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Quality Development and Standards in e-Learning: Benefits and Guidelines for Implementations

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Abstract: This research study focuses on quality development in e-Learning and on quality standards as appropriate instruments for corresponding activities. Quality standards are supporting the adoption and implementation of quality development throughout the whole organisation. Based on the introduced definition of quality development, the benefits of quality standards are presented. Especially the first ISO quality standard for learning, education, and training "RFDQ" (ISO/IEC 19796-1) offers a promising potential for the raise of quality awareness and the involvement of all stakeholders. The implementation and adaptation of the quality standard is the main focus looking at the specific given situation and organisation.

Introduction

In e-Learning there can be identified two main challenges today: The demand for overall interoperability and the request for (high) quality. This research study deals with the tasks and potentials of the quality development and looks for appropriate instruments. The answer on the question: "How to implement and improve quality development in e-Learning?" leads to the support which can be provided by quality standards. Based on the general definition of quality development, we will introduce quality standards as an appropriate means for quality development. Especially the first quality standard for learning, education, and training "RFDQ" (ISO/IEC 19796-1) will be explained in detail. In summary, the implementation and adaptation of the quality standard demonstrate its support for the quality development in e-Learning.

1. Quality Development in e-Learning

Quality development is a crucial task for education in general as well as for e-Learning. A long-term debate on quality development regarding the different quality issues, aspects and approaches has taken place (cf. Deming 1982; Juran 1951 and 1992; and for an overview Stracke 2006a). Here we focus on the special support that quality standards can provide and in this regard, we can only highlight the main characteristics of quality development and its relevance in e-Learning.

Quality development in its broad sense can be defined as follows (cf. Stracke 2006b):

Quality development covers every kind of strategy, analysis, design, realisation, evaluation, and continuous improvement of the quality within given systems.

Quality development needs a long process to be established and integrated throughout a whole organisation. Once started, it has to be a continuous ongoing circle to be successful. Quality cannot be described and fixed by a simple definition, because in itself quality is too abstract to have any impact. Therefore, quality has to be defined and specified according to the given context and situation considering the perspectives of stakeholders involved. It is important to identify the relevant aspects and requirements and to specify the suitable criteria. It is necessary to find a consensus amongst the different views and perspectives to gain a common understanding of quality for the given context and situation due to different and sometimes contradictory needs and definitions of quality by all stakeholders (Crosby 1980; Deming 1986; Donabedian 1980).

In this way quality awareness is the basic requirement for the adoption of quality development by all stakeholders from any organisation. But quality awareness will also be raised by the implementation of quality development on the other hand. To come to a sustainable integration of quality development within the whole organisation and to ensure the involvement of all stakeholders it is crucial to build a quality strategy and to integrate the quality objectives into the educational and business processes. Also the stakeholders' needs and responsibilities need to be integrated into the overall quality development.

The process of the adoption, implementation and adaptation of quality development can roughly be divided into three steps based on three different levels that need to be covered and addressed for a sustainable and long-term quality development (for the three level concept of the introduction of quality development cf. Stracke 2006b, Hildebrandt/Stracke/Jacovi 2006 and Stracke/Hildebrandt 2007):

- **Level of the individual person**
As the first step, the building of personal quality awareness has to be addressed. The objective is to ensure that every stakeholder knows what quality development means and is standing for.
- **Level of the organisation**
At the second step, the whole organisation has to be included to develop a quality vision and a common understanding of the quality objectives and the resulting mission statements. Individual quality awareness is the necessary base for this.
- **Integration of quality development involving all stakeholders**
The third step is looking for bringing the organisational vision and quality objectives into the educational and business process to become part of the daily business. The involvement of all stakeholders is important for ensuring their motivation and contribution.

In the following we will describe how quality standards offer a valuable support for the adoption and implementation of quality development: First, we will explain the benefits of quality standards in general; and second, we will discuss how quality standards support the quality development.¹

¹ Former research has shown that Support Systems especially designed for these purposes could be a strong and valuable help for all three levels and for the involvement of all stakeholders (cf. Hildebrandt/Stracke/Jacovi 2006 and Stracke/Hildebrandt 2007). The research findings presented here are partially results of the Quality Initiative E-Learning in Germany (Q.E.D.), the biggest e-Learning project in Germany running from 2004 to 2008, funded by the Federal Ministry of Economics and Technology (BMW) of Germany. The author expresses his sincere thanks to all his Q.E.D. colleagues for the strong and successful co-operation and especially to Barbara Hildebrandt. For more information online see: <<http://www.qed-info.de>>.

2. Benefits of Quality Standards

Quality standards are offering specific benefits for organizations, processes, and products. The quality standards themselves cannot guarantee high quality and success: it is always a question of the implementation and adaptation. Users of a quality standard will gain sustainable and significant advantages for their business if they are implementing and adapting the quality standard in a correct, appropriate, and long-term way that lives the idea of the quality standard.

Seven main benefits of quality standards can be identified in general. Those seven benefits are listed here and also explained in relation to the field of e-Learning.

Quality standards have got an impact in particular on the following seven factors:

1. **Competitiveness:**

Quality standards can increase the competitiveness: They allow the benchmarking of performance based on standards for a first or better comparison between e-Learning products and between e-Learning providers (enterprises as well as universities or schools).

2. **Economics:**

There can be strong and positive effects on the economics: Quality standards define clear processes and thus, they can lead to the reduction of failures during the analysis, design, production, and realisation of e-Learning.

3. **Motivation:**

The motivation can also be improved through given transparency and the involvement of all stakeholders required by the quality standards. That includes the customers that are in the field of e-Learning the learners and students who are gaining a better overview and understanding of the learning objectives and processes.

4. **Image:**

The internal and external image can benefit from quality standards: Their international acceptance effects the reputation and facilitates the marketing for e-Learning products and e-Learning providers.

5. **Planning reliability:**

Quality standards can increase the planning reliability: They allow a risk management by standardization. In e-Learning, that means the tested and evaluated high quality and business excellence of learning designs and learning processes including their re-use.

6. Customer orientation:

The customer orientation is required by quality standards: The e-Learning providers can establish an equal partnership with their customers, i. e. with the learners and students for better mutual understanding and relationship increasing the customer satisfaction.

7. Continuous improvement cycle:

One of the most important benefits of quality standards (if not the most important one) is the establishment of a continuous improvement cycle: By the introduction and realisation of a sustainable evaluation and consequent optimization according to the evaluation results, the e-Learning organizations, processes, and products can be improved continuously towards high quality and business excellence in e-Learning.

The following figure lists the seven main benefits of quality standards at a glance:



Figure 1: The seven main benefits of quality standards

In summary, quality standards have got the potential to improve the organizations, processes, and products leading to high quality and business excellence. The benefits for e-Learning could be characterised in brief: In the following, we will discuss the first ISO quality standard for learning, education, and training as well as how it supports the quality development.

3. Quality Standards for Quality Development

Quality does not exist in a simple manner as we have shown before. First, all stakeholders have to define their own understanding what the term “quality” is standing for in relation to the given context. Then these different perspectives and opinions about quality have to be combined, to be brought into consensus and transferred into practice. The specification of relevant aspects and criteria to define quality as well as the application of these criteria into the given context of the organisation are quite abstract by itself. For this purpose a common reference framework is needed. The standard **RFDQ (ISO/IEC 19796-1)**, **the first international quality standard for learning, education and training**, is providing such a common reference framework for educational processes and will be explained in the following.

The quality standard ISO/IEC 19796-1

The ISO/IEC 19796-1 standard was developed in consensus by the Working Group 5 "Quality Assurance and Descriptive Frameworks" of the standardisation committee ISO/IEC JTC1 SC36². This quality standard was issued by the International Standardization Organization (ISO) in 2005 and contains the reference process model "Reference Framework for the Description of Quality Approaches" (RFDQ) to support stakeholders in learning, education, and training especially regarding e-Learning to document and (re-)define their daily business and processes. We will show that the reference process model can serve as a valuable instrument for the implementation and establishment of quality development in learning, education, and training.

The structure of the reference process model:

The **reference process model** of ISO/IEC 19796-1 called RFDQ is the integration of the following two main reference models (cf. ISO/IEC 2005) that will be described in detail below:

- the **generic process model** and
- the **generic description model**.

² The abbreviation stands for: "International Organisation for Standardization (ISO)/ International Electrotechnical Commission (IEC) Joint Technical Committee 1 (JTC1) - Information Technology - Subcommittee 36 (SC36) - Information Technology for Learning, Education, and Training (ITLET)"; for more information online see: <<http://www.iso.org/jtc1/sc36>>.

The reference process model covers the whole lifecycle of learning, education, and training in general including e-Learning and blended learning. Therefore it can be used to describe any learning scenarios as well as any educational and vocational training product and learning solution. The reference process model can be characterised especially by the following aspects:

- **Integration:**
Any provider, producer, customer and user of e-Learning (and of any learning, education, and training solution) can use the reference process model. Therefore it provides a common reference framework for all stakeholders involved in learning processes.
- **Completeness:**
All processes of learning solutions, products, and organizations are addressed and covered by the reference process model. The reference process model can be adapted to any learning scenario by selecting only a subset or all of its processes.
- **Openness:**
There is no regulation or prescription of any procedures or methods to be used within the processes of the reference process model, but there is a need for the specification of their mutual relations and interdependencies, of the involved actors and of the metrics and measurements regarding the requirements of the given context of usage.
- **Adaptability:**
The sub-processes, objectives, and results of all the processes of the reference process model are individually adaptable and expandable. This allows users to specify and adapt the process model to any given learning and organisational context.
- **Uniqueness:**
The reference process model provides the basis for the first and unique ISO standard focusing on quality in learning, education, and training.

It is important to note that the reference process model does not include any regulations about the sequence of the processes or interdependencies between them as well as it does not give any instructions on its specific implementation in detail as a prescription or regulation.

The reference process model serves as an open descriptive framework that always needs the adaptation to the organisation, the learning context, and the given situation.

The two main reference models of the reference process model (the process model and the description model) will be described in the following for a better understanding of their implementation and adaptation.

The process model of ISO/IEC 19796-1:

The reference process model is based on the generic **process model** that is divided into seven process categories containing in total 38 processes. It is described by the following table:

ID	Category	Description	Processes
NA	Needs Analysis	Identification and description of requirements, demands, and constraints of an educational project	NA.1 Initiation NA.2 Stakeholder Identification NA.3 Definition of objectives NA.4 Demand analysis
FA	Framework Analysis	Identification of the framework and the context of an educational process	FA.1 Analysis of the external context FA.2 Analysis of staff resources FA.3 Analysis of target groups FA.4 Analysis of the institutional and organisational context FA.5 Time and budget planning FA.6 Environment analysis
CD	Conception / Design	Conception and Design of an educational process	CD.1 Learning objectives CD.2 Concept for contents CD.3 Didactical concept / methods CD.4 Roles and activities CD.5 Organisational concept CD.6 Technical concept CD.7 Concept for media and interaction design CD.8 Media concept CD.9 Communication concept CD.10 Concept for tests and evaluation CD.11 Concept for maintenance
DP	Development / Production	Realization of concepts	DP.1 Content realization DP.2 Design realization DP.3 Media realization DP.4 Technical realization DP.5 Maintenance
IM	Implementation	Description of the implementation of technological components	IM.1 Testing of learning resources IM.2 Adaptation of learning resources IM.3 Activation of learning resources IM.4 Organisation of use IM.5 Technical infrastructure
LP	Learning Process	Realization and use of the learning process	LP.1 Administration LP.2 Activities LP.3 Review of competency levels
EO	Evaluation/ Optimization	Description of the evaluation methods, principles, and procedures	EO.1 Planning EO.2 Realization EO.3 Analysis EO.4 Optimization/ Improvement

Table 1: The process model of ISO/IEC 19796-1

The process model (table 1) structures the lifecycle of learning processes, but it does not contain any prescriptions on the structures or procedures of how to deal with the stated processes.

The description model of ISO/IEC 19796-1:

The structure how to describe each of the processes is provided by the generic **description model** which is also part of the ISO/IEC 19796-1 standard. The description model defines a standardised way and a format how all processes belonging to the overall learning process should be described. The description model is not only a format for documenting the processes, but it also raises the attention of the stakeholders to aspects that have to be considered for defining the effected processes. Thus, it supports the users in reconsidering their current situation as far as it is related to the learning processes. The following table 2 shows the thirteen categories (attributes) of the description model which allow a consistent description of all processes from the process model:

Attribute	Description	Example
ID	Unique Identifier	ID1234
Category	Main Process	Course Development
Process Name	Process name	Method selection
Description	Description of the process	Within this process the didactic concept and methods are evaluated and selected
Relations	Relation to other processes	Before the method selection a target group analysis must be performed; FA.6
Sub-processes / sub-aspects	Sub-processes / sub-aspects / tasks	Method identification, method alternatives, method prioritisation
Objective	Objective of a Process	Adequate selection of one or more didactic concepts
Method	Methodology for this process Reference to guideline / documents	Method selection shall be based on the target group. Methods are selected based on the teachers' experience. See Method Guidelines Handbook
Result	Expected result of a process	Method specification Documents
Actors	Responsible / participating actors	Team Didactical Design
Metrics / Criteria	Evaluation and Metrics for this process	Criteria catalogue 3.2.2-3.2.6
Standards	Standards used	DIN EN ISO 9241, IEEE 1484.20.1:2007 Reusable Competency Definitions
Annotation / Example	Further Information, Examples of usage	See evaluation results from 2008 in the document: "ID1234_evaluation_results_2008.pdf"

Table 2: The description model of ISO/IEC 19796-1

For the combination of both generic models, each selected process of the reference process model (table 1) has to be described according to the criteria from the description model (table 2). This integration of the two models results in the complete reference process model of the ISO/IEC 19796-1 standard covering seven process categories and 38 processes. First, a selection of appropriate processes from the process model has to be made depending on the current context of usage; and second, each of the selected processes needs to be specified in detail according to the description model. Thus, the reference process model provides a common basis for defining processes, a discussion basis for the involved actors as well as a guiding framework of aspects to be considered and specified in a given learning and organisational context. This process of implementing and adapting the ISO/IEC 19796-1 standard in practice will be described in the following.

4. Adoption, implementation, and adaptation

The ISO/IEC 19796-1 reference process model is a generic model: This means that it cannot simply be implemented and used as it is, but instead it has to be adapted to every specific context of usage. In this chapter we will describe the process of implementing and adapting the reference process model of the standard in practice based on first gained experiences.

In the implementation process of quality development based on the reference model of the quality standard ISO/IEC 19796-1, an individual selection of processes, which are applicable, has to be made and each of the selected processes has to be specified according to the current situation. During this adaptation, the specific requirements and objectives of the current situation are considered and thus, become part of the model.

Since the process model covers any learning processes, it is applicable to any application scenario. Each scenario has got specific characteristics and focal points. In the planning phase of a learning opportunity (product or solution), the model provides valuable support especially for the analysis of the needs and the requirements. The reference process model supports customers defining a call for biddings as well as providers customising corresponding learning opportunities. In the development phase of learning contents, the model can be helpful for the design of a learning opportunity as well as for selecting and implementing an appropriate infrastructure. Moreover, the model also supports the production, implementation and realisation of learning opportunities as well as the continuous evaluation just from the beginning.

To achieve a holistic quality development the needs and requirements of all stakeholders of the current learning scenario have to be considered (Feigenbaum 1986; Ishikawa 1985; Soin 1992). This perception is also valid for the adoption and introduction of the reference process model: A strong procedure systematically planned is needed for adapting the reference process model of the standard ISO/IEC 19796-1 to a specific organisation including all stakeholders. Therefore simple to use quality tools can deliver helpful support.

The introduction of the reference process model of the standard ISO/IEC 19796-1 can simplified be divided into the following two main steps:

1. Creating a context-specific quality profile

The term *quality profile* defines a selection of processes of the 38 overall processes of the reference process model which are relevant for the specific context of usage and thus, need to be considered. All processes of the process model need to be analysed by involving the different perspectives of the stakeholders with the aim to identify the relevant and applicable processes. For all processes which are considered to be not applicable to the given situation, a justification for this choice needs to be provided during the analysis phase. This analysis procedure ensures that first, the stakeholders get to know the reference process model in general, that second, they start to get a better understanding of the

processes of their daily business; and that third, they get a first insight into the complex field of quality development and how to break it down into small and manageable parts. Only a subset of the 38 processes of the generic process model will be applicable in most of the cases, but of course there also occur situations where all of the processes will remain part of the individual quality profile. Discussing the process model with all stakeholders ensures that a well fitting quality profile as an individual model of the processes with regard to the current situation is developed which is on the one hand complete and on the other hand not excrement.

2. Specifying the individual process descriptions

After the development of the individual quality profile, this originated individual model has to be filled with organisation-specific descriptions of each of the selected processes according to the description model of the standard ISO/IEC 19796-1.

First, every process needs to be described and thus defined. In this phase, the description and the thoughts about the business processes contribute to raising quality awareness on the level of each involved actor as well as on the level of the organisation and how to integrate quality measures into the learning and business processes. The definition and selection of appropriate quality means as well as the commitment and general agreement on corresponding instruments, measures, and metrics need special attention. They are the base for the realisation of the objectives and outcomes of each process ensuring their measurements. An organisation that has already implemented an explicit quality management system can import and integrate its existing process descriptions into the quality profile. Quality development is an ongoing and continuous process: Therefore the quality profile (which means the individual selection of processes from the process model which have been considered to be important for the current scenario) as well as the process descriptions of each of the selected processes have to be analysed and evaluated according to their appropriateness. The more experience a user and the organisation are gaining in quality development and quality management, the more appropriate and complete the results of the used methods and instruments of quality management will become leading to a continuous improved quality development.

In the meantime, the second quality standard of the standard family ISO/IEC 19796 has been developed by ISO/IEC JTC1 SC36/WG5 and was approved and published in 2009: ISO/IEC 19796-3 is the Part 3 "Reference Methods and Metrics" (cf. ISO/IEC 2009) that extends the reference framework for the description of quality approaches (RFDQ) defined in ISO/IEC 19796-1 by providing a harmonized description of the methods and metrics required for the implementation and adaptation of the quality standard RFDQ (ISO/IEC 19796-1). Thus the second quality

standard ISO/IEC 19796-3 is a strong and valuable instrument for the implementation and adaptation of the first quality standard ISO/IEC 19796-1 and in particular for this second step of specifying the individual process descriptions.

The reference process model of the quality standard RFDQ (ISO/IEC 19796-1) can be used for different tasks and in different situations. The reference process model supports organisations especially concerning the following three tasks and objectives:

- **Introducing and documentation of innovative process-oriented quality management**

In the case that there has not yet been implemented any explicit quality strategy throughout an organisation, the reference process model serves as a starting point to quality development in this organisation by providing support for introducing and implementing quality development for learning processes and educational and vocational training.

- **Analysis of an established quality management system**

If there is already an established quality management system focusing on educational and vocational training throughout an organisation, the reference process model allows the organisation to examine and analyse its quality development regarding the quality vision and the quality objectives of the organisation and their completeness.

- **Re-Design of processes and change management**

Since the reference process model contributes to the quality awareness of individuals as well as of the whole organisation, it can also support the evaluation and if appropriate, the (re-)design of the established quality management system in the sense of a broad change management towards sustainable quality development.

Summary and Future Prospects

In this research study, we have presented and analysed the meaning and the relevance of quality development and quality standards (in general and in the field of e-Learning) by highlighting their potentials and benefits and in combination with guidelines for the implementation of the first international quality standard for learning, education, and training RFDQ (ISO/IEC 19796-1).

Quality development is always depending on the given situation. The definition of quality development was introduced and the benefits of quality standards were explained in general and in particular relation to e-Learning. The establishment of a continuous improvement cycle could be identified as one main important benefit and the involvement of all stakeholders as one main aim for the introduction of quality development. It has been shown that quality standards are offering a valuable support for the adoption and implementation of quality development. Especially the first international quality standard for learning, education and training ISO/IEC 19796-1 was described in detail: It is an appropriate means for the adoption and implementation of a sustainable quality development that is covering all learning and business processes. We have pointed out the main tasks and potentials for its adaptation that is always needed for gaining an overall quality development with continuous improvement. Until now only promising experiences were gained by the implementation of ISO/IEC 19796-1: It is the demand of further research to evaluate the long-term benefits of the quality standard in practice.

In summary, it can be stated that the first quality standard for learning, education, and training ISO/IEC 19796-1 is a suitable and valuable instrument for the introduction and implementation of sustainable quality development in e-Learning as well as in learning, education, and training in general.

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