, skills and expertise of the participant in order to gain:

- *professionalism, as the faculty of dealing with various tasks and problems of a healthcare organization using modern managerial tools and methods;*
- *flexibility, meaning the ability to manage successfully restructuralization and change of identity in a healthcare organization;*
- *ethical integrity, meaning the ability to tackle tasks and problems of a healthcare organization in a way which respects the dignity of the patients/clients and personnel, in a way which ensures that the organization is viewed positively by the public and in the way that assures excellent economic results.*

„Improhealth“ team developed a set of case studies and project thesis (tasks) with intermediate steps for support. Teachers via e-communication overcome incorrect assumptions, wrong learning attitudes and to assist in the reflection process in order to aid the student to build a consistent mental model of the subject domain.

3rd ROOM OF THE VHCQC: e-Implementation

The mission of the e-Manual with possibility of on-line consultation is to enable VHCQC customers to gain the knowledge, skills and ability necessary to design and introduce a quality management system in a healthcare organization.

The objectives of the e-Manuals are to provide VHCQC customers with:

- *instructions for design and implementation of a Quality Management System [QMS] in a healthcare*

organization,

■ *consultation and advice with the help of Frequently Asked Questions [FAQ] for the design and implementation of a QMS in a healthcare organization.*

For the implementation of quality management systems a basic handbook and environment for on-line consultation with a QMS advisor based on Frequently Asked Questions (FAQ) was prepared.

This part of the VHCQC is able to use the technology of the Web Generator of Simulated Games developed in the course of the project. [13]

The idea of role play, in its simplest form, is that of asking an individual to imagine either themselves or any another persons in a particular situation. In essence, each player acts as part of the socio-eco-eco-technical environment and provides a framework in which users can test out their repertoire of behaviors or study the interacting behavior of the group. [10] Role play involves participants in taking roles and acting them out. The aim of an individual is to adopt more or less recent roles in different situations, and try to imagine and express their proceeding with regard to the proceedings of their partners. Quality Management Role Play Simulation [QM-RPS] has been developed at the Technical University of Košice, Faculty of Electrical Engineering and Informatics, and it is being continuously made use of in the process of teaching subjects the way to focus on the quality management in Slovakia as well as abroad.

The keystone of QM-RPS is team-wise experimenting with a model of quality management system prepared in advance. The team consists of trainees or actual managers from an arbitrary organization. Experimenting appertains to main characteristics of the organization, its policy and quality objectives, as well as to the managerial functions and the quality management activities. Results of experiments are being recorded in pre-devised forms.

When the game is ready to be played the moderator explains to the participants that they are going to play the role of the healthcare organization managers, and that their goal is to develop and implement the QMS according ISO 9001:2008 [7] and improve according to ISO/IWA 1:2005 [8] or use another adequate model available. Next, under the guidance of the moderator, the players proceed through individual phases, fulfilling their assigned tasks. They help themselves by discussing some issues with the

moderator, by mutual discussions and by studying some on-line and other supporting documents.

The phases in QM-RPS are as follows:

1st phase: Organization presentation

- familiarization with an organization;
- finding the right places for the right people;
- position acceptance in an organization.

2nd phase: Experimentation with the processes of the QMS

- selection from randomly distributed processes;
- acceptance of intentionally assigned processes;
- taking responsibility for processes.

3rd phase: Experimentation with QMS process inputs and outputs

- buying from randomly distributed processes;
- buying from intentionally distributed processes;
- formulation of the comparative effective value.

4th phase: Documentation of a new QMS

- enhanced descriptions of managerial tasks;
- defined QSM processes;
- responsibility and competence matrixes in the QMS.

5th phase: Experimentation with the functioning of QMS

- identification of the situation in an organization;
- reason analysis and the determination of responsibilities;
- improvements and prevention measures.

The course learning objectives are thus being arrived at, and on an interim basis the below outlined documents are elaborated:

■ *the manager job descriptions including adopted quality management processes;*

■ *definitions of the quality management processes;*

■ *matrixes of the quality manager liabilities and powers enforced in the QMS;*

■ *drawn up at the end is a list of documents and the QMS basic document: Quality Manual [Q-MAN].*

QM-RPS develops better understanding and imprints practical skills in building Quality Management System for healthcare. The simulation runs with a basic database that forms the reference model of a healthcare organization. Production of the role play variants is facilitated by combination of various pre-prepared sub-models.

For VHCQC our Improhealth team developed three types of templates for Quality Manual: Q-MAN for Small Healthcare Organization (usually doctor and nurse); Q-MAN for Healthcare Laboratory (ISO 15189:2007) [5]; and Q-MAN for Pharmacy Shop.

Dissemination of the basic course materials across countries that have not participated in the produc-

tion of the “pilot courseware” demands the use of a discussion platform focused on customizing the so far produced materials for Europe-wide audience.

4th ROOM of the VHCQC: e-Improvement

The mission of e-Improvement is to provide VHCQC customers with the opportunity to gain the knowledge, skills and abilities necessary for improving quality, performance and economic effectiveness by means of a QMS and to acquire professional approaches, attitudes, tools and methods.

Objectives:

- *auditing of QMS in accordance with ISO 19011:2002 [6];*
- *self-evaluation of the healthcare organization in accordance with the EFQM Model of Excellence or Malcom Baldrige National Quality Award Model;*
- *benchmarking of the quality, performance and economic effectiveness of a healthcare organization;*
- *strategic management of the healthcare organization using Balanced Score Card [BSC];*
- *continuous improvement of the healthcare organization using: Seven basic quality improvement tools; Healthcare Failure Modes and Effects Analysis [FMEA]; Gantt Chart; Program Evaluation and Review Technique [PERT]; JACIE Standards; Healthcare; Six Sigma [6σ]; and Quality Function Deployment [QFD].*

There are many tools which can be used as a hammer, but there is only one tool type specialized for a specialized task e.g. to force nails into walls. Depending on the size of the healthcare organization and the technology and processes of it we are using even a special variety of “hammers” - tools.

In the knowledge loop we have added the most appropriate tools to support the required activity.

e-Knowledge book

A breakthrough effect identified through the use of the VHCQC approach is automated track-keeping of

all questions posed by students and answered by the teachers of the course in an e-Knowledge book. This is felt to be a big advantage over “standard” educational approaches, where information and innovative knowledge may (and often does) get lost (Fig. 3).

CONCLUSIONS

The VHCQC was designed to educate healthcare managers, caregivers and researchers in understanding how to achieve quality, efficiency and economic effectiveness of services provided by healthcare organizations. Multi-lingual and multi-national Q&Q Omni-Present HC Glossary for professionals in healthcare organization can be interlinked with e-Learning courses, e-Manuals and e-Tools all focused on usage of local and global information and broad and deep knowledge accumulated.

The VHCQC is operational and has been populated by multilingual e-Glossary of frequently used terms for quality management and by all the modules of the accredited course for management in the healthcare environment. Pilot courses have been run in the Bulgaria, Czech Republic, Finland, Greece, Italy, Romania, Slovak Republic, Spain, and Sweden. Several tools facilitate the tracking of study progress and self-evaluation of achieved knowledge by students. Experience is being collected by the producers of this technology based on the feedback from people enrolled in pilot courses in order to improve the effectiveness of the system. Wide discussion platform serving for improvement of the courseware is needed in order to assure the sustainability and cross-country use of the presented e-Learning modules in general and Contemporary Healthcare Quality Management module in deep.

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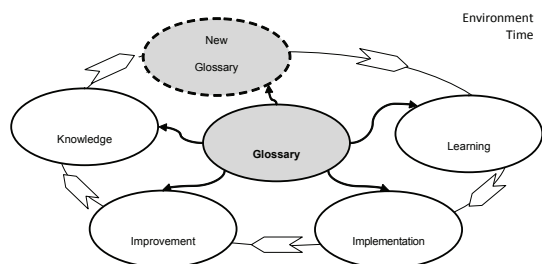


Fig. 3 VHCQC learning loop

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