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# Fostering Quality in MOOCs: a European Approach

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**Abstract:** Societal, educational and personal changes have brought Open (Online) Education in the forefront of the global learning setting. One of the most significant challenges behind the EU Modernization Agenda is for education to respond to the characteristics of future students and to new needs in society. According to the Europe 2020 agenda, 40% of young people should complete higher education studies by 2020. The entire European university sector witnesses an increase of student numbers. Conventional learning methods are suboptimal solutions for these massive student numbers. Thus, important questions and issues arise: How can we anticipate increasing student numbers combined with the likelihood of lower funding? How should we combine online and traditional formats to devise sustainable university business-models? In order to address these challenges Europe is investing in flexible educational solutions as this is embraced by the EC in its Open Educational Resource (OER) agenda. During the last years Massive Open Online Courses (MOOCs) became very popular: Since the year 2008, when the first MOOC was provided, the number of MOOCs is constantly increasing. The year 2012 was considered as the "Year of the MOOCs". However, MOOCs and OER are a good solution as long as they retain a certain level of quality. So far, experience and practice are leading to an increasing debate about their quality as an educational tool. The high drop-out rates of MOOCs that are typically measured in traditional distance education courses as well as in all formal education settings are discussed causing requests for rebooting MOOCs and the research on them and their quality.

This article addresses the open issue of integration of quality approaches and mechanisms into the design of MOOCs through the development of a European MOOC Quality Reference Framework (QRF). The MOOC QRF provides a generic, organisation-wide system to help Higher Education Institutions and external stakeholders to design, develop, monitor, evaluate and improve the effectiveness of MOOCs along with the quality management practices. Based on flexible, configurable quality criteria and indicative descriptors, monitoring and reporting is adapted to organisational needs. The article presents the structure and quality dimensions of the MOOC QRF. It is based on the first international quality standard ISO/IEC 40180 and currently submitted to the European and international standardization committee (CEN TC 353 and ISO/IEC JTC1 SC36) for approval as first quality standard for MOOCs. The MOOC QRF is practical to encompass a wide range of approaches to quality assurance emphasizing that it is the quality of the outcomes that matters most in the design of MOOCs, thus leading to a new era of learning experiences in Europe.

**Keywords:** Quality Reference Framework (QRF), Massive Open Online Courses (MOOCs), Open Education and Learning, Massive Online Open Education Quality (MOOQ), Global MOOC Quality Survey

## 1. Introduction

The societies and their economies, working and living conditions are changing all over the world. That includes the educational systems that are challenged by moving objectives and development targets (Nyberg, 1975, Stracke, 2018). Competing businesses and interests at national, regional and international scales are demanding for citizens to acquire and develop much different skills and competences, also new kinds of literacy, and many educational public authorities are understanding this shift and following this request (OECD, 2016). Personality and competence building in public education should prepare for new economies and jobs that are emerging but not yet fully developed.

On the other hand the personal living conditions are also changing considerably, not only related working opportunities and pressure but also related individual communication, collaboration and learning. The raise of the world-wide internet and social media including online communities is affecting people's lives as well as personal learning. Many new opportunities for online learning and collaboration have been developed and are available for almost all interested people worldwide though technology and Internet access limits are still leading to unbalanced and non-equal situations mainly in developing countries (Stracke, 2018). Nevertheless

we can call it a global movement due to the continuous increase of technology and Internet use all over the world (World Bank, 2016).

As a consequence of the societal, educational and personal changes, Open (Online) Education has experienced a major development raising awareness amongst all actors (European Commission, 2011, Stracke, 2015). It has led to global grass-root movements, events, communities and associations as well as to international policies and implementations in national and regional educational systems. Next to the UNESCO declarations on Open Education and in particular on Open Educational Resources (OER) (UNESCO, 2012), it was driven by the European Commission through the communication on "Opening Up Education" (European Commission, 2013) demanding a change and improvement in European education and society.

During the last years Massive Open Online Courses (MOOCs) became very popular: Since the year 2008, when the first MOOC was provided, the number of MOOCs is constantly increasing (Gaskell & Mills, 2014, Stracke, 2018). The year 2012 was considered as the "Year of the MOOCs" leading to an increasing debate about their quality as an educational tool (Daniel, 2012). In particular, the high drop-out rates of MOOCs that are typically measured in traditional distance education courses as well as in all formal education settings are discussed causing requests for re-booting MOOCs and the research on them and their quality (Reich, 2015). Although this discussion results mostly from an improper use of formal learning concepts in what is basically a non-formal learning experience (Onah, Sinclair, & Boyatt, 2014), alternative measures have been proposed and discussed to focus better the learners and their individual goals (Stracke, 2017).

## 2. The quality initiative MOOQ

To address the quality issues, the MOOQ initiative was established as the European Alliance for Improving Massive Online Open Education Quality (MOOQ). MOOQ is directly relevant to several key aspects of the EU Modernization Agenda (European Commission, 2011) and the main objectives of the MOOQ alliance are:

- Europe is already taking steps in investing in flexible educational solutions as this is embraced by the EC in its OER agenda; "Digital learning and recent trends in (OER) are enabling fundamental changes in the education world, expanding the educational offer beyond its traditional formats and borders. [...] Europe should exploit the potential of OER much more than is currently the case" (European Commission, 2011). MOOQ shares and contributes to this objective by providing guidelines for designing more successful MOOCs from an educational and business model point of view.
- One of the most significant challenges behind the EU Modernization Agenda is for education to respond to the characteristics of future students and to new needs in society. MOOQ contributes to the transferring of first class European expertise in Open Learning to the higher education system using formal channels (standardisation).
- How can we anticipate increasing student numbers combined with the likelihood of lower funding? How should we combine online and traditional formats to enhance quality and at the same time devise university business-models sustainable?
- One target of the Europe 2020 agenda is that 40% of young people should complete higher education studies by 2020. MOOQ contributes to this objective albeit, the design of MOOCs to achieve this end without quality guidelines or standards will result in the phenomenon of increased dropout rates and/or failed attempts to deploy MOOCs by HE institutions. Thus, the goal to increase the number of graduates is served.
- The entire European university sector witnesses an increase of student numbers. Conventional learning methods are suboptimal solutions for these massive student numbers. MOOCs and OER are a solution as long as they retain a certain level of quality. MOOQ contributes to this end, beyond the experimentation phase being used by many HE institutions, by offering a systemic approach to massive student-centred online learning. By counter-parting the mere digitalisation of content or the use of simple process-oriented standards, the proposed project contributes towards the formation the appropriate pedagogical, organisational and business models for open and flexible education.
- MOOQ will research and formalise the design of multi-stage, mixed model MOOCs that may be offered during anyone's lifetime, including non-formal and informal learning. These MOOC modes strive to serve new target groups such as combination of study and work, practitioners in professional networks in sectors of innovation and learning in the context of regional

development (smart specialisation). This is a contribution to the implementation of the 2013 Communication by the EC on Opening up Education (European Commission, 2013).

The vision of MOOQ is to improve the quality of MOOCs leading to a new era of online learning experiences. Therefore MOOQ defined as its mission to develop a Quality Reference Framework (QRF) for the adoption, the design, the delivery and the evaluation of MOOCs in order to empower MOOC designers and providers for the benefits of the learners.

Therefore, the main goal of MOOQ was the development and the integration of quality approaches, new pedagogies and organisational mechanisms into MOOCs with a strong focus on the learning processes, methodologies and assessments.

To achieve these broad objectives, MOOQ has consequently selected and followed a mixed methods approach that is presented together with its results in the following section.

### 3. The MOOQ research results and achievements

MOOQ addressed the open issue of integration of quality approaches and mechanisms into the design of MOOCs by pursuing and fulfilling the following objectives:

- Analysis on existing practices for integrating quality approaches on emerging open online courses, including active discourse on open issues and concerns arising from the massive, large-scale implementations, showcasing paradigms of key players in the field.
- Collection of demands and needs related to the quality of MOOCs from different target groups and their detailed analysis and scientific publication.
- Development of a Quality Reference Framework (QRF) in collaboration with all interested stakeholders for the design, evaluation and improvement of MOOCs.
- Design, deployment and assessment through pilot testing of two collaborative MOOC pilots "Introductions to Embedded Systems" and "Introduction to Software Technology", using in practice and showcasing how to apply and manage the QRF.
- Standardisation activities that shall allow the integration of the QRF into specifications and standards both at European level (CEN-European Committee for Standardisation) and internationally (ISO).

MOOQ has developed and realized a mixed method approach for the scientific research combining the analysis and interpretation of quantitative and qualitative data from three online surveys including open questions and semi-structured interviews as presented in the following tables 1 and 2:

**Table 1:** Overview of all participants of the Global MOOC Quality Surveys and of the subsets for open questions

	MOOC learners	MOOC designers	MOOC facilitators	TOTAL
All participants	166	68	33	267
Open questions	117	41	27	185

**Table 2:** Overview of the interviews with MOOC designers, facilitators and providers

	MOOC designers	MOOC facilitators	MOOC providers	TOTAL
Key questions	15	10	13	38
No. of Interviews	12 (1 hour min.)	12 (1 hour min.)	12 (1 hour min.)	36 (>50 hours)

The key findings are already published and revealed that MOOC learners and MOOC designers have different perspectives and preferences in particular in the fields of online interactions and collaboration (Stracke & Tan, 2018, Stracke et al., 2018): All four interaction types have significant correlation with the experiences of the MOOC learners (and even very high significance for three out of the four interaction types) whereas none of the four interaction types has any significant correlation with the experiences of the MOOC designers (Stracke & Tan, 2018, Stracke et al., 2018).

#### 4. The Quality Reference Framework (QRF) for MOOCs

The Quality Reference Framework (QRF) was designed and organized by MOOQ, the European Alliance for the quality of Massive Open Online Courses (MOOCs). The QRF is based on the International ISO standard ISO/IEC 40180 (2017), the former quality standard ISO/IEC 19796-1 (2005), the results from mixed methods research by MOOQ including the Global MOOC Quality Surveys and semi-structured interviews as well as the feedback from the MOOQ Workshops at international conferences.

The desktop research and literature review and in particular the findings from the three international surveys and 45 semi-structured interviews (as reported in the section 3 above) were instrumental in the iteration and progressive refinement of the QRF. In addition, the contributions and feedback from the participants of the MOOQ workshops at the following international conferences were integrated into the QRF:

- ICDE 2015 in Sun City, South Africa
- OE Global 2016 in Krakow, Poland
- EC-TEL 2016 in Lyon, France
- OE Global 2017 in Cape Town, South Africa
- IEEE EDUCON 2017 in Athens, Greece
- ICALT 2017 in Timisoara, Romania
- EARLI 2017 in Tampere, Finland
- EC-TEL 2017 in Tallinn, Estonia

The QRF provides quality criteria and a checklist for designing MOOCs. They were discussed and developed in close collaboration with all interested international stakeholders. Their contributions and evaluation led to practice tools for designers, facilitators and providers to improve future MOOCs for learners worldwide. Furthermore the QRF was used in the design for the two MOOQ MOOCs what provided valuable feedback, too.

The QRF consists of three dimensions including quality criteria and instruments as presented in the following table:

**Table 3:** Dimensions of the Quality Reference Framework:

Dimension 1: Phases	Analysis, Design, Implementation, Realization, Evaluation
Dimension 2: Perspectives	Pedagogical, Technological, and Strategic
Dimension 3: Roles	Designer, Facilitator, and Provider

The first dimension of the QRF defines the phases.

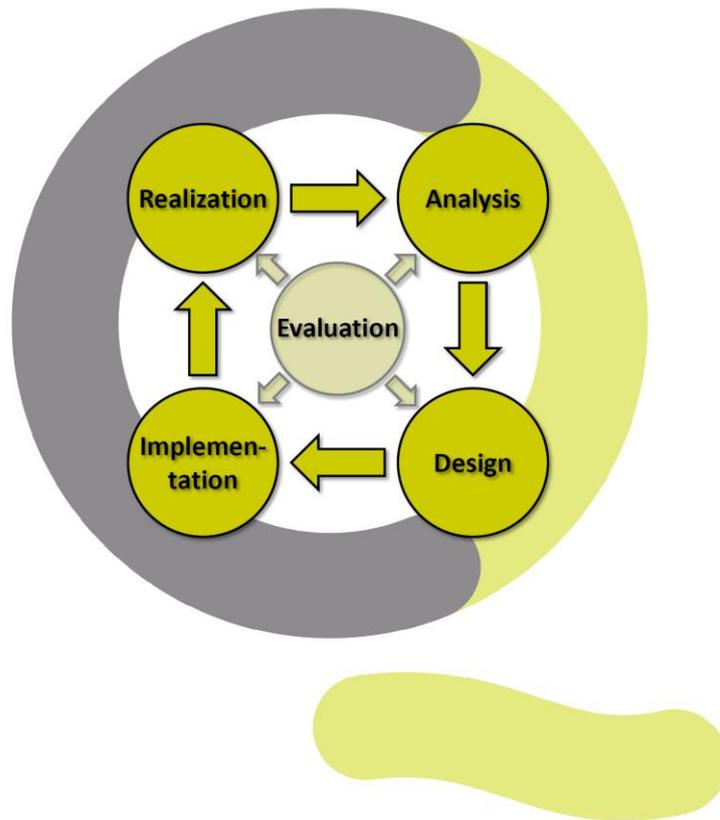
The QRF consists of the following five phases:

1. Analysis (A): identify and describe requirements, demands and constraints
2. Design (D): conceptualise and design the MOOC
3. Implementation (I): implement a MOOC draft and finalize it through testing
4. Realization (R): realise and perform the MOOC including support and assessment
5. Evaluation (E): define, run and analyse the evaluation and improve the MOOC

The phases can be and are often processed in parallel. They are dependent of each other what is often leading to iterative cycles and progressive refinement. Each phases consists of several processes, e.g., "A-1 Initiation" as first process of the analysis phase.

The evaluation phase can and should already start at the beginning of the planning and designing of the MOOC. The evaluation addresses all other four phases to allow a formative evaluation of all processes. Therefore the evaluation can ensure a continuous improvement cycle during all phases and the whole development of the MOOC.

The figure below illustrates the five phases:



**Figure 1:** The phases of the Quality Reference Framework (QRF)

The second dimension of the QRF defines the three core perspectives:

The QRF covers the following three main perspectives that have to be considered and addressed in the five phases:

1. Pedagogical
2. Technological
3. Strategic

The third dimension of the QRF defines the roles in MOOCs:

The QRF focuses the three main roles (designers, facilitators and providers). Roles are clustered into these three core groups as follows:

- Designer: Designer includes content experts, content authors, instructional designers, experts for MOOC platforms, technology-enhanced learning and digital media and any others who may contribute to the design of a MOOC.
- Facilitator: Facilitator includes the pedagogical facilitators and experts with content knowledge (such as moderators, tutors, teaching assistants) who manage forum, provide feedback and monitor learning progress, technical facilitators (such as technical support for learners) and others who may contribute to support participants in their learning process in a MOOC.
- Provider: Provider includes (internal and external) MOOC providers, technical providers (such as technology providers, programmers, software designers and developers), managers, communication and marketing staff and others who are involved in the decision-making processes leading to the delivery of a MOOC.

A detailed description of all three dimensions and their quality criteria can be found in the QRF.

It is most important to note that MOOC designers, facilitators and providers have to select the appropriate and relevant phases and processes according to their situation, the learning objectives, target groups, context and conditions. Some processes are already decided and (partly or completely) defined by pre-conditions and requirements (e.g., the available resources, budget and staff).

In addition, the Quality Reference Framework provides the QRF Key Quality Criteria and the QRF Quality Checklist for designing and developing MOOCs.

Main target groups of the Quality Reference Framework are the designers, facilitators and providers of MOOCs as well as the MOOC learners. The Quality Reference Framework can be used to analyse the needs and demands for future MOOCs, to design, develop and implement new MOOCs and to evaluate and improve existing MOOCs.

The main benefits of the Quality Reference Framework are:

- It provides a generic framework that can be adapted to each specific context.
- It identifies key quality criteria for better orientation on the MOOC design.
- It presents a checklist for the quality development and evaluation of MOOCs.
- It enables a continuous improvement cycle for MOOC design and provision.

## 5. Towards a quality standard for MOOCs

The Quality Reference Framework (QRF) was continuously revised and refined after each research and discussion step. More than 30 versions were developed during the last three years. The latest and stable version was submitted to the European and international standardization committees as New Work Item (NWI) for discussion and approval. Currently the European Standardization Committee CEN TC 353 "Technology-Enhanced Learning" and the International Standardization Committee ISO/IEC JTC1 SC36 "Information Technologies on Learning, Education and Training" are debating the QRF to reach consensus. As mentioned above, the QRF is based on the unique international quality standard for technology-enhanced learning ISO/IEC 40180 (2017) that is the regular revision and replacement for the very first ISO quality standard in learning and education ISO/IEC 19796-1 (2005). In addition, the QRF is also the first NWI and application of ISO/IEC 40180 (2017) and ISO/IEC 19796-1 (2005) for a specific type of technology-enhanced learning: After the official voting and approval by the European and international standardization committees, the QRF would be the first European and international quality standard for MOOCs.

## 6. Outlook

MOOQ was a first step in our ambitious and long-term approach to improve the quality of MOOCs and online learning for all: MOOC learners, designers, facilitators and providers need to mutually learn more about their preferences, needs and demands for a better understanding and realization of quality education online. The development of the Quality Reference Framework (QRF) based on the scientific findings from the mixed methods approach and international collaboration with all interested stakeholders is a promising first milestone. We hope that the further discussion based on its submission to the European and international standardization will lead to its further refinement and approval as first quality standard for MOOCs with large-scale implementation and impact throughout Europe and worldwide.

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