Online Learning Objects in higher education, an alternative in times of pandemic

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Abstract
The objective of this research was to describe the benefits of Online Learning Objects as didactic strategies for teaching and learning in higher education in times of pandemic. The methodology used was based on the qualitative paradigm, applying the deductive method; the type of research was descriptive bibliographic documentary, through content analysis of scientific articles and research papers as the basis of the study. The analysis of the results was carried out through content analysis according to categories of research interest. It was possible to establish several advantages and benefits associated with the use of Online Learning Objects to improve the teaching-learning process in different areas of higher education, especially in times of pandemic.
Keywords: Online Learning Objects, higher education, pandemic, virtual learning object.

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Resumen
El objetivo de esta investigación fue describir los beneficios de los Objetos Virtuales de Aprendizaje como estrategias didácticas de enseñanza aprendizaje para la educación superior en tiempos de pandemia. La metodología utilizada se sustentó en el paradigma cualitativo, el método deductivo, el tipo de investigación fue documental bibliográfico de carácter descriptivo, a través del análisis de contenido de artículos científicos, y trabajos de investigación, los cuales fueron el sustento de la investigación. El análisis de los resultados se llevó a cabo a través del análisis de contenido atendiendo a categorías de interés investigativo. Se lograron establecer diversas ventajas y beneficios asociados al uso de los OVA para mejorar el proceso de enseñanza-aprendizaje en las diferentes áreas de educación superior, especialmente en estos tiempos de pandemia.
Palabras clave: Objeto virtual de aprendizaje, educación superior, pandemia

Introduction

Now a days, it is impossible not to notice the great impact of Information and Communication Technologies over all social scenarios. And even more so in recent years, from 2020, in which humanity has faced a pandemic by the SARS virus COV-2 or better known as COVID-19, a pandemic that has forced to rethink and reformulate many of the systems, methods, techniques and ways of doing things to adapt them to the virtuality with the clear intention of promoting work from home and protect the health of thousands of people.

It is in these times where the great advantages and strengths offered by the use of technological resources supported by virtuality as allies to maintain the development of educational activities and labor productivity, and minimize, to a large extent, the negative impact that brought with it the necessary isolation in pursuit of prevention, and that has absent society from the different physical, labor and educational spaces.

Following this order of ideas, as a result of this phenomenon, special attention has been paid to the promotion of strategies and study modalities supported by virtuality at the different levels of formal education.

In this sense, in spite of the fact that many educational centers have demonstrated a great advance in the matter of inclusion of ICT and promotion of emergent modalities of study totally based on virtuality, many others have been forced to face, for the above-mentioned reasons, to an abrupt technological jump, even with deficiencies as far as technological competitions of teachers and students, deficiency in the systems of connectivity and lack of equipment.

The higher education subsystem in Ecuador does not escape from this reality, however, according to the international survey of the International Association of Universities IAU, cited in Marinoni et al. (2020) reports that almost all Higher Education Institutions (HEI) consider that this new reality represents an "important opportunity to propose more flexible learning possibilities, explore hybrid or blended learning and combine synchronous and asynchronous learning" (p. 11).

Following this order of ideas, it can be said that this abrupt leap to virtuality brings with it new opportunities in the educational field to evolve, to update the didactic plans and

strategies and to offer students new alternatives that, when properly designed and thought out, can be not only motivating but also more enriching, representing an advance to promote education even with the lacking conditions that many universities present today.

It is important to emphasize that at the level of Higher Education, the student will face various contents of applied sciences, which are usually complex and difficult to assimilate at this level. This could be a determining factor in the academic continuation of students, if adequate attention is not given to the selection and use of different learning activities, didactic strategies, resources and evaluative activities in accordance with the new times. For this reason, it is important for university teachers of the new era to keep updated not only in terms of content but also in terms of alternatives that technology and virtuality offer.

In this sense, among the resources whose features and characteristics make it quite accessible and useful in these times are the so-called “Online Learning Objects” OLO. In that order and to go a little deeper into this term, it is important to note that it is considered polysemic, since there is currently no consensus on this definition. In fact, the basic idea allows for a wide variety of interpretations. However, most agree on what Triquell and Vidal (2007, p. 91) define as "any digital or non-digital entity that can be used, re-used or referenced for technology-supported learning".

For his part, from an educational dimension, García, (2005, p. 3) indicates that OLO are “files or digital elements with a certain level of interactivity and independence, which can be used or assembled, without prior modification, in different teaching-learning situations”. That is to say that they can, for example, be assembled into a much more complete learning management system to support and maximize the teaching-learning process.

On the other hand, this type of resources has particular characteristics that make them effective allies in teaching-learning. This assertion is confirmed through various investigations that have demonstrated the effectiveness of OLO as teaching-learning resources in various higher education programs, in contrast to the use of traditional strategies. To mention some of them, the considerations of Bermeo et al. (2016) state that the use of OLO has allowed improving the teaching-learning process helping students to acquire more knowledge by linking theory and practice with the use of 3D simulations.

For their part, Martínez et al. (2018) determined its effectiveness in the development of mathematical competencies, which involve the acquisition of knowledge and skills of differential calculus. For their part, Cabrera et al. (2016) demonstrated a great receptivity of teachers and students, and effectiveness in implementing an OLO in the wave physics course. And so, many other researches have achieved similar results.

In this sense, the interest arises for the authors to deepen on the benefit offered by the use of Online Learning Objects as didactic strategies of teaching and learning in contemporary higher education, in order to offer teachers an overview of all the possibilities that they can consider in their educational practices with this type of totally relevant resources, even more so in these times, where virtual education plays a crucial role in history. Hence, the aim of this research is to describe the benefits of Online Learning Objects as didactic teaching learning strategies for higher education in times of pandemic.

Materials and methods

In order to respond to the stated objectives, this study was developed from the qualitative approach, and the documentary review was implemented. According to Hernández et al.

(2014), this type of research "seeks to specify the properties, characteristics and profiles of people, groups, communities, processes, objects or any other phenomenon that is subjected to analysis" (p.92). At the same time, it is of bibliographic type, since it has the purpose of detecting and deepening in the findings of diverse investigations about the subject that is proposed. Likewise, it was carried out under the deductive method. The variables under study were Online Learning Objects and Higher Education.

In order to respond to the general objective, a controlled review of research records hosted in repositories such as Scielo, Redalyc, and in the academic Google search engine was performed. For the selection of documents, criteria such as validity and relationship with the variables of study were taken into consideration, which facilitated the process of detection, selection and analysis of the information.

Results of the documentary review carried out

Online Learning Objects:

An important aspect about this type of resources is described by Mora (2012, p. 108), although it is believed that a Learning Object is an extensive entity, in reality it should develop only one objective, it should contain activities and an evaluation or final check. This allows it to complement or adapt to various courses and contexts, unlike a material that is more extensive and covers many contents.

On the other hand, the online learning object ranges from a single unit (such as a graphic, image, video, audio) to a collection of assembled information units (such as a software, a mobile application, slideshows, among others) using metadata that correspond to the needs and personality of a particular learner.

As an example, Veytia et al. (2019), cited by Moreira et al. (202,1, p 931), state the following about online learning objects (OLO):

> An OLO is a trigger question, an image, a photograph, a series of exercises, a PowerPoint presentation, a quiz or diagrams, a slide, a table, experiments, games, animations, audio or video sequences, sentences or paragraphs of text, computer applications.

Similarly, Hodgins (2000, p. 34) points out that "multiple Learning Objects can be grouped into larger sets and nested together to form an infinite variety and sizes".

Features of the OLOs

According to some authors such as ILO/Cinterfor (2013), Galeana (2005), Hilera and Hoya (2010), Rebollo (2004), Chan and González, (2007), and Salas and Umaña (2010), the following characteristics that every OLO must have can be pointed out:

1. Flexibility: The material that is designed can be used in different contexts, due to its structure, ease of updating and knowledge management.

2. Personalization: Learning Objects can be adapted to the needs and characteristics of the context, so that they have greater meaning and significance for their users.

Modularity: The possibility of designing Learning Objects that can be used in modules, in such a way that they favor the fulfilment of the established objectives. In some bibliographies this character is also known as granularity.

4. Adaptability: One of the most relevant characteristics is that the Learning Objects can be adapted to the different learning styles of the students.

5. Re-use: They can be re-used for different instructional moments in a group, for example, at the beginning to review previous knowledge, in the development to go deeper into the topic, and in the closing to carry out a synthesis of the main aspects of the topic.
6. Scalable: They must have the capacity to be integrated, articulated and assembled with others of different type and extension.
7. Durability: To be most effective, they should be in effect for a considerable period of time.
8. Articulated in its interior: that is to say, it should clearly show users the route to carry out the activity or task. It must be intuitive and easy to manipulate according to its didactic structure.
9. Conceptual self-containment*:* Must possess the ability to explain oneself without the need to resort to external informative elements.
10. Representational and significant: that is, it takes up aspects of reality, which allows both students and teachers to recover a sense and meaning from its use.
11. Accessibility: It must be easy to identify, search and find thanks to tagging or metadata, allowing its quick location in the repositories in which it is stored.

It is important to highlight that all these characteristics will guarantee the teacher or designer of this type of resources that their effectiveness will be significantly increased, reducing production time and costs.

Internal components of an OLO:

The Ministry of National Education of Colombia (Aprendeenlinea, s.f.), cited by Herrera, Gelvez and Sanchez (2014, p. 688), established that OLOs must be "made up of at least three internal components: content, learning activities and contextualization elements", which are shown in Figure 1.

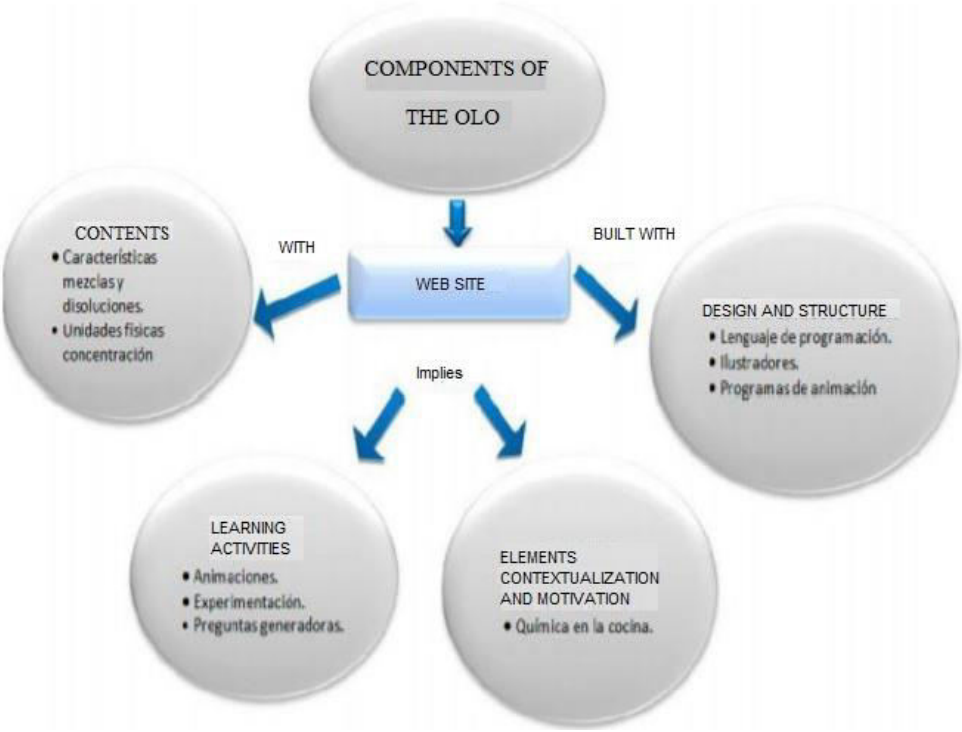

Figure 1. Internal Components of a Learning Object
Source: Álvarez (2012), cited in Herrera et al. (2014).

Quality criteria of an OLO:

After studying the variables, it became evident that many authors have developed various quality criteria for OVA, basically oriented to evaluate each of the methodological aspects of their production. But for the purposes of the present research, the quality criteria that could be useful to higher education teachers for the production of OVAs are outlined below:

It must comply with the pedagogical intentionality:

As some adult education systems use pedagogical methods at the undergraduate level to obtain favorable changes in student learning, the OLA must have a pedagogical intention, otherwise it will be, as Flamand and Gervais (2004 p. 110) state that it is "simply an informative resource... used in the framework of learning processes".

In this sense, according to Martínez et al. (2018, p. 64), "despite the importance of OLOs, in education, not all employed for educational purposes have a significant impact on learning, especially for not complying with criteria established in design standards". In short, these were grades as a didactic and pedagogical scaffolding resource in its essence. Therefore, teachers must evaluate the quality and relevance of this material, as well as the pedagogical coherence with the objectives of a given course.

They should be reusable and considered for hosting in OER open educational resource repositories:

Many works focus on further studying and taking advantage of the modular and adaptive characteristic of Online Learning Objectives (OLOs). In this sense, considering that this can be reusable, it could provide a solution to many problems present in virtual education; for example, Bermeo et al. (2016) study the phenomenon that globally, in higher education institutions, many teachers are creating massively and dispersed various virtual learning objects, which translates into greater effort and time invested.

Muñoz et al. (2006, p. 2) emphasize that "content leakage is a common problem in some universities", since when some teachers leave, they take all their experience and their created productions with them.

In this sense, this leads to reflect on the value of knowing and creating repositories of open educational resources that facilitate the selection and reuse of OLO hosted there, by the teachers of the university community. Especially in these times, when teachers have been in the imperative need to improve their educational practices with the support of ICT in an abrupt way - because of the pandemic-; it is important then, to promote the collaborative work of teachers as creators of such resources, minimizing the effort, hours of production and quality of resources.

Following this order of ideas, a reference that has taken steps towards the promotion of OLO repositories is the one carried out by the Ecuadorian Consortium for the Development of Advanced Internet CEDIA, with the initiative "Repositories and Learning Objects" (Colome, 2019). The development of this project allowed the generation of a series of strategies to promote not only the generation of this type of materials but also their publication in banks of open educational resources.

They must meet the interactivity criterion:

It is essential that these objects contain motivating, interactive, accessible elements, in such a way that they allow establishing simple and complex relationships that complement the information through links and concept maps that present the information in a synthetic

and structured way, prioritizing the search, they must use multimedia elements, among others (Toll et al 2011, p. 6).

After conducting an extensive literature review to respond to the objectives, it was then possible to establish various advantages and benefits associated with the use of OLO to improve teaching strategies or e-learning supported by ICT in different areas of higher education, which, as mentioned in previous lines, is considered an extremely important aspect to minimize the negative effects brought by the abrupt migration to virtual educational modalities motivated by the pandemic product of covid-19.

Benefits of implementing OLO in higher education in times of pandemic:

1. This type of resource is based on a constructivist paradigm of learning, so in these times when the figure of the teacher accustomed to traditional teaching is displaced, the OLO can give an interactive and protagonist character to the student. At the same time, this type of constructivist practices, in the long term, can prepare students even better to develop critical thinking, autonomous, empowered, proactive, curious, able not only to consume content but to produce and share them, to work in an interconnected way in the globalized world to prepare them better for the future.
2. If all universities in the country promote open educational resource banks where teachers collaborate in the production and exchange of OLOs. This would represent a major advance in virtual education. And it could guarantee time savings for teachers and researchers, not only in the production of this type of materials, but also in obtaining timely and relevant information for the appropriation of knowledge, taking advantage of collective intelligence, and sharing experiences of use.
3. OLOs can also offer the teacher a clear didactic organization, since they are produced from theoretically established methodologies to highlight their pedagogical essence, and to achieve clearly established academic objectives, which saves the teacher a lot of work.
4. In most cases, OLOs provide ease of use without the need for internet connection, due to their packaging, formats and transfer characteristics. This is an extremely important aspect nowadays considering that not all students have constant access to internet, but it is a necessity to take advantage of virtuality. To ensure the democratization of education and social inclusion, teachers in the new era must consider resources that can be functional and easily accessible to students even without internet connection.
5. Some OLO can be designed with an interactive interface, which allows to involve elements such as 3D modeling simulations, augmented reality, playful activities, satellite views, GPS, access to observatory data in real time, among others. This can stimulate training, motivation and give meaning to learning. It should also be noted that this would represent a technological breakthrough for contemporary education.
6. It provides the teacher with tools to easily keep evaluative records of each student's performance, which translates into better control, automation, monitoring and timely attention of the teaching-learning experiences.

Conclusions

In the first instance, it is important to emphasize that the implementation of OLO as a teaching and learning resource should be based on a need and a desire to improve practices in the development of materials for virtuality. In this sense, it is considered important to

sensitize the teaching staff about the need to experiment through practice in the incorporation of various strategies throughout the course they teach. It is also important to evaluate their scope and adapt them through a cyclical process.

This is a new era in which virtuality has taken much more prominence and it is the responsibility of those who have the noble task of teaching to keep updated on this issue. The call is to encourage university teachers to study and promote virtual learning objects in their educational practices, as well as to share OLO resources through repositories of open education.

It is also urged to systematize and disseminate the experiences obtained with the management of this type of resources with other teachers in the area to create a sufficiently broad documentary base that can nurture more people and institutions benefiting from this type of technological resources.

For its part, it is considered useful to replicate the experiences at other levels of education nationally and internationally, as they can also benefit from the use of such resources to strengthen their educational practices in the face of the new challenges that society faces today.

Finally, it should be said that this digitized era is a great ally to develop entrepreneurial activity where creativity -supported by technological resources-, feed solutions away from tradition.

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