

The MECD Quality Certification Proposal of MOOC Courses

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Abstract: This article discusses the possible application of quality standards MOOC (Massive Open Online Courses) at the Ministry of Education, Culture and Sport (MECD) of Spain through EduTool®, registered trademark in the Spanish Office of Patent and Trademark (3,087,298 in force). This work comes from a line of research of the Pablo de Olavide University of Seville and it was developed in the Computational Intelligence Laboratory (hereinafter CIL) under the auspices of the UNE 66181. In the tool we have analyzed the weights of the subfactors of each of the dimensions (recognition of training, learning methodology and levels of accessibility) of this standard for Quality Management of Virtual Training for MOOC by fuzzy logic. In this sense, It arises the possibility to apply the quality certification of that tool to the Ministry MOOC educational offer in order to alleviate the high dropout rate of users in the MOOC pilot plan for teacher education occurred in 2014, within the lines of action of the project "New Forms of Training" and, thus, be avoided in the offered training activities for this current year 2015.

Key-Words: MOOC, Training, Educational Quality, Educational Assessment, Quality Management, MECD, E-Learning.

1. Introduction

The MOOC courses are a new form of training proposals to the webcast of content and a plan of learning activities open to collaboration and mass participation. These are courses with scalable web support and free for those who wish to access enrollment and continue training proposals.

The training MOOC proposals, term coined by Dave Cormier during the development of an open course on Connectivism in 2008, have spread

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globally with millions of participants in platforms such as Coursera, Udacity, EdX... In this sense, the National Institute of Educational Technologies and Teacher Training of the Ministry of Education, Culture and Sports of Spain (hereinafter NIETTT) began in 2014 a pilot plan of MOOC for teacher training within the lines of action of the project "*New Forms of Training*" in its MOOC platform educaLAB.

The MOOC movement is certainly a milestone in the education of the XXI century and it has brought a revolution to the Ministry of Education, Culture and Sports of Spain in the model of continuous training. In this way, its quality is an emerging field for researchers concerned with measuring such training qualitatively and quantitatively. Thus, most studies focus on calmly evaluating what these courses offer in their educational value in the field of training via the Internet and, more importantly, how they can improve in this regard. (Aguaded, 2013; Guàrdia *et al.*, 2013). Also, it doesn't seem so obvious that MOOC offer quality training (Martín *et al.*, 2013) and it would need to be improved if the goal is for them to be a disruptive milestone (Roig *et al.*, 2014).

Based on the above, this study emphasizes the need to certify the MOOC courses offered by the NIETTT through the EduTool® instrument, based on the AENOR standard (Spanish Association for Standardization and Certification). The main contribution of the tool in the field of e-learning tools is the UNE 66181 norm of Quality Management of Virtual Learning. This standard was updated in July 2012, after an initial version dating from 2008, and establishes a series of quality indicators headings with five levels for each one of them.

2. New Forms of Training at the National Institute of Educational Technologies and Teacher Training

In June 2014 it was announced on the blog of NIETTT that two MOOC courses had been completed. One of them dealt "PLE (acronym for Personal Learning Environment) for the professional development of teachers". After processing the data of participation, the Ministry makes an analysis on the experience of training non-university teachers started with the announcement of that course. This call was an experimental proposal and it is part of the main priorities of the "*New Forms of Training*" project in the framework for Teacher Professional Development, in collaboration with the Training Services of the Autonomous Communities in Spain.

Although they have not been officially certified, these open courses have been an opportunity for all participating teachers to be able to share their ideas and proposals on educational use of PLE and the PBL methodology (acronym for Problem Based Learning), and advance together in their digital competence and professional development as teachers connected to virtuality.

2.1. Results of experimental MOOC plan for teacher training.

A total of 14,237 users (58% female and 42% male) have been registered and logged on the platform that has supported these courses (<https://mooc.educalab.es/>). 61% of users come from Spain, with the regional distribution as shown in Table 1.

| <i>Autonomous Community</i> | <i>Participation (%)</i> |
|-----------------------------|--------------------------|
| Andalusia | 27,0 |
| Madrid | 11,0 |
| Castile and Leon | 9,0 |
| Valencia | 9,0 |
| Galicia | 6,5 |
| Castilla La Mancha | 5,6 |
| Catalonia | 5,4 |
| Asturias | 3,6 |
| Murcia | 3,4 |
| Aragon | 3,0 |
| Canary Islands | 2,7 |
| Basque Country | 2,7 |
| Extremadura | 2,4 |
| Navarre | 1,8 |
| Cantabria | 1,8 |
| Balearics Islands | 1,5 |
| The Rioja | 0,7 |
| Ceuta and Melilla | 0,5 |

Table 1. *Percentage of user participation of the Autonomous Communities.* Source: <http://educalab.es/mooc>

As for users from other countries, the distribution of countries with the largest share in Table 2 is shown.

| <i>Other countries</i> | <i>Participation (%)</i> |
|------------------------|--------------------------|
| Mexico | 9,6 |
| Argentina | 7,7 |
| Colombia | 6,0 |
| Peru | 5,8 |

Table 2. *Percentage of countries with the largest share of users.* Source: <http://educalab.es/mooc>

7,871 users were enrolled in the MOOC about "PLE for teacher development", which began on January 13 and ended in March. Of all those, only 66% initiated activities and 1,052 participants successfully completed them, 20% of them really started actively (13% of all enrolled). Given the

dedication required to complete the plan of activities of the course and that the percentage of completion of a MOOC is usually very low, this data is important and positive. Table 3 shows the generated products as a result of participation (full or partial).

| <i>Course of "PLE for the professional development of teachers"</i> | |
|---|---------------|
| Created Products | Number |
| Blogs | 1,700 |
| Virtual Communities | 120 |
| Discussion Threads | 1,500 |
| Digital emblems delivered to complete the first module | 900 |
| Digital emblems delivered to complete the course | 700 |
| Venues face # MOOCafé | 40 |
| Hangouts | 49 |
| Tagged tweets #eduPLEmooc during the first 30 days | 21,000 |

Table 3. *Products from user participation.* Source: <http://educalab.es/mooc>

In the “PBL” MOOC course, which began on March 31 and ended in early June, 5,137 users were enrolled, where only 71% initiated activities. The 11% of those who started completed the course successfully (402), and 349 collected the final emblem. Also, this course has generated as a result of learning activities, a series of products shown in Table 4.

| <i>“PBL” Course</i> | |
|---|---------------|
| Created Products | Number |
| Collection of publications of the course product in Flipboard | 1 |
| Course planet blogs | 1 |
| PBL communities in Procomún network | 10 |
| Followers in channel of course in Twitter | 3,000 |
| Messages with hashtag #ABPmooc_INTEF | 10,000 |
| Pins in board in Pinterest | 91 |
| Social bookmarking Group of resources about PBL in Diigo | 1 |

Table 4. *Products of the participation of users.* Source: <http://educalab.es/mooc>

The feedback from participants has been very positive, being in the top quartile more than 90% of responses on the evaluation forms, as shown in Figure 1. In the NPS question (Net Promoter Score) in scale 0-10 about if students would recommend the course to a colleague, both courses have had an average above 8.

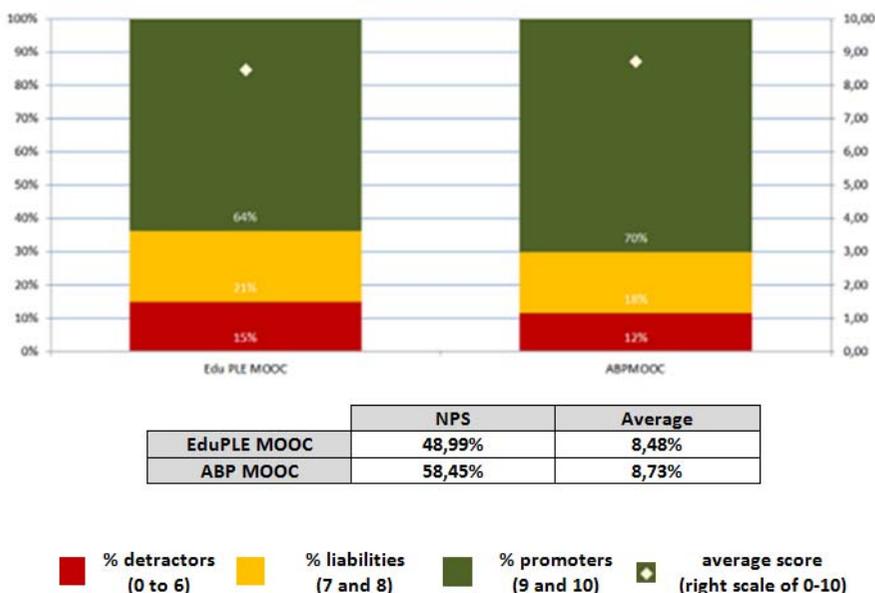


Figure 1. Assessment of the participants. Source: <http://educalab.es/mooc>

2.2. MOOC training assessments made by the Ministry of Education, Culture and Sports.

Participation was really massive, hence the thousands of participants who enrolled as tracking who have had courses in educational platform. It is a modality which can be very useful in promoting non-formal training processes.

It is questionable whether the results would have been better with certification of activity who completed the activities plan with the relevant publication in its digital portfolio of evidence of their learning in the course. Perhaps many more teachers would have participated with a proposal for certification of activity by education authorities.

Much of the success of the courses has resided in the good work of facilitation teams and energizing them, and training actions that have been built on a plan of activities aimed at promoting interaction, generation of communities, creating products in collaboration and web dissemination of all materials generated.

Assessment processes have been raised appropriately: blog as portfolios of learning evidence, peer review by P2P activity headings, automated assessment of the system (which records video opening, completion of questionnaires, P2P activities and participation in the forum) and self-assessment processes.

As an element of motivation and recognition of the work performed, each course proposed to get 3 digital emblems (they were given a total of 2,420 emblems in the MOOC of PLE and 1,322 in the MOOC of PBL) implemented by *Mozilla Open Badges*. Forums assigned "medals" to the most active participants. Thus, it has initiated a new way of recognition of training, more associated with the development of competencies and personal learning graph.

The MOOC format is shown as a new form of training that can be useful for teacher training oriented to career development, but can also be useful for the educational system both in skills training and networking support to students learning with participation of families and generating learning communities and "*learning hubs*". It could also be used to generate workgroups in schools, whose results were certified by the education authorities of the autonomous community.

As indicated in the European initiative "*Opening up Education*" (2013), these new forms of mass training can encourage students to create and produce their own products and contents as a result of learning in inter-centers cooperation projects. Besides offering new innovative opportunities for schools, teachers and students, allowing to extend the use of open educational resources (OER) and facilitating widespread access.

Thus, as has been done in other countries, it would be advisable to centralize the whole range of mass training for non-university teachers on the same platform, and establish basic common criteria for validating of courses and possible forms of accreditation of developed learning. MOOC certification of quality offered by the NIETTT institution becomes necessary based on the latter idea.

3. EduTool® Instrument as Quality Evaluation and Accreditation Proposal of the NIETTT MOOC Training Mode

3.1. The UNE 66181:2012 standard on quality management of virtual training.

The phenomenon of virtual training facilitated by globalization and the development of information and communications technology (hereafter ICT) has been remarkably developed in recent years, which has helped to improve and expand the existing educational offerings. This type of training is used by many organizations to comply with paragraph 6.2 of the UNE-EN ISO 9001 norm on systems of quality management, to "provide the necessary demand to employees and ensuring their competence". In this sense, it is necessary "to ensure that the acquired virtual training meets the specified purchase requirements" according to section 7.4 of that standard.

Therefore, the UNE 66181: 2012 norm is intended to serve as a guide to identify the characteristics of virtual training activities, so that users can select

virtual courses that best suit their needs and expectations, and that educational organizations can improve their offer and student satisfaction too. In this sense, the dimensions of the satisfaction factors of virtual training are: employability, learning methodology and accessibility.

The information of quality levels is expressed according to a system of representation of cumulative stars, where one star represents the minimum level and five stars represent the highest level. Thus, the level reached in each dimension is represented by an equal number (from 1 to 5) of accumulated black stars from the left, followed by the remaining stars until five without a color (white). Therefore, the quality levels of this standard are cumulative, so that each level is also the sum of the contents of the previous levels.

However, these headings have been adapted to an instrument that can easily measure the courses with quality indicators. In summary, a MOOC course could include indicators of different headings of quality levels and it wouldn't be cumulative, so that each quality standard could be valued and would not have to contain the sum of the indicators from previous levels (Baldomero *et al.*, 2015a).

3.2. Stage study and analysis of research of the EduTool® instrument.

The EduTool® instrument is in the line of work started in the ICT teaching innovation research 2.0 in the European Higher Education Area, located in the framework of Action 2 of Innovation Projects and teaching development subsidized by the Department of Teaching and European Convergence of the Pablo de Olavide University of Seville and developed in the CIL.

This tool, with registered trademark at the Spanish Patent and Trademark Office (file number in force: 3,087,298), has the following dimensional structure (Baldomero *et al.*, 2015b):

- The dimension of the recognition of training for employability consists of 6 items.
- The dimension of the learning methodology contains 43 items divided into four sub-factors: the didactic-instructional design (11), training resources and learning activities (10), mentoring (9) and digital technology-learning environment (13).
- The dimension of the accessibility levels contains 21 items divided into three sub-factors: the hardware accessibility (7), accessibility software (7) and web accessibility (7).

Each item is dichotomous (yes/no) and measures the clarity of the claims of each subfactor indicator of the corresponding dimension. The defuzzified values or weights of the obtained sub-factors are distributed evenly among the indicators for each scope of each. This criterion of

distribution in this research has been used because it is a simple continuous pattern. That is, in the case of adaptations of standard indicators, presumably stochastic, these can only take values between two ends: a and b. Thus, all slots of the same length (inside the ends) has the same probability, as shown in the expression (1).

In this sense, scope levels (Beginner, Basic, Good, Very Good or Excellent) of the same sub-factor will have the same weight corresponding to the proportional share of defuzzified value of the sub-factor divided between five levels of reach. Thus, the total set of indicators for each reach level will have the same weight, which also corresponds to the proportion of the number of indicators in the range one.

$$f_x(x) = \begin{cases} \frac{1}{b-a} & \text{if } x \in (a, b) \\ 0 & \text{if } x \notin (a, b) \end{cases} \quad (1)$$

Therefore, the distribution function of the weights is obtained by integrating the density function, as shown in Formula 2.

$$P(X \leq x) = \begin{cases} 0 & \text{if } x \leq a \\ \frac{x-a}{b-a} & \text{if } x \in (a, b) \\ 1 & \text{if } x \geq b \end{cases} \quad (2)$$

For example, and based on this, the weights distribution in the sub-factor 1.1 is clarified as shown in Table 5. The weighting of this sub-factor is 9.51%. Therefore, for each level of scope shall correspond 1.902% (9.51/5) and, according to the number of indicators that contains each level of scope, the weights will be allocated proportionally to each indicator of the level. Thus, for level indicators "Very Good" will correspond a weighing of 0.951% (1,902/2).

| Dimension 1: Recognition of the training for employability | | | | |
|--|-----------|---|---|--------|
| Sub-factors of satisfaction | Levels | Indicators | Assessment | |
| 1.1. Recognition of the training for employability | Beginner | No diploma or certificate is not issued (if it is received something, pointing) | 1.902% | |
| | Basic | Students receive a certificate of attendance | 1.902% | |
| | Good | A certificate for those students who pass an assessment test of knowledge acquired is granted | 1.902% | |
| | Very Good | | The certificate of knowledge is recognized by the Administration or by an external prestigious entity | 0.951% |
| | | | A monitoring process of training recognition is performed | 0.951% |
| | Excellent | The reached title or certificate has international validity | 1.902% | |
| Peso del subfactor 1.1.: 9.51% | | | | |

Table 5. Weight values of the indicators of sub-factor 1.1. "Recognition of training for employability" from defuzzified value of weigh. Source: Baldomero and others (2015c).

In Social Sciences, the instruments design must fulfill two basic and fundamental conditions for its implementation and validation: content validity and reliability. Thus, the content validity is the efficiency with which an instrument measures what it purports to measure (Chávez, 2004; Hurtado, 2010). That is, the grade to which an instrument reflects content domain-specific of what is measured and, therefore, that the selected items are truly indicative of what is to be measured (Hernández *et al.*, 2010).

This study checks the validity of the content of the instrument in the literature review and the regulatory framework on which it is based, that is, the UNE 66181 standard. In this sense, it is premised that this norm meets the attributes of an opinion of experts, that is, it is considered an informed opinion of people with experience in the subject, which are recognized by others as qualified experts, and they can provide information, evidence, judgments and assessments (Escobar and Cuervo, 2008).

With regard to the reliability of the instrument of information collection, a measurement is reliable or safe, when applied repeatedly to the same individual or group, or simultaneously by different researchers, provides the same or similar results (Sánchez and Guarisma, 1995). In this same discursive line, different authors indicate that the reliability of a measuring instrument refers to the degree to which its repeated application to the same individual or object produces the same results and the accuracy of data in the sense of stability, repeatability or precision (McMillan and Schumacher,

2010; Hernández *et al.*, 2010). In this study, it is displayed that the reliability of the instrument for obtaining the same results when it is applied by different investigators and the use of free scales of deviations, since each item is dichotomic.

3.3. The graphic quality of the EduTool® instrument.

Figure 2 shows the representation in the space of two MOOC quality triangles (Baldomero *et al.*, 2015c). On the one hand, the ideal orthic triangle of MOOC supreme quality indicates an equilateral triangle (for all three dimensions of the instrument) by the highest scores in all quality dimensions (cut to the axes in the point 1 is the thereof). This ideal triangle is called orthic because it is the highest quality projection area and it will serve as a reference for measuring the "lack of quality" of the MOOC courses. On the other hand, the second triangle has been shown the actual quality triangle (hatched area) of a MOOC course anyone when the tool is applied to it, which intersects with the mentioned axes above at lower points to 1.

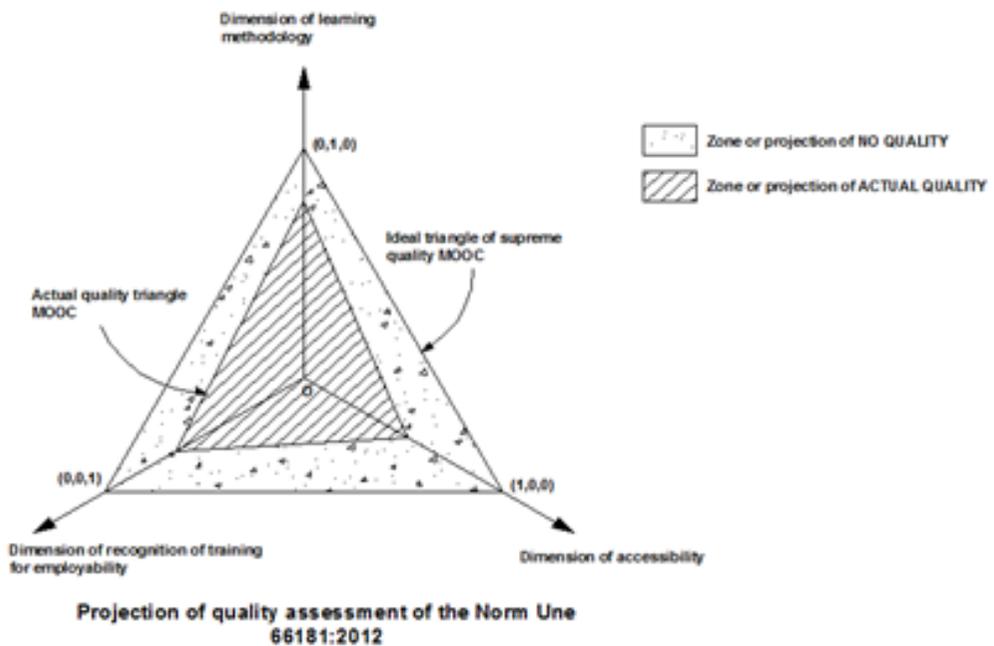


Figure 2. Representation of isometric triangles of quality of MOOC. Source: Baldomero and others (2015c).

4. Conclusions

This article will come to the same conclusions as in other studies, where it is evidenced that the MOOC courses of NIETTT have a solid educational foundation in their formats (Glance *et al.*, 2013). So, in general, we can say that the evaluation of the analyzed quality courses in this platform have a quality score slightly above average (Roig *et al.*, 2014).

As for the two offered MOOC courses by the NIETTT, and unlike other studies (Roig *et al.*, 2014), there is a significant difference in educational terms between them, as it can appreciate differences in the degree of homogeneity of the quality thereof. In this sense, this instrument would analyze the quality (single and average) of the NIETTT MOOC offer and the degree of homogeneity of the offered quality for it.

Therefore, although these two courses have broken into the network training relevantly, It is observed in the evaluation by the Ministry of Education, Culture and Sports of Spain that there is a lack of quantitative quality in terms of virtual training (13% and 11% of participants culminated the courses respectively). Because of this, MOOC courses, as a new educational response within a techno-social environment, the Net, have not yet reached a break with online training models of e-learning (Roig *et al.*, 2014). It is necessary to find new research ways to open an interdisciplinary center of attention and reflection on the shortcomings of those sub-factors of the analyzed dimensions in this research.

In this way, it could accredit to NIETTT with certified MOOC courses and prevent the supply of training activities with weaknesses in inappropriate teaching methodologies from the current educational theories and impeding, as far as possible, the tendency to standardization of knowledge and serious problems to address individual differences due to overcrowding, which leads to a unidirectional communication design, teacher-centered and based on the content.

In any case, the assessment of the quality of these courses is on the research agenda for the future (Baldomero *et al.*, 2015c). In this regard, more studies about some indicators of e-assessment quality in online courses is necessary, as well as longitudinal studies (Stödberg, 2012) or comparative ones (Balfour, 2013). And more specifically, continue researching to answer questions about methods to improve reliability, validity, authenticity and safety of user assessments, or techniques which could offer effective automated assessment and immediate feedback systems; and how they can be integrated into open learning environments (Oncu and Cakir, 2011) to provide more usability guarantee to quality tools that can be developed, alleviating the high degree of user abandonment..

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