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# Quality Development and Quality Standards in e-Learning: Adoption, Implementation, and Adaptation

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**Abstract:** This article focuses on quality development for e-Learning and education and on appropriate instruments. Based on the given definition of quality development the ways to introduce and improve it are analyzed by the presented three level concept of quality awareness, quality strategy and finally quality development: Quality standards are supporting the implementation of quality development throughout the whole organization. Especially the new standard for quality management and assurance in learning, education, and training ISO/IEC 19796-1 offers a promising potential for the raise of quality awareness and the involvement of all stakeholders. Its implementation is described by pointing out the need for its adaptation to the specific situation of usage.

## Introduction

e-Learning has to face two main challenges today: The demand for overall interoperability, and the request for a certain quality. This contribution will focus especially on the tasks and potentials of the quality development and on appropriate instruments. The leading question is: "How to implement and improve quality development in e-Learning?" We will provide an overview on quality development in general followed by the introduction of our three level concept for quality development. Based on this general understanding we will introduce quality standards as an appropriate means for quality development. Finally, the first quality standard for learning, education, and training issued by the ISO (International Standardization Organization) will be explained as a valuable instrument showing its support for the quality assurance and quality management in e-Learning.

## Quality Development in e-Learning

In this chapter the term quality development is defined first. Then we will introduce our three level concept for the adoption, implementation, and adaptation of quality development in e-Learning.

A long-term debate on the quality issues, aspects and approaches has taken place that cannot be repeated here (Deming 1982; Juran 1951 and 1992; and for an overview Stracke 2006a). In this contribution we focus only on the main characteristics of quality development and its relevance in the field of e-Learning.

Quality development can be defined as follows (Stracke 2006b):

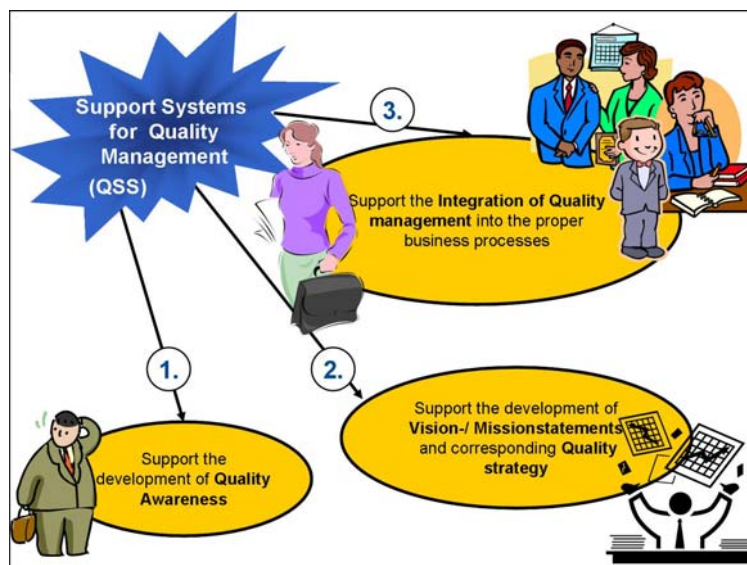
**Quality development** covers every kind of measurement, assurance, optimization, and continuous improvement of the quality within given systems.

For the establishment and integration of quality development throughout a whole organization a long process is needed, which, once started will remain an ongoing procedure to be successful. Quality cannot be defined per se, because in itself it is too abstract to have any impact. Therefore, in any given context it has to be defined and specified what the stakeholders understand by quality. Relevant aspects and requirements have to be identified and made concrete by specific criteria. Since the different stakeholder's needs and definitions of quality will often be contrary, it is also necessary to find a consensus amongst the different perspectives and aspects to gain a common understanding of quality for the given context (Crosby 1980; Deming 1986; Donabedian 1980).

The process of quality development can roughly be divided into three steps indicating three different levels which need to be involved and considered for a holistic and effective quality development:

- *Level of the individual person* (e. g. decision-maker, operational staff, learner): At this level the individual stakeholders of educational processes within or related to an organization are addressed to build personal quality awareness. Therefore, each individual user should be provided with prepared and contextualized information and educational material on quality development related to the user's current situation so that she or he builds and raises her/his own quality awareness gaining experience and expertise on quality.
- *Level of the organization*: At this level the focus is on the whole organization. Based on the quality awareness of all stakeholders from the step before (level of the individual person), a vision and mission statements, quality objectives, and a corresponding quality strategy will be defined. These definitions are the basis for all further activities in the field of quality development for this organization. The organization's activities on finding and defining a quality vision and quality objectives (e. g. workshops, brainstormings, discussions) will further contribute to each involved stakeholders' quality awareness. On the other hand, a certain amount of quality awareness as well as quality experience is a precondition for this step. In most cases, the initial input for these activities results from a quality expert (management or external consultant).
- *Integration of quality development involving all stakeholders*: After the organization has defined its quality vision and quality objectives and a corresponding quality strategy was chosen, these in itself abstract means have to be applied to the organization's processes. It is crucial, that all stakeholders understand their roles and their contributions to the organization's success. At this level the organizational definitions from the step before are communicated to all stakeholders and corresponding concrete quality management instruments and measures have to be applied to all educational and business processes. The stakeholders have to be involved in all processes concerning the quality development to get an understanding of its importance and impact. Therefore it is crucial to integrate the quality development objectives into the educational and business processes as well as to integrate the needs and responsibilities of all stakeholders into the overall quality management. A meaningful definition and documentation of the organization's educational and business processes is the basic point to start any activities concerning quality development.

Therefore quality awareness is on the one hand the basic requirement for the quality development adoption and on the other hand the (first) result of the quality development implementation. On all three levels quality development can be supported by especially designed computer-based tools. The results of the former research have led to the category of "Support Systems for Quality Management (QSS)" for the enhancement of the quality management and its impact on the before mentioned three levels of quality development (Hildebrandt; Stracke; Jacovi 2006):



**Figure 1:** The three steps of quality development and the role of support systems for quality management

## Quality Standards for Quality Development

In the previous paragraph it was shown that quality does not exist “per se”, but that first, it has to be defined what the stakeholders understand by the term “quality” in a given context and second, this understanding of quality aspects has to be transferred into practice. Since both, defining the aspects and criteria to define quality on the one hand and regarding these criteria in a context of usage on the other hand are quite abstract by itself and since many different perspectives have to be brought into consensus, a common reference framework is needed. Such a common reference framework for educational processes is provided by the new standard ISO/IEC 19796-1. In the following, this first quality standard for learning, education, and training will be introduced.

### The new quality standard ISO/IEC 19796-1

The ISO/IEC 19796-1 standard was developed by the Working Group 5 "Quality Assurance and Descriptive Frameworks" of the standardization committee ISO/IEC JTC1 SC36<sup>1</sup>. The quality standard contains the reference process model "Reference Framework for the Description of Quality Approaches" (RFDQ) to help stakeholders in learning, education, and training and especially in e-Learning or blended learning to document and (re-)define their everyday business and processes. It will be shown that the reference process model can serve as a valuable instrument for the implementation and the 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 is the integration of two main reference models which both will be described in the following (cf. ISO/IEC 2005):

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

The reference process model covers the whole e-Learning or blended learning lifecycle and thus can be used to describe any educational scenarios. The model itself can be distinguished by the following characteristics:

- *Integration:*  
The reference process model can be used by providers, producers, customers, and users of e-Learning and of educational and vocational training. Thus it provides a common reference framework for all stakeholders involved in educational processes.
- *Completeness:*  
The reference process model covers all processes of educational projects and educational offers. By selecting only a subset or all of its processes the model can be adapted to any educational scenario.
- *Openness:*  
The processes of the reference process model do not prescribe any procedures or methods, but instead have to be specified according to their mutual relations and interdependencies, involved actors and metrics regarding the requirements of any given context of usage.
- *Adaptability:*  
The sub-processes, objectives, and results of each of the processes of the reference process model are individually expandable. This allows users to adapt the process model to any educational context.
- *Uniqueness:*  
This reference process model provides the basis for today's only ISO standard especially focusing on quality in educational and vocational training.

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<sup>1</sup> The abbreviation stands for: "International Organization 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)"; more information online: <http://www.iso.org/jtc1/sc36>

It is important to note that the reference process model does not include any temporary sequences or given interdependencies nor any specifications on the implementation. It serves as an open descriptive framework that needs always to be adapted to the organization and the given situation.

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

ID	Category	Description	Sub-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 organizational 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 Organizational 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 Organization 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 educational processes, but it does not provide any structures or procedures how to deal with the stated processes. This functionality is provided by the generic *description model* which is also part of the ISO/IEC 19796-1 standard. The description model defines a standardized way and format

how each of the processes which are forming a whole educational process should be described. The description model does not only provide a format for documenting the processes, but it also raises the users attention to aspects which should be considered for (re-)defining effected processes. Again, the model does not intend to prescribe any procedures and methods, but it supports the user in reconsidering her or his current situation as far as it is related to educational processes. The following table 2 presents the 12 categories 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 prioritization
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 1484.12.1:2003 Learning Object Metadata
Annotation / Example	Further Information, Examples of usage	

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

In combining both models, each of the processes of the reference process model (table 1) is 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. Depending on the current context of usage a selection of appropriate processes from the process model is made and each of the selected processes is specified in detail according to the description model. Thus, the reference process model provides a basis for defining processes, a discussion basis for involved actors as well as a guiding framework of aspects to be considered and specified in a given educational context. This process of using the ISO/IEC 19796-1 standard in practice will be described in the following section.

## Adoption, implementation, and adaptation

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

In the process of implementing quality development based on the ISO/IEC 19796-1 reference model 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. In doing so, the specific requirements and objectives of the current situation are considered and thus become part of the model.

Since the process model covers any educational processes it is applicable to a great variety of application scenarios. Each of these scenarios will have specific characteristics and focal points. In the phase of planning an educational offer the model might provide helpful support especially for the analysis of needs and requirements, for a call for biddings by customers and for customizing corresponding offers by providers. In the phase of developing educational contents the model can be used for the design and production of an educational offer as well as for selecting and implementing an appropriate infrastructure. Moreover, the model also supports the implementation and realization of educational offers as well as the continuous evaluation just from the beginning.

In the sense of a holistic quality development the needs and requirements of all stakeholders of the current educational scenario have to be considered (Feigenbaum 1986; Ishikawa 1985; Soin 1992). This is also valid for the adoption and introduction of the reference process model: For adapting the reference process model of the ISO/IEC standard to a specific organization including all stakeholders a systematic planned procedure is needed, whereby simple to use quality tools can deliver helpful support.

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

1. *Creating a context-specific quality profile*

In this context 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. Involving the different perspectives of the stakeholders all processes of the process model need to be analyzed and the relevant and applicable processes have to be identified. For any process which becomes considered to be not applicable during this analysis phase a justification for this choice needs to be provided in the following. This analysis procedure ensures that the stakeholders first get to know the process model in general, second start to get a first understanding of the processes of their everyday business and third get a first insight into the complex field of quality development and how to break it down into manageable pieces. In most of the cases only a subset of the 38 processes of the generic process model will be applicable, but of course there also might occur situations where all of the processes will remain part of the individual quality profile. Discussing the process model with all stakeholders ensures that an individual model of the processes of the current situation is developed which is on the one hand complete and on the other hand not excrescent.

2. *Specifying the individual process descriptions*

After the individual quality profile has been created this originated individual model has to be filled with organization-specific descriptions of each of the selected processes according to the description model of the ISO/IEC standard. In a first step each of the processes needs to be described and thus defined. In this phase describing and thinking about the way business is done contributes to raising quality awareness on the level of each involved actor as well as on the level of providing ideas how to integrate quality measures into the educational and business processes. The definition and selection of appropriate quality means as well as the agreement on corresponding instruments, measures, and metrics need special attention. They are the basis to realize the objectives and outcomes of each process ensuring their measurements. Organizations that have already implemented an explicit quality management system can import and integrate their existing process descriptions into the quality profile. Since quality development is an ongoing and continuous process both, the quality profile (which means the selection of processes of 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 examined according to their appropriateness. The more experience

a user and the organization gain in quality development, the more appropriate and complete the results of using methods and instruments of quality management will become.

Organizations can use the reference process model of ISO/IEC 19796-1 for different tasks and in different situations. Especially, the reference process model supports the following tasks:

- *Introducing and documentation of innovative process-oriented quality management:*  
If there has not been implemented any explicit quality strategy so far in an organization, the reference process model will serve as a starting point to quality development in these organizations by providing support for introducing and implementing quality development for educational and vocational training.
- *Analysis of an established quality management (system):*  
In case there is already an established quality management focusing educational and vocational training within an organization, the reference process model allows these organizations to reconsider and analyze their quality development regarding the organization's quality objectives and their completeness.
- *Re-Design of processes and change management:*  
Since the process model contributes to the individuals as well as to the organization's quality awareness it can also serve as an input for the examination and if appropriate for the (re-)structuring of the established quality management in the sense of a broad change management towards sustainable quality development.

## Summary and Future Prospects

In this article it was shown that quality development is always depending on the given situation. The three level concept (quality awareness, quality strategy and quality development) could describe the main steps for the adoption and introduction of quality development by involving all stakeholders. Quality standards are offering a valuable support for the implementation of a sustainable quality development. The first new quality standard for learning, education, and training ISO/IEC 19796-1 was presented as an appropriate means covering all educational and business processes. The implementation and necessary adaptation of the standard was explained pointing out the main tasks and potentials for the long-term quality development. Promising experiences were gained by the implementation of ISO/IEC 19796-1. The future has to show the long-term benefits of the new quality standard in practice as a suitable instrument for continuous and sustainable quality development.

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