

## MOOCs in Research Methodology for Universities in Ecuador

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### Abstract

*It is imperative that universities incorporate ICT in their teaching and learning processes because now more than ever it is a fact that we live in the "Age of the information and interaction society", where information and communication technologies play its determining role. The general objective of this work was to create an online MOOC course with an expected learning model for undergraduate and postgraduate students. This work will encourage UNEMI to overcome limits that only apply to the education of professionals through face-to-face training systems and will adopt them in the near future in mixed learning environments that open the way to new paradigms that consider principles epistemological, ontological, ethical, political and educational. The general objective of this research was to propose a massive open online course MOOC for Research Methodology. Said course was born from the investigation of Didactic Strategies to improve the attitude towards research of students of a university in the province of Guayas, Ecuador. This work contributes to massify research at the university by using ICT as a means to change traditional face-to-face learning environments into virtual learning environments. The results obtained allow us to say with all seriousness that they have been positive, managing to educate a large group of students and teachers from an Ecuadorian university.*

**Keywords:** MOOC Course, Research Methodology, Virtual Learning Environments, Research Skills, Universities.

### Introduction

Currently, universities have a face-to-face education system, the challenge is to provide learning experiences that meet the needs, respecting the norms and standards of higher education in the society of the 21st century. Education is changing as a result of the emergence of the "era of the information and interaction society", where information and

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communication technologies (ICTs) play a dominant role. It is a fact that this new scenario poses a challenge for higher education institutions, as they include in the curriculum distance learning processes mediated by ICTs, which allow the provision of extensive didactic and pedagogical resources and the integration of multimedia (Cabero & Vázquez, 2014) and (Aguaded Gómez & Vázquez-Cano, 2016)

Obviously, the new trends of the information and interaction society increase the pressure on universities to develop and adapt to the conditions of teaching, creation and dissemination of knowledge, since it is possible to use learning strategies in the classroom that go beyond the dictation of keynote lectures, because ICTs offer a wide range of didactic and pedagogical services. which have a very important impact on the way it is taught in the face-to-face training system.

But chief and most important in this new era is the potential for radical change in the organization of academic work, renouncing what Weber in the last century called the administrative society whose feature that stood out was the vertical bureaucratic organization where information flowed from the top under the direction of managers downwards, employee and respectively student education systems characteristic of late industrial organization in the nineteenth century (Weber, 1993). (Esteban & López Meneses, 2015).

The alternative is for universities to overcome new challenges in the knowledge and communication society, to use a combination of face-to-face teaching with online teaching and to distinguish between what is learned and what is not learned, to teach and share learning through various communication channels.

Milagro State University, like all universities, adapts to the organizational forms of society, because traditionally the transfer of knowledge and information face-to-face is carried out from the owner, the teacher, to the recipient, the student. This model of transmission is a faithful reflection of the technological organization of society, in which the owners of the mass media transmit information or knowledge to the public (García Aretio, 2015).

In a traditional introductory class to face-to-face training systems, an example of this is the delivery model supported and legitimized by communication, mainly in written language and very rarely verbal (Rovai, Ponton & Panadero, 2008). The organization of face-to-face systems moves away from the usual classroom class, to prioritize the process of knowing where attention shifts from what is present, teach, and directs to learning. This new approach caused a trend in the didactic organizational model of virtual education, which moves from the reserved to the open, from individual face-to-face work to online work, from individual work to teamwork, from product orientation to participation, from an elitist position to an open position, from the internal criterion of educational quality to an explicit criterion. from providing information to promoting active learning (Harvey & Knight, 1996)

This changed in the educational didactic organizational model with the use of Information and Communication Technologies in the face-to-face education system. It would allow the university to organize information and knowledge with versatile, transversal, longitudinal, horizontal, vertical and unlimited options In the context of the information age and the interactive society, Information and Communication Technologies are available for the design of training systems and programs, in the face-to-face modality they express a face-to-face modality and distance modality and are mainly related to the transmission of voice, image and data.

The transmission of data to send and receive data is mainly used by computers to send and receive data. information in electronic format. It is in computer science, a field of technology in which unprecedented changes took place and that had a very important impact on training and teaching, as a result of the great possibilities offered by the

computer to transmit information. It became a learning machine by which individual lessons and preparatory courses can be offered to the student, not only as an assistant in teaching, but also as an aid in managing and producing learning and participating in the acquisition of information and student progress. Another advantage that computers provide in their function as a means of communication is to include them as a resource in the planning of teaching work, in activities of distribution of e-mail, fax, real-time conferences and applications of the World Wide Web (www).

This global and institutional context provides an opportunity to improve the teaching-learning processes of our students and sometimes solves the problem in any educational institution. Specifically, this research has the general objective of improving, building and strengthening the competencies of students in the methodology of research, in various professions taught at the university. This is also an initiative to create instructional materials available online in virtual spaces that contain interactive content, exercises, and learning objects where the phenomena included in the curricula and programs are modeled.

An alternative to this need is massive open online courses that do not require a teacher, because their design allows the student to progress at their own pace. MOOCs are a good solution, because people who do not have the opportunity to obtain a higher education, can study with the same materials and teachers as in industrialized countries. They can be used to create information about participating users. Education meets the needs and interests of students. There is no limit on the number of entries. You can follow them online, you don't need to attend the Open school and access to learning is free.

However, they have disadvantages such as the fact that they are made by programmers and are not designed to fit the prior knowledge that each student possesses. Students do not know the time required to complete them; Sometimes they lack the necessary technical knowledge. Assessment doesn't always rate students' actual learning. The Laboratory of Evaluation and Digital Education, LEED, of the National Autonomous University of Mexico, created a course proposal that recovers the massive character of MOOC courses, which are open and self-directed but have a greater advantage in learning activities than if they value competence because they have a curriculum based on results. as well as exams that allow the user to place themselves at a level and can choose the modules in relation to their individual training needs.

## **Methodology**

The development of this research follows a quantitative approach and design because it is the one that best adapts to the characteristics and needs of this study, it is intended to measure the reality that is explored during the process, responding to the hypotheses established at the beginning of the work. The data collection technique was a survey, whose purpose was to know the current situation of the participant, in this case a MOOC in Research Methodology was designed, so this approach allows to understand in a standardized way processes and direct and realistic opinions of the participants, thus creating a quantitative phase by giving way to the statistical data of the research object. Thus, Hernandez, Fernandez, and Baptista (2014) mention: "A quantitative approach: using data collection to test hypotheses based on numerical measurements, statistical analysis to determine patterns of behavior, and testing theories" (p. 5),

The design was field because it was executed directly at the place where the research was conducted. In addition to the empirical analysis, the study also includes analyses of books, articles, journals, web theses, and other works related to the topic; In addition, a sequential explanatory design was used, through which the reasons why the phenomenon occurs in which the MOOC of Research Methodology strengthens the research process of

teachers and students and in what conditions they manifest themselves and why these two variables are related, as indicated by Hernández. Fernández and Baptista (2014, p.554).

Regarding the population, the study was aimed at students and teachers of the State University of Milagro, in the Faculty of Education. 1000 students and 50 teachers were considered. The sample was equal to the population since the survey was applied to the entire group of students and teachers. The validity of the instrument was rated by three experts in the field. Reliability was measured through consistency and Cronbach's alpha coefficient was used.

To evaluate this research, a survey consisting of 14 questions and a Likert scale was applied. The questionnaire was developed and sent by email to the subjects in the format of Google Forms. The results obtained were processed with the statistical software IBM SPSS version 22 in Spanish.

### **Theoretical framework**

A MOOC (Massive Open Online Course) is a type of online course that is designed to be accessible and open to an unlimited number of participants. These courses are offered through online platforms and are usually free, although some platforms also offer paid options to earn certificates or access to additional content. MOOCs are designed to provide online education on a large scale and are usually taught by experts in the respective field. Participants can access course materials, such as lecture videos, readings, activities, and assessments, through the online platform. They also often include discussion forums and other interactive tools that allow participants to interact with each other and with instructors (Arboleda, 2018).

MOOCs cover a wide range of topics, from science and math to humanities and arts. Some popular platforms that offer MOOCs include Coursera, edX, and Udacity, among others. The flexibility of MOOCs, their accessibility, and the ability to learn from experts in different fields make them an attractive option for those who want to gain new knowledge and skills online, without the time and location constraints of traditional education. MOOCs (Massive Open Online Courses) emerged in the early 2010s as a new form of online education that allowed thousands of people to access courses taught by prestigious educational institutions around the world for free (Ayabara, 2019).

The concept of MOOCs originated in 2008, when George Siemens and Stephen Downes offered an online course called "Connectivism and Connective Knowledge" at the University of Manitoba, Canada. This experimental course attracted a large number of participants and laid the groundwork for the development of MOOCs (Sangra, 2021 & Silva, 2021).

In 2011, Sebastian Thrun and Peter Norvig of Stanford University offered an online course on artificial intelligence, titled "Introduction to Artificial Intelligence." The course attracted more than 160,000 students from all over the world, demonstrating the enormous potential of massive online education (Tunimo, 2016).

In the wake of the success of these courses, several MOOC platforms emerged, such as Coursera, edX, and Udacity, which partnered with reputable educational institutions to offer free online courses in a wide range of topics. These platforms developed a technological infrastructure that enabled the delivery of educational content on a large scale, including videos, assignments, exams, and discussion forums. MOOCs are characterized by their accessibility and flexibility. Anyone with internet access can enroll in a MOOC course, regardless of geographic location or educational level. Participants can study at their own pace and on their own schedules, making them ideal for those who work or have other responsibilities (Duart, Roig-Vila, Mengual- & Maseda, 2017).

As MOOCs gained popularity, different business models also emerged. While many MOOCs are still free, some platforms started offering verified certificates for a fee. These certificates often require completing additional assignments and exams to demonstrate proficiency in the content. Over time, MOOCs have evolved and adapted to the needs of students and educational institutions. The topics and diversity of courses have expanded, and many institutions now recognize MOOC certificates as academic credit or as evidence of professional development (Verdesoto, 2020).

In short, MOOCs have revolutionized online education by offering free access to high-quality educational content taught by renowned educational institutions. They have democratized education by allowing anyone the opportunity to learn and improve their skills in a wide variety of subjects, and have opened up new possibilities for lifelong learning (Luque, Molanes, & García, 2013).

There are several MOOCs (Massive Open Online Courses) available in research methodology (Medina & Aguaded, 2014). These courses can be an excellent option to learn the fundamentals of research methodology in a flexible and self-taught way. Below, I'll mention some popular MOOCs in this area: Coursera: "Methodology of Scientific Research" – Taught by the National Autonomous University of Mexico (UNAM), this course offers a comprehensive introduction to scientific research methodology. It covers topics such as problem formulation, research design, data collection and analysis, and research ethics (Mengual, Vásquez, & Eloy, 2016).

edX: "Introduction to Research Methods" – Offered by Emory University, this course provides an overview of research methods in the health and social sciences. It focuses on the formulation of research questions, the collection and analysis of data, and the interpretation of results (Ruiz, 2013)., (Miríadax, 2017).

FutureLearn: "Research Methods in Psychology" – This course, taught by the University of York, focuses on research methods used in psychology. It covers topics such as research design, data collection, statistical analysis, and communication of results.

Udemy: "Methodology of Scientific Research" - This course in Spanish provides a comprehensive introduction to scientific research methodology. It covers everything from the basics to more advanced aspects, such as writing scientific articles and reviewing the literature.

These are just a few examples of MOOCs available in research methodology. I would recommend exploring platforms like Coursera, edX, FutureLearn, and Udemy, as they offer a wide range of courses in this area and you'll be able to find one that fits your needs and level of knowledge.

MOOCs (Massive Open Online Courses) are online courses that are available to a wide audience and are usually free. There are several online learning platforms (LMSs) that offer MOOCs. Below, I will mention some of the most popular platforms:

Coursera: Coursera is one of the most well-known online learning platforms. It offers a wide variety of MOOC courses in collaboration with renowned universities and organizations around the world. Some courses are free, but there are also paid options to earn certificates and access to additional content. edX: edX is a MOOC platform founded by Harvard University and the Massachusetts Institute of Technology (MIT). It offers a wide range of free courses in various areas, such as science, technology, humanities, business, among others. You can also choose to receive a certificate of completion by paying a fee. Udemy: Udemy is an online learning platform that allows instructors to create and sell their courses. While not all courses on Udemy are MOOCs, you can find a plethora of options at affordable prices. There are free and paid courses, and they cover a wide range of Prendes topics (Espinosa & Sánchez Vera, 2014).

FutureLearn: FutureLearn is a UK-based MOOC platform. It offers a wide selection of free and paid courses, developed in collaboration with universities and organizations around the world. It also offers certificates of completion for some courses. These are just a few of the popular LMS platforms that offer MOOC courses. Each has its own course offerings and pedagogical approaches.

Moodle is a very popular online learning platform that is used for the creation and management of online courses. Many educational institutions and organisations use Moodle to offer online courses, including Massive Open Online Courses (MOOCs). A MOOC (Massive Open Online Course) is an online course that is designed to be accessible to a large number of participants for free. These courses are usually taught by professors or experts in a specific field and focus on varied topics, from science and technology to humanities and business.

Moodle provides a robust infrastructure for creating and managing MOOCs. If you are interested in taking a MOOC on the Moodle platform, you can search online for different educational institutions and organizations that offer courses on that platform. Some institutions have their own Moodle instances, while others use shared instances or custom versions of Moodle.

Moodle is only an online learning platform, and MOOCs in Moodle are provided by external educational institutions or organizations. Moodle is an open-source learning management system (LMS), which means its software is designed to help educators create online courses and manage learning in a virtual environment. Moodle provides a robust and flexible platform that allows educators and students to interact, collaborate, and participate in online learning activities (Vladimirovna & Valentinovna, 2018).

Key features of Moodle include:

Course creation: Moodle allows educators to create online courses with various resources and activities, such as reading materials, quizzes, assignments, discussion forums, wikis, and more. Communication and collaboration: Participants can communicate and collaborate through tools such as discussion forums, chats, internal messaging, and video conferencing. Assessment and tracking: Educators can use Moodle to create and manage online assessments, such as quizzes and assignments, and track student progress. Customisation: Moodle is highly customisable, meaning that educators can tailor the look and functionality of their courses according to their needs and preferences. Mobile access: Moodle is mobile-friendly, allowing students to access and participate in courses from their smartphones or tablets.

Moodle is used in a wide variety of educational settings, including schools, universities, businesses, non-profits, and governments. Being open source, Moodle is free and has a global community of developers and users who contribute to its continuous improvement and development. Moodle was created by Martin Dougiamas, an Australian developer and educator. Martin started working on Moodle in 1999 as part of his postgraduate thesis at Curtin University of Technology in Australia. Their goal was to design an online platform that would encourage collaboration, active learning, and interaction between students and teachers. In 2002, Dougiamas released the first version of Moodle, which was based on constructivist and social pedagogical principles. Since then, Moodle has seen significant growth and has become one of the most popular and widely used learning management platforms worldwide. Martin Dougiamas continues to lead the development of Moodle and plays an active role in its community of users and developers. His vision and commitment to online learning have been instrumental to the success and evolution of Moodle as an open source learning management platform.

In short, Moodle is an online learning management platform that provides educators and students with an effective way to interact, collaborate, and participate in online learning courses and activities. A massive self-managed course to train in scientific research

competencies for university students aims to provide students with the necessary skills to carry out scientific research effectively. Some key features of this type of course could include: Modular structure: The course can be organized into modules that cover different aspects of scientific research, such as formulating research questions, literature review, experimental design, data analysis, and communicating results.

Multimedia content: A variety of multimedia resources, such as videos, presentations, readings, and practical examples, can be used to facilitate understanding of research concepts and techniques. Hands-on activities: Hands-on activities that allow students to apply the knowledge gained can be included. These activities may include the development of research protocols, the analysis of real data, the writing of scientific reports, and the presentation of results. Formative assessment: Tests and exercises can be provided to assess student progress and provide ongoing feedback on their performance. This will allow them to improve their skills as they progress through the course. Learning community: Collaboration and the exchange of ideas among students can be encouraged through discussion forums, working groups, and group activities. This will promote social learning and allow students to benefit from the perspectives and experiences of their peers. Permanent Access: As it is a self-managed course, students will have continuous access to the material and will be able to progress at their own pace, adapting it to their schedule and individual needs. Additional Resources: Additional resources, such as links to scientific articles, recommended bibliographies, and relevant software tools, can be provided to expand students' knowledge and research skills.

Importantly, the specific features of the course may vary depending on the educational institution or platform on which it is offered. The structure and content of the course should be designed in a way that promotes a sound understanding of the principles and practices of scientific research, and encourages the development of practical skills that are applicable in academic and professional contexts.

Google Classroom is a free platform for schools, nonprofits, and anyone with a personal Google account. It was launched by Google in 2014 with the aim of simplifying and improving the creation, distribution, and grading of assignments digitally. Key features of Google Classroom include:

Classroom management: Google Classroom allows educators to create classrooms, invite students, assign and grade assignments, and give feedback on a single platform. Google Workspace integration: Google Classroom integrates tightly with other Google Workspace (formerly G Suite) tools, such as Google Docs, Sheets, Slides, and Drive. This allows educators and students to create and share documents directly within the platform.

Class Communication: Google Classroom has a "Stream" feature that functions as a class bulletin board, allowing educators to make announcements, ask questions, and facilitate discussions.

Assignments and grades: Educators can assign assignments and quizzes directly through Google Classroom. They can also review and grade these assignments within the platform, and students can view their grades and feedback.

Originality of reports: To help prevent plagiarism, Google Classroom can generate originality reports that compare student work to published websites and books.

Accessibility: Google Classroom can be accessed from any device with an internet connection, and it has dedicated apps for Android and iOS devices.

Google Classroom has been widely adopted in many schools and school districts around the world, especially during the period of remote learning caused by the COVID-19 pandemic.

Connectivism is a learning theory that explains how people acquire, process, and use information. It was proposed by George Siemens and Stephen Downes in the early 21st

century, and is considered a response to the limitations of other learning theories such as behaviorism, cognitivism, and constructivism. The key characteristics of connectivism are as follows:

**Knowledge networks:** Connectivism holds that learning occurs through knowledge networks, both in the brain and in social networks. Knowledge is distributed in these networks and learning occurs when an individual connects and navigates these networks.

**Importance of context:** According to connectivism, the context in which information is learned is crucial. The same piece of information can have very different meanings depending on the context in which it is learned.

**Continuous learning:** Connectivism holds that learning is an ongoing process that does not stop once an individual has left the educational environment. Lifelong learning is a fundamental part of connectivism. **Updating:** Connectivism recognizes that knowledge changes rapidly, especially in the digital age. Therefore, learning does not only involve acquiring new knowledge, but also updating and unlearning obsolete knowledge.

**Importance of social and digital networks:** Social and digital networks are vital for learning in connectivism. These networks provide access to a wealth of information and also allow people to learn from each other's experiences and knowledge.

In summary, connectivism is a modern learning theory that considers learning to be a networked, social, continuous, contextual, and constantly updating process

## **Results**

The results were processed and the following effects were obtained with respect to the fourteen most important questions under analysis and to establish a conceptual framework to draw conclusions about the propensity to use MOOCs as a learning tool in Ecuadorian universities. The results of the quantitative study show that teachers and students do not have much knowledge to use MOOC courses, but it can also be concluded that they have great potential to develop in Ecuador and their work environment increases their recognition. Universities must visualize their strengths and use them as educational administrative support. Regarding MOOCs, despite their recent entry into the educational market, there is already a lot of analysis of their educational effects and to ensure it in the future as a means of preparation for those who do not have access to quality face-to-face training and also for those who seek to expand their knowledge.

One of the most important aspects is that despite their participation in the student market and all the millions for students who finished, pursued and accepted studies at this level, universities did not see them as an enemy but as an ally, allowing students to learn from other environments, creating potential opportunities for the development of a quality education.

## **Conclusions**

In Ecuador, there is a lack of information about its benefits and that more and more people are participating and processing new ones. Topics of knowledge, pointing out that MOOCs are not only for education to get a job but to strengthen and increase knowledge, updates of the best universities in the world. Through the research it was visualized to show the potential of the students, but of the whole country. Have access to higher education free of charge and with minimum representative fees according to different institutions and types of programs in which it participates. The need for a wider distribution than MOOCs in order to reach a wider audience should be analysed, largely based on the profile of middle-aged students, who have a job and already have higher education.

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