MOOCs in open education: Comparative studies, regularities, and recommendations for their design

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ABSTRACT
Open education is a movement that is growing rapidly in today's world. Within this movement, the so-called open educational resources arise, an initiative to share, modify, or reuse everything that is produced in terms of learning. However, it has been the massive open online courses (MOOCs). Those resources have had more growth in recent years. A much-discussed problem in the international scientific community is the design of these courses, and there have been so many and diverse proposals that denote the need for the establishment of regularities for the methodological work in function of this process. The aim of this paper is to present the results of a small-scale comparative study on the didactic and technological design of these courses in a sample of 58 courses in four prestigious platforms (Coursera, MiríadaX, Udacity, and EdX). This is based on five parameters that serve as a basis for determining similarities and differences and establishing regularities that reveal certain trends. The comparative studies method was used, which proposes a system of methodological steps for its implementation accompanied by percentage analysis and measures of central tendency, such as mean and mode. The regularities obtained allowed a

critical and reflexive analysis from the Cuban pedagogical foundations that have allowed reorienting the methodological work in the design of MOOCs.

Keywords: massive open online courses, open education, distance education, comparative studies, open educational resources.

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1. INTRODUCTION

For Cuba, it is a priority objective to advance towards the process of digital transformation in all economic, political, and social spheres. Thus, higher education must redefine its processes and create a culture that allows fostering innovation, collaboration, and experimentation in the teaching–learning process based on the development of digital competencies in teachers as leading elements of this process.

For this reason, new models of virtual education are implemented, and open learning and distance education are promoted as alternatives that offer different opportunities to educators and provide greater flexibility in undergraduate and graduate studies (Aretio, 2021; Bailey et al., 2020; Soler-Pellicer et al., 2024).

Currently, the debates on the nature and characteristics of a new model of higher education that can be glimpsed

after the emergence of massive open online courses (MOOCs) have become extraordinarily relevant, first strongly and then critically. Interestingly, López Nicolás (2020) considers that the pandemic boosted telework in universities and companies around the world because, until now, only timidly evolved towards the adoption of these modalities.

It is for this and many other reasons that open education is increasingly advancing, and a large number of countries are now adopting it. It is not a new technology but a new philosophy of how to conceive education, that is, to conceive education as a public good and as a human right. The idea is that all human beings, regardless of where they live, their economic status, level of schooling, or age, can learn without access restrictions and free of charge. It is, therefore, an opportunity for the excluded, the disabled, the elderly, and ethnic minorities. Therefore, it is an appeal to the democratization of knowledge and educational inclusion.

That is why the maxim that sustains it is lifelong learning, expanding educational opportunities to different sectors, promoting openness in terms of access, and eliminating the barriers of traditional educational systems.

However, open education also presupposes sharing and distributing everything that is produced so that knowledge, means, tools, and learning objects can be used, modified, or redistributed by users. The goal is to provide everything we have done to improve education, and this is where the concept of open educational resources (OER), a term coined by UNESCO, comes in.

There is no single definition of OER that has been accepted globally. The term was first adopted by UNESCO in 2002, at the forum on the Impact of Open CourseWare

for Higher Education in Developing Countries, sponsored by the William and Flora Hewlett Foundation, an institution that awards large grants to educational and cultural institutions. They are defined as those resources for teaching, learning, and research that reside in a public domain site and that have been published under an intellectual property license that allows others to use them freely or for purposes other than those contemplated by their author (UNESCO, 2002, p. 17).

In this sense, the Creative Common (CC) license has become a global standard for the registration of open resources of any kind. It is a way to ensure that the author preserves some rights while releasing others. Especially, CCLearn is a division dedicated to enhancing the potential of the Internet to support open learning and OER. The key difference between OER and any other type of educational resource is its license (Santos-Hermosa, 2022, p. 13), in addition to important advantages that the author raises, such as:

- Accessibility: availability to be located and used.
- Interoperability: ease of adaptation and interconnection between different systems.
- Sustainability: correct functioning regardless of versions, software, and so on.
- Metadata: descriptions for indexing, storage, search, and retrieval.
- Granularity: single or composite units.
- Reusability: property to be modified.

The most frequent classification found within OER is that which divides them into educational content, tools, and implementation resources. However, MOOCs have had a greater growth in the last 10 years.

Studies show that teachers consider MOOCs valuable as teaching models in socio-educational contexts since they offer undoubted advantages, such as free use, training for disadvantaged groups, and time flexibility (Gómez-Galán et al., 2020). Several MOOC management platforms have emerged worldwide, offering an infinite number of courses related to different areas of knowledge. Some examples of platforms are Coursera, Udacity, EdX, MiríadaX, and others. Similarly, several higher education institutions have recognized the benefits of MOOCs and have proposed their own courses, which take advantages of modular and decentralized design, based on specific needs, and at the same time, dynamic and adaptable.

One of the current problems is the difference in criteria for MOOC design. It is complex to find in the multitude of research works on the subject and to determine regularities in them that allow to draw guidelines for the methodological work in the creation of these types of courses. Interesting experiences in the design of MOOCs stand out (Cirulli et al., 2017; Edel-Navarro et al., 2018; Gértrudix-Barrio et al., 2017; Oyo et al., 2017).

Several authors have created courses with recommendations for their implementation or design (Alhazzani, 2020; Arpaci et al., 2020; Cobos & Ruiz-Garcia, 2021; Doo et al., 2020; Gómez-Galán, et al., 2020; Julia & Marco, 2021; Lambert, 2020; Zulkifli et al., 2020). However, comparative studies for the determination of regularities in their design are very limited.

This paper addresses this important issue and, based on a comparative study of 58 MOOCs hosted on four internationally recognized platforms, determines regularities in the didactic and technological design of these courses. Based on the results obtained from the comparative study,

a reflective analysis is made from the traditions and theoretical positions defended by Cuban pedagogy.

2. METHODOLOGY

The essential method used in this work is the comparative study. Comparative studies occupy a very prominent place in the social sciences. This is not only because of the value of the descriptions, explanations, or interpretations of reality that can be made from them but also, especially in recent decades, because they have emerged as an input for the diagnosis of social problems and for the design of policies. At the same time, they also serve as a benchmark and a source of legitimacy (Piovani & Krawczyk, 2017, p. 11).

These studies involve the analysis and synthesis of the similarities, differences, and patterns of two or more cases that share a common approach or goal. In many academic settings, it is assigned the status of a scientific method for research activity and has been frequently employed in quantitative and qualitative research. The effectiveness of the method lies in the selection and definition of the objects and properties to be compared, as well as in the care and systematicity of the procedures of production and analysis of the data from which the comparisons are made (Marradi, 1991, p. 2).

The following methodological steps were taken into account:

- Selection of the process under analysis and identification of the objective of the study and the metrics that will be useful to achieve it.
- Selection of the sampling objects.
- Selection of the comparison parameters.
- Collection of the data.

- Analysis of similarities and differences.
- Determination of regularities and trends.
- Interpretation of the results.

Selection of the process to be analyzed and identification of the objective of the study and the metrics that will be useful to achieve it: It was determined that the object of analysis would be MOOCs in prestigious platforms such as MiríadaX, Udacity, EdX, and Coursera. These courses in different subjects would be taken and using comparison criteria in the qualitative order that could be subsequently quantified and processed using a percentage analysis accompanied by tables and graphs. The subjects of the MOOCs analyzed are diverse: social sciences (39.2%), humanities (21.4%), natural sciences (18.5%), exact sciences (4.8%), and technologies (16.1%).

Selection of sampling objects: A total of 58 MOOCs were sampled and distributed as follows: 14 courses on the EdX platform, 16 courses on the Coursera platform, 15 courses on MiríadaX, and 13 courses on Udacity.

Selection of comparison parameters: Taking into account that this is a small-scale study with the objective of focusing on the didactic and technological conception, the following comparison parameters were established:

- Average duration of the course.
- The way the lessons are organized.
- The way in which the content is presented.
- The way in which the content is evaluated and the relationship between the individual and social nature of the learning being evaluated.
- Technological resources used for advancement, restriction, collaboration, feedback, and others.

The steps of data collection, analysis of similarities and differences, determination of regularities and trends, and the interpretation of the data are presented below.

3. RESULTS AND DISCUSSION

After comparing the differences and similarities in each of the parameters, we proceeded to determine regularities that finally allowed us to establish trends. Regarding the duration of the courses sampled, there are two interesting elements. There is an oscillation of duration that varies between weeks and eight months in length. All the analyzed platforms contain MOOCs that have this variability. However, when calculating the average duration, an average of 3.7 months is obtained, and when calculating the mode, the most repeated value is MOOCs with a duration of three months, representing 57.2% of the total of the sampled courses.

When studying in each case, the way in which the lessons are organized, it was found that 36.2% are structured in modules subdivided by topics, 32.8% in weeks subdivided by topics, and 31.1% are structured directly in topics without using an organizational criterion of higher hierarchical level. As can be seen, there are no significant differences that, in this aspect, denote a predominant tendency.

In 93.2% of the courses, it was observed that there is a logic given by the existence of an introductory section with a welcome message, followed by the development of the content. The evaluation is located indistinctly, as a process for each of the topics in 88.2% of the courses, and 12.8% contain only a final evaluation.

The form in which the content is presented is variable; it can be seen that the information is mainly in video format (77.5%) and, to a lesser extent, in various documents

with a predominance of .pdf format (22.5%). In the courses sampled, no content was found in the form of electronic presentations (.pptx format). When analyzing this aspect, it was observed that these slide presentations were finally converted to documents in .pdf format, and most of them were shown in the videos.

It is significant as a regularity that in 67.2% of the videos found as sources of information, the teacher is observed imparting the content. This element is important to achieve the affective climate that a virtual teaching and learning process needs. Another aspect to be considered was the duration of the videos presented. As a regularity, it can be seen that the average length of the videos is 15–20 minutes.

According to studies carried out on the psychology of information processing and perception, memory, and attention, the overall average time of an online video should be 10–15 minutes for elementary school students and 20–25 minutes maximum for students at higher levels. These researchers have shown that after 10 minutes of visualization, attention rates decrease. In fact, research indicates that, for the most part, students will only watch the entire video for about 6 minutes.

The reasons for the success of video for e-learning are that it is an effective way to implement the explanatory-illustrative method and can help learners visualize abstract or complex topics easily. In fact, studies show that about 30% of the brain's total capacity is devoted to processing visual stimuli.

Many online courses observed are video-based but also include supplementary readings, graphics, written quizzes, tests, and exercises. This means that there needs to be a unity between one or more sources of information that can be supplemented and one or more sources of assessment.

The way in which the content is evaluated, although diverse, has invariants that typify MOOCs. The functions of evaluation do not change in online courses; likewise, evaluation must fulfill pedagogical, innovative, and control functions (Portela & Álvarez, 2010). From the point of view of the scope of the evaluation, it can be individual, group, pair, or team evaluation, analogous to that developed in face-to-face education.

In this study, we stopped to evaluate whether the evaluation fulfilled certain functions since this required the presence of specialists in the different areas of knowledge; for this reason, the analysis focused on determining regularities in terms of typology. Figure 1 shows that a total of 37 (63.7%) courses focused the evaluation on automatic grading questions, with multiple-choice and single-choice questions predominating over other typologies, out of the 58 MOOCs sampled. It is noteworthy that only nine (15.5%) courses used group evaluation, using discussion forums in different typologies. Co-assessment or peer assessment was present in eight (13.7%) courses and, in four MOOCs, team activities were revealed (6.9%). The integration between individual and group activities was present in 20 courses (34.5%).

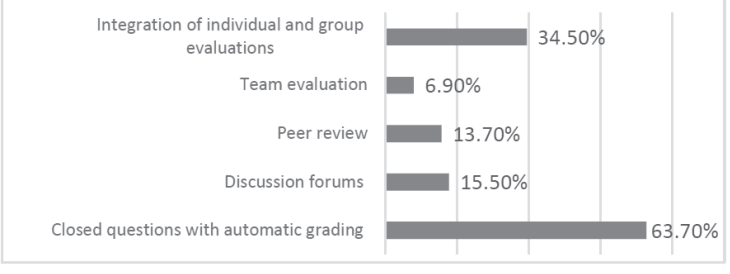

Figure 1. Predominant types of evaluations. Source: Own elaboration.

From the above analysis, it can be seen that despite the trend towards incorporating activities of a social nature in the evaluation process, there is still a predominance of activities that focus on the individual evaluation of the learner. In recent years, a considerable number of authors have worked on the basis of classifying MOOCs into two large groups: xMOOCs and cMOOCs. For these authors, cMOOCs are characterized by social learning and promote discussion and interaction ("c" refers to collaborative learning), while xMOOCs limit interaction to teacher and student and are generally evaluated by means of closed questions. Lately, the term tMOOC has also proliferated, referring to a hybrid model with the previous ones. Many other terms have appeared that obviate the nature of learning and make this phenomenon very complex.

We join the criterion of Castellanos et al. (2001) who state that learning continuously crystallizes the dialectic between the historical-social and the individual-personal. It is always an active process of reconstruction of culture and discovery of the personal meaning and vital significance that knowledge has for the subjects.

These theoretical positions are based on the historical-cultural theory of Vigotsky (1987). This theory is assumed by Cuban pedagogy and, among its foundations, states that learning implies the transition from the external to the internal, from the interpsychological to the intrapsychological, from the dependence of the subject to independence, and from external regulation to self-regulation. For this reason, the unity between the social and the individual is necessary.

The technological resources used in MOOCs were another parameter taken into account. There is a wide range of resources that can help learning and allow its analysis

(learning analytics), but we only stopped to explore some resources that are frequently used for the progressive advancement, restrictions, or completion of activity.

4. CONCLUSIONS

Up to now, we have not found a comparative study in theoretical reviews of updated sources. This is based on the establishment of regularities and trends and based on parameters such as the duration of the course, the way in which the lessons are organized, the way in which the content is presented, the way in which the content is evaluated, the relationship between the individual and social character of learning, as well as the technological resources used for the advancement, restriction, and completion of the activity.

Among the regularities observed was the average duration of most of the MOOCs analyzed, established in a period between three and four months, with courses lasting three months being the most appreciated. In the way in which the lessons are organized, a balance between courses that are structured in modules subdivided into topics and those that are organized by weeks and topics or those that are structured only in topics is observed as a regularity.

As a significant regularity, the predominance of video over other sources of information to present the content stands out, which is due to the advantages of using this medium to explain and illustrate phenomena, processes, or learning objects in a more effective way and to present abstract or complex content that requires the use of moving images.

Although it has been investigated that there is a tendency in MOOCs to increase the number of courses that opt for collaborative evaluation in groups, by teams or

pairs, the predominance of individual evaluation with the use of closed questions with automatic grading is still a regular feature.

A distinctive feature of the MOOCs present in all the courses analyzed is the use of technological tools or resources that allow this type of course to be operational, such as resources that allow automatic progress based on the completion of activities or access restrictions conditioned to the completion of tasks. This regularity is given by the free access to these courses that become massive courses and generally do not allow a very personalized attention.

In order to establish trends through scientific methods, successive comparative studies are required. This could be a focus of future research. However, observation and empirical experience indicate an increase in MOOCs with a didactic conception that integrates individual and group evaluation, the use of videos as a source of information, and a growing level of prestigious institutions dedicating spaces to offer these types of courses.

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