

# Total Quality Management (TQM) framework for e-learning based on EFQM and Kirkpatrick models

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**Abstract**— The EFQM excellence model is a famous quality management tool. We have translated it to be useful in e-learning quality management. EFQM will be used as a framework for self-evaluation. We developed the e-learning stakeholder model. We identified the main criterion and positioned them in the stakeholder model.

We present short the Kirkpatrick evaluation model of e-learning. We developed a Kirkpatrick-EFQM self-assessment framework. We propose the limited learner-centric self-assessment framework. A preliminary set of quality criteria have been identified for self-assessment by the learners.

**Index Terms**—e-learning, Kirkpatrick, TQM

## I. INTRODUCTION

It is challenging to support and enhance quality management in e-learning. The need for quality management in e-learning has risen since the use of e-learning has expanded. Expanding the use of e-learning has put pressure in changing the organisation, processes and services in education. More emphasis has to be put on the quality of operations and contents of teaching and learning, online learning materials and pedagogic and technical support services for e-learning.

We have to find answers on the following questions: how is quality defined, How can quality be assessed? How can quality be embedded in the existing operational procedures of the learning organisation? What kind of quality management system can be implemented? In this paper we focus on the assessment of quality.

The EFQM excellence model is a famous quality management tool. EFQM will be used as a framework for self-evaluation. We identified the main enabling criterion and positioned them in a stakeholder enable model. We built our stakeholder self-assessment model upon the Kirkpatrick evaluation model. A set of quality criteria will be identified to set up the self-assessment questionnaire by the learners.

## II. THE QUALITY- AND EXCELLENCE MODEL OF E-LEARNING

### A. Introduction: Quality Management in E-learning

The same principles apply to quality of e-learning as in the quality of teaching and learning in general. However, there are some special characteristics in e-learning that need to be specified. Quality management has to cover three areas, first the teaching and learning, including the organization of the learning process, second the learning content and third the pedagogical and technical support for e-learning including equipment and facilities. Quality criteria have to be defined for those three areas.

### B. The Stakeholders

We focus on the learning/training organization or more specific on the learning department of a company or an institute, that is organizing the learning activities and also the e-learning activities for the staff of all the other company departments.

All stakeholders request some services from the learning department. Those are all stakeholders of the e-learning activity.

To become excellent, the learning department has to balance and satisfy the needs of all relevant stakeholders. The stakeholders consist of the company management, all company departments to which the learners belong, the individual learners, the suppliers of all learning resources. The customers of the company are involved in an indirect way because training will have an impact on the product quality.

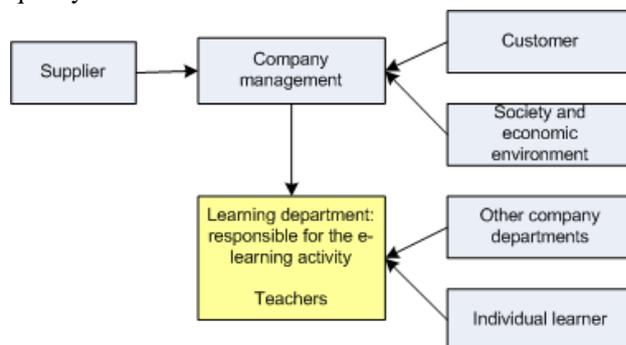


Figure 1. The stakeholder model

### C. Some Fundamental Concepts of Excellence

#### 1. Results orientation:

A first result the learning organization has in view is to enhance the knowledge of the learners. An excellent learning content has to be delivered and the learning process has to be organized in an optimal way, taking care of some built in interaction, of an attractive user interface and of the organization of an effective tutoring. The e-learning solution has to fit the learning objectives that are set forward by the learner and the learner's department. A second result must be that the learner will retain and transfer back the new knowledge and skills on the job. Will the learners change their behaviour as a result of new learning? As an example a representative has participated in a sales training program and has changed his attitude. Namely if a prospect did not buy anything, the representative will end the contact with specific future action steps. A third result is the business impact of the training of the staff member. As an example if the maintenance staff is better trained in the technology of their product, the number of calls to the help desk will decrease.

#### 2. Client focus:

The direct clients are the learner and the learners department. The indirect clients are the company management and the customers of the company. The clients are the final arbiter of product and service quality. The basic element of quality management is taking the viewpoint of the client and the processes. Operational quality and processes from the point of view of the learner, the manager, ...

#### 3. A strategy of continuous learning, innovation and improvement will lead to excellence

Organizational performance is maximized when it is based on the management and sharing of knowledge within a culture of continuous learning, innovation and improvement. Management must be aware of new and innovative products, technologies and methods. New product design and at the same time optimized production processes will result in excellence. The innovation and the improvement are also situated in the learning department. The adoption of up to date learning content must be delivered and new learning concepts and tools will optimize the learning process of the learners.

### III. THE EFQM EXCELLENCE MODEL IN E-LEARNING

#### A. The EFQM Excellence Model

Regardless of sector, size, structure or maturity, to be successful, organizations need to establish an appropriate management framework. The EFQM Excellence Model is a practical tool to help organizations do this by measuring where they are on the path to excellence, helping them understand the gaps and then stimulating solutions. The

EFQM model is based on some fundamental concepts or characteristics of excellence

The EFQM Excellence Model is a non-prescriptive framework based on 9 criteria. Five of these are 'Enablers' and four are 'Results'. The 'Enabler' criteria cover what an organization does. The 'Results' criteria cover what an organization achieves. 'Results' are caused by 'Enablers' and 'Enablers' are improved using feedback from 'Results'. Each of the nine criteria has a definition, which explains the high level meaning of that criterion. To develop the high level meaning further, each criteria is supported by a number of sub-criteria. Those pose a number of questions that should be considered in the course of an assessment. For example in the criteria leadership, focus is on the way management can motivate and stimulate the organization to evolve to continuous improvement. Some questions: How is management engaged in creating a culture of continuous improvement? How is management supporting the improvement activities? How is management evaluating and motivating the staff?

The EFQM Model is presented in diagram form below. The arrows emphasize the dynamic nature of the Model. They show innovation and learning helping to improve enablers that in turn lead to improved results

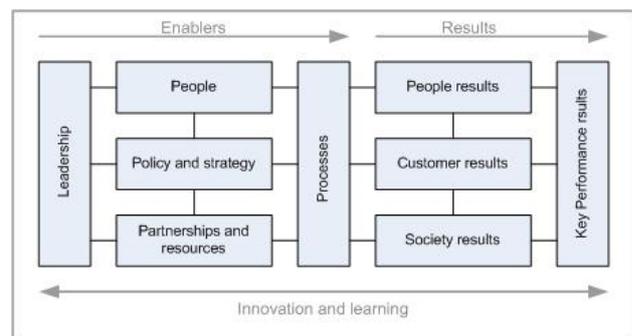


Figure 2. The EFQM excellence model

The EFQM model is a tool that organizations may use for the following purposes, among others:

- as a framework for *self-evaluation* that enables an organization to identify its strengths and areas for improvement and the extent to which its operations and results are in line with the characteristics of an excellent organization;
- As a way to *Benchmark* with other organizations
- As a guide to identify areas for *Improvement*

The Model's 9 boxes represent the criteria against which to assess an organization's progress towards Excellence. To develop the high level meaning further each criterion is supported by a number of criterion parts. Criterion parts pose a number of questions that should be considered in the course of an assessment.

**B. The EFQM Model in the E-learning Organization**

The enabler criterion:

1. *Leadership*: the promotion and support of a culture of innovation and continuous improvement.
2. *Policy and strategy*: career guidance for the staff and a training plan to support it.
3. *People management*: learning has to be promoted.
4. *Resources*: management of staff, buildings, materials, intellectual and information resources on an effective and efficient way, to contribute to learning, attainment and improvement in the organization.
5. *Processes*: taking care for improvement of learning and teaching processes.

The results criterion:

6. *Client satisfaction*: meeting the needs and expectations of the stakeholders
7. *People satisfaction*: meeting the needs and expectations of the learning organization /department, responsible for the learning process.
8. *Impact on society*: leadership in adoption of advanced and innovative learning concepts and e-learning solutions.
9. *Impact on the company's success*: the business impact of the training of the staff members.

**IV. EFQM SELF ASSESSMENT**

**A. Introduction**

Following EFQM, the process of self-assessment is a catalyst for driving business improvement. EFQM self-assessment can be defined as being a comprehensive, systematic and regular review by an organization of its activities and results referenced against the EFQM Excellence Model. The self-assessment process allows the organization to discern clearly its strengths and areas in which improvements can be made and culminates in planned improvement actions that are then monitored for progress. Organizations have enjoyed various benefits as a result of undertaking self-assessment using the EFQM excellence model.

**B. How to do Self-Assessment**

There is no definitive answer to the question “which technique is the right one for my organization? There is no single “right” way to perform self-assessment. We adopted the questionnaire approach. This technique can be one of the least resources intensive and can be completed very quickly. It is an excellent method for gathering information on the perceptions of people within an organization. Some organizations use simple yes/no questionnaires, others use slightly more

sophisticated versions that use a rating scale. Self-assessment using standard questions designed to get the organization started thinking in terms of process improvement. Questionnaires can also be used to facilitate group discussions about improvement opportunities and to inform management workshops. In some situations another evaluation method would be more effective, or maybe a mix of more methods can be recommended.

In each case the evaluation will be based upon a set of quality criteria. A set of quality criteria has to be defined for each evaluation activity.

**C. Questionnaire**

A questionnaire has to be developed. A set of sub-criteria has to be identified for each main criterion. A question will be formulated for each sub-criterion. We prefer questions with a multiple answer or rating scale corresponding 4 phases of growth to excellence.

The learner has to decide on 3 points, first on the relevance of the aspect, second on their phase of growth, and third on the phase they have in view. An example is shown in the figure.

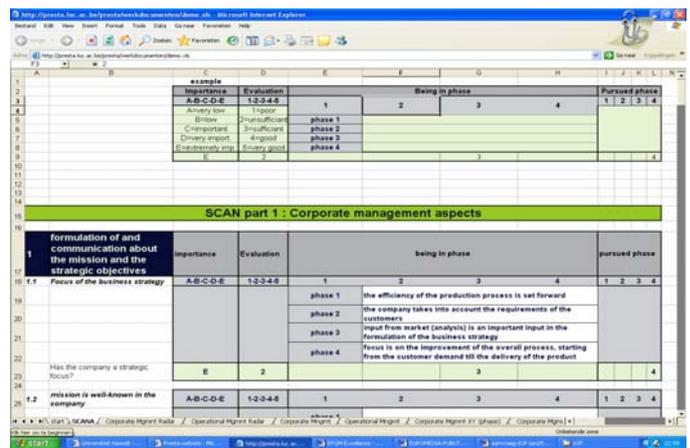


Figure 3. EFQM questionnaire

**D. Kirkpatrick Evaluation Model**

D. Kirkpatrick presented a four-level model of evaluation, that can be applied to traditional way of learning and also to e-learning.

This model is composed of 4 levels of quality evaluation of e-learning.

1. student's reaction
2. learning results
3. impact of learning on functioning in the workplace
4. impact on business results

1. Students' reaction: students are asked to evaluate the training after completing the program.

First is asked how well they like the training. But other questions are about the relevance of and the fitting to the objectives, the quality of the included interactive exercises, the ease of navigation, ...

2. Learning results: has the learner increased his knowledge of the topic? What about the achievement?

3. Behaviour in the workplace: Are any of the new knowledge and skills retained and transferred back on the job? Is the student's behaviour changed as a result of new learning?

4. Business results: the evaluation of the business impact of the training must be measured.

A set of quality criteria or self-evaluation topics have been identified. Quality of learning criteria can be linked with the first two evaluation phases "students' reaction" and "learning results". Impact of learning is linked with the last two evaluation phases "behaviour in the workplace" and "business results".

*E. Kirkpatrick-EFQM Self-Assessment Framework and the TQM Model for E-learning*

The following Kirkpatrick-EFQM self-assessment framework is a fusion of the two models EFQM and Kirkpatrick.

The learning department is responsible for the organization of the e-learning activities. All stakeholders request some services from the learning department. To become excellent, the learning department has to balance and satisfy the needs of all relevant stakeholders. In the center of the framework we put the 4 levels of Kirkpatrick. We split them in the first two levels being the *learner centric levels* (yellow) and the two others being the *environment centric levels* (green). The EFQM main criteria (in blue) are linked with them via dotted lines.

The stakeholders are put around the frame. Their requirements are linked with the EFQM criterion parts via arrows.

The EFQM total quality model (TQM) for e-learning has been transformed to our Kirkpatrick-EFQM self-assessment framework. The self-assessment must be focused on the requirements as set forward by all stakeholders. Company management and the learning department have to take responsibility for quality assessment on these criteria. Several stakeholders can participate in the evaluation activity. The learner can partly take up the role of evaluator. Especially the resources and the processes can be evaluated by the learner. The assessment of the quality of e-learning must be done by the internal stakeholders of the e-learning activity of the company:

1. Company management and the learning department: leadership, policy and strategy
2. learning department and learner: the sources especially the learning system

3. learner: the resources and the processes and all aspects of the learning process
4. learning department: the process of development of e-learning solution
5. company management and other company departments: impact of learning
6. Company management is responsible for the evaluation of the fulfillment of the requirements of the external stakeholders.

But in most cases evaluation will be limited to the learners evaluation task.

**V. EVALUATION OF E-LEARNING BY THE LEARNER AND THE LIMITED LEARNER CENTRIC SELF-ASSESSMENT FRAMEWORK**

In most cases evaluation will be limited to the learners evaluation task and so the TQM model will be limited to a subset of criteria, namely those that can be measured by the learner.

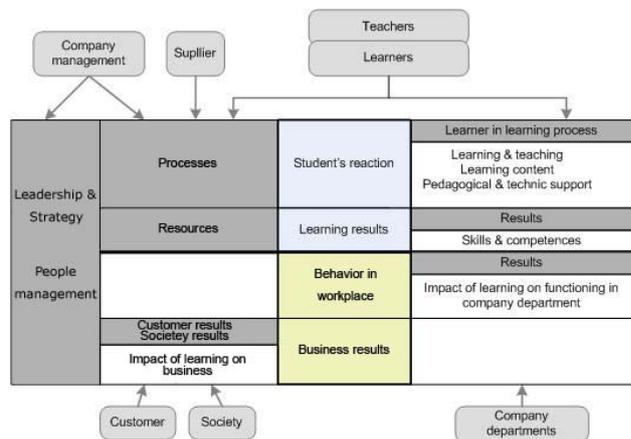


Figure 4. Kirkpatrick-EFQM self-assessment framework (1) the process of development of e-learning courses. If the learning department is developing its own e-learning courses, than the development process has to be evaluated too.

In that case, the evaluation itself is limited to a subset of the EFQM criteria domains. Some examples are the learning content, the learning process and the resources on point of infrastructure and organisation of the learning process activities.

To identify the set of quality criteria we must take into account all the requirements of the stakeholders. But we will limit our framework. (figure 5) The learner can fulfill the role of evaluator of all aspects of the first two levels of Kirkpatrick, combined partly with the processes and resources domains of EFQM.

However the impact of learning can best be evaluated by company management and the company departments to which the learners are belonging. On company level evaluation could be made of the other EFQM domains.

If the learning department is developing its own e-learning course, than the development process has to be

evaluated by the learning department itself. Other learning resources are included in the quality of the learning process and will be evaluated by the learner.

Processes	Student's reaction	Learner in learning process Learning & teaching Learning content Pedagogical & technic support
		Results Skills & competences
Resources	Learning results	

Figure 5. Limited learner centric self-assessment framework

## VI. SOME EXAMPLES OF QUALITY CRITERIA

From the EFQM we adopt the (learning) resources and the enabling (learning) process criteria. The student's reaction and learning results can be seen as the results (learning) process criteria.

We structure the criteria into those three main criteria categories.

We structure the main criteria categories into a number of main criteria and for each of them into a set of sub-criteria.

<b>RESOURCES</b>
<b>1. Technology Infrastructure</b>
1.1 Server
1.2 Meets needs of users
1.3 Meets needs of learning resources
1.4 Technical support available
1.5 Technology matches that of the organisation
<b>2. The electronic Learning Environment</b>
2.1 Space & facilities
2.2 Accessibility
2.3 Privacy
2.4 Facilities
2.5 Maintenance of facilities
<b>3. The physical learning Environment</b>
3.1 Space & facilities
3.2 Accessibility
3.3 Privacy
3.4 Facilities for disabled
3.5 Maintenance of facilities
<b>4. Learning Resources (materials)</b>
4.1 Availability : promised resources were there at the right time

4.2 : Easyness of use (ergonomy, graphics ...)
4.3 Accuracy : Materials available match needs
4.4 Materials are up to date
4.5 Use of the various media 's pertinence
4.5 quality of the pedagogical approaches
4.6 Diversity : good catalogues of materials
4.7 Selection procedure
4.8 Feedback gathered on all materials
<b>5. Information</b>
5.1 Meets needs of users
5.2 Accurate and updated
5.3 Confidential information kept secure

<b>PROCESSES (enabling and results)</b>
<b>1. Cognizance of learning program and registration process</b>
1.1 Learning courses portefolio
1.2 Promotion
1.3 Advice and guidance in decision of learner on point of which courses to select
1.4 Contractualisation
1.5 Welcome and orientation in learning provision
<b>2. Learning process: setup and use of L.E. and learning systems and e-courses</b>
2.1 Setup and management of learning environment
2.2 Assistance in ICT use for the user
2.3 Help desk
<b>3. Learning process: self-paced learning of e-learning content</b>
3.1 Facilitating self-learning
3.2 Learning content
3.3 e-learning courses built on pedagogical concepts, delivering the learning content
3.4 Individualised pathway for learning, organised by the teacher
3.5 Personal learning pathway setup by the learner himself
3.6 Support of the learner
3.7 Measuring of the progress of the learner and provision of feedback and advice in the continuation of the process
3.8 Evaluation of the provision
<b>4. Blended learning/ integration of face to face learning and e-learning</b>
4.1 Structuring of learning path of course, the

organisation of a learning scenario of different learning activities
4.2 Scheduling
4.3 Help to learn effectively
<b>5. Collaborative learning</b>
5.1 Formulation of objectives
5.2 Provision of tools
5.3 Provision of adequate methodology
5.4 Assistance
<b>6. Individual assimilation of learning content</b>
6.1 Organisation of assimilation activities
6.2 Delivery of supplementary content
6.3 Organisation of tutoring
<b>7. Assessments</b>
7.1 Organisation of online assessments
7.2 Organisation of alternative forms of evaluation
7.3 Organisation of final examination

## VII. CONCLUSIONS

It is challenging to support and to enhance quality management in e-learning. In this paper we found answers on the question how quality can be assessed. We have translated the EFQM model to become useful in e-learning quality management. That is why we made a fusion of it with the Kirkpatrick's model of e-learning evaluation. If we limit the TQM to the role of the learner as an evaluator, we have to limit our framework too. A set of quality criteria has been identified and will be used for self-assessment by the learners. The learner can fulfill the role of evaluator of the resources and the enabling and the results of the learning process for the learner. The impact of learning on the functioning of the learner in his department afterwards, and the resulting effects on the company results can best be evaluated by the other stakeholders. Another questionnaire has to be developed for that case.

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