USABILITY PROBLEMS OF LMS LEARNING MANAGEMENT SYSTEMS, BASED ON THE MOODLE PLATFORM

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Summary
A documentary review was carried out on the production and publication of research papers referring to the study of the variables Learning System and Moodle, as software to create and manage personalized online educational environments. The purpose of the bibliometric analysis proposed in this document was to know the main characteristics of the volume of publications registered in the Scopus database during the period 2017-2022, achieving the identification of 1620 publications. The information provided by this platform was organized through graphs and figures categorizing the information by Year of Publication, Country of Origin, Area of Knowledge and Type of Publication. Once these characteristics have been described, the position of different authors towards the proposed theme is referenced through a qualitative analysis. Among the main findings made through this research, it is found that the Russian Federation, with 151 publications, was the country with the highest scientific production registered in the name of authors affiliated with institutions in that country. The Area of Knowledge that made the greatest contribution to the construction of bibliographic material referring to the study of Learning Systems and Moodle, was Computer Science with 1045 published documents, and the Type of Publication most used during the period indicated above were Conference Articles with 56% of the total scientific production.
Keywords*: Learning System, Moodle.*

1. Introduction

Education is a trigger for evolution, the practice of imparting and acquiring knowledge has played a fundamental role in society, its function and importance is vital for the construction of paths that lead to progress and a promising future, that is why, from the different institutions of an educational nature, over the years they have been framed, dogmas, practices and models that constitute the true force of teaching. In recent years, higher education institutions have implemented the use of Information Technology (ICT) as tools that offer dynamism in the learning management system (LMS). *Learning Management System*), through software applications such as Moodle. The above, as individuals who develop today, gestate their needs from the digital context from the moment they are born, an indisputable fact for those who form and are part of academic institutions and who must not only implement, but promote the flexibility and integration of ICT. (Sánchez, Sánchez, & Ramos, 2012)(Prensky, 2001)

There are all kinds of documents of a scientific and academic nature, which analyze and study the implementation of technology for the achievement of new knowledge and from what is already known and especially related to the inclusion of Moodle, however, it is of little knowledge the investigations based from the student perspective and in the face of teaching-learning practice, In addition to ignoring what the challenges are from its applicability, what benefits it gives to the current

pragmatics and what challenges teachers face today. (Cole & Helen, 2007)(Pérez, Garcia-Arista, Arratia, & Galisteo, 2009)

The objective of this scientific document is to determine the benefits and disadvantages of these softwares as teaching tools, once the proposed bibliometric analysis has been carried out.

For all the above, we seek to verify with this article if the variables Learning Systems, Moodle, can be considered educational dogmas for student learning, through the description of the main characteristics of the set of publications attached to the Scopus database and that are related to our variables, as well as the description of the position of certain authors affiliated with various institutions during the period between 2017 and 2022.

2. GENERAL OBJECTIVE

Analyze from a bibliometric and bibliographic perspective, the elaboration and publication of research works in high impact journals indexed in Scopus database on the variables Learning System, Moodle, during the period 2017-2022.

3. METHODOLOGY

This article is carried out through a mixed orientation research that combines the quantitative and qualitative method.

On the one hand, a quantitative analysis of the information selected in Scopus is carried out under a bibliometric approach of the scientific production corresponding to the study of the Learning System and Moodle.

On the other hand, examples of some research works published in the area of study indicated above are analyzed from a qualitative perspective, starting from a bibliographic approach that allows describing the position of different authors against the proposed topic. It is important to note that the entire search was performed through Scopus, managing to establish the parameters referenced in *Figure 1*.

3.1. Methodological design

Figure 1*. Methodological design*
Source: Authors.

3.1.1 Phase 1: Data collection

Data collection was executed from the Search tool on the Scopus website, where 1620 publications were obtained from the choice of the following filters:

TITLE-ABS-KEY (learning AND system, AND moodle) AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017))

- Published documents whose study variables are related to the study of Learning Systems and Moodle.
- Limited to the years 2017-2022.
- Without distinction of country of origin.

- Without distinction of area of knowledge.
- Regardless of type of publication.

3.1.2 Phase 2: Construction of analysis material

The information collected in Scopus during the previous phase is organized and subsequently classified by graphs, figures and tables as follows:

- Co-occurrence of words.
- Year of publication.
- Country of origin of the publication.
- Area of knowledge.
- Type of publication.

3.1.3 Phase 3: Drafting of conclusions and outcome document

In this phase, we proceed with the analysis of the results previously yielded resulting in the determination of conclusions and, consequently, the obtaining of the final document.

4. Results

4.1 Co-occurrence of words

Figure 2 shows the co-occurrence of keywords found in the publications identified in the Scopus database.

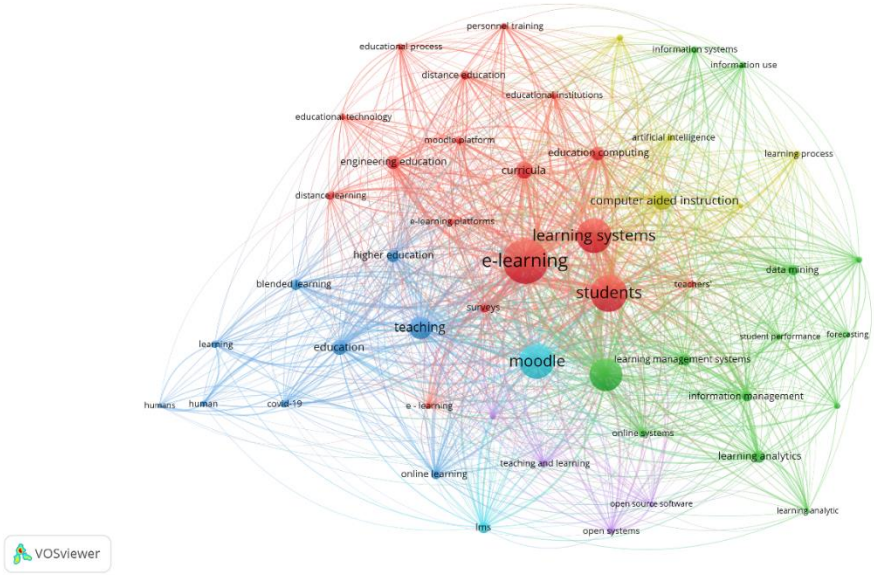

***Figure 2**. Co-occurrence of words*

Source: Own elaboration (2023); based on data exported from Scopus.

The data in Figure 2, exported from Scopus, shows us our variables and their relationship with other terms which we will explain below.

Within the framework of professional and personal skills, we understand that education is a pillar that bases the growth and character of the being, so it is evident that words such as e-learning, students and learning systems, have a strong presence in the articles indexed in the Database consulted, as it is precisely the introduction of ICT as a learning method, The objective of this analysis and that in this order of ideas words such as Moodle, Teaching and Higher Education, also find active participation, taking into account that Moodle as software, is currently used as a tool that represents a factor of modernization and improvement as an instrument of integrator of technology in teaching.

On the other hand, they complement words such as Distance Education and Artificial Intelligence, as phenomena to take into account, in the future strengthening of these educational practices, through their use and the different modalities.

4.2 Distribution of scientific production by year of publication

Figure 3 shows how scientific production is distributed according to the year of publication.

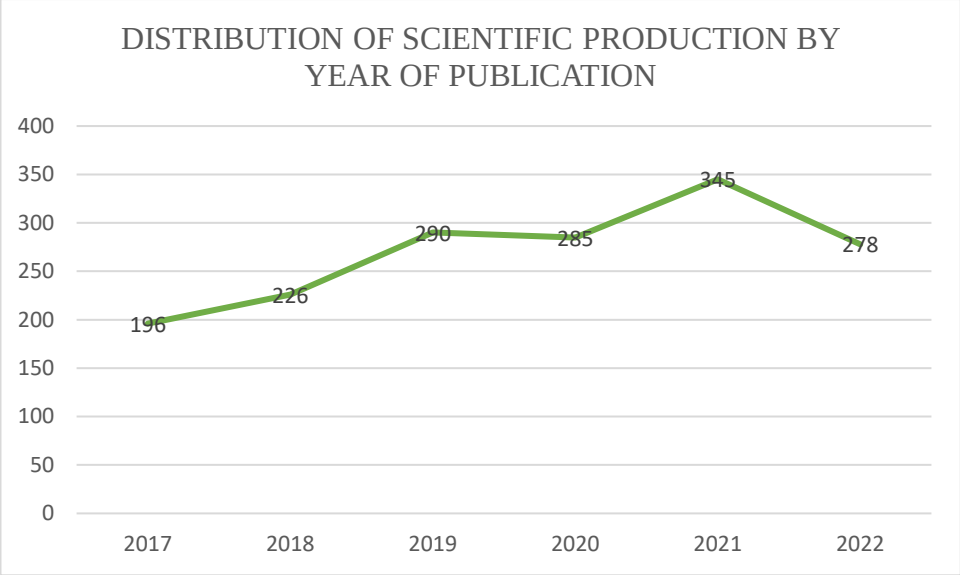

***Figure 3**. Distribution of scientific production by year of publication.*
Source: Own elaboration (2023); based on data exported from Scopus

In figure 3 we find that, the scientific production concerning the variables Learning Systems, Moodle, during the period between 2017 and 2022, is of remarkable volume and importance, having a total of 196 publications in the year of 2017 and reaching 278 in the validity of 2022, despite the highest peak in the growth line of Figure 3, is in 2021, finding that only in that annuity there are 345 publications indexed to the study of the variables, so it is important to highlight the article of this period "Classification of learning patterns and outliers through sequences of clicks of Moodle course material and questionnaire scores", whose objective, consisted of establishing through a method, the identification of students, who with the use of the Software, were in difficulty between the learning patterns and the outliers, for this it was referred to the flow of clicks in the course material and the qualification of the same in the application and to be able to locate them in the learning patterns. The metrics of this type of articles are important, with the aim of expanding the spectrums against the use of Moodle and the existing problems against its use. (Dobashi, Ho, Fulford, Lin, & Higa, 2021)

On the other hand, the 2022 article, entitled "Development of LMS Moodle Media in the learning of mathematics in upper secondary school", research that was carried out, with the aim of developing learning means in the logical-mathematical area, based on the Moodle Learning Management System (LMS) and through the guiding verbs of Analysis, is identified with great relevance, Design, Development and Implementation of the population group belonging to the State High School of the City of Bandung, who went through small and large-scale filters in observance of experts in the field, for which it was concluded that the implementation of said Software is valid and use optimizes the educational standards already known. (Priatna, Martadiputra, & Ridhwansyah, 2022)

4.3 Distribution of scientific production by country of origin

Figure 4 shows how scientific production is distributed according to the nationality of the authors.

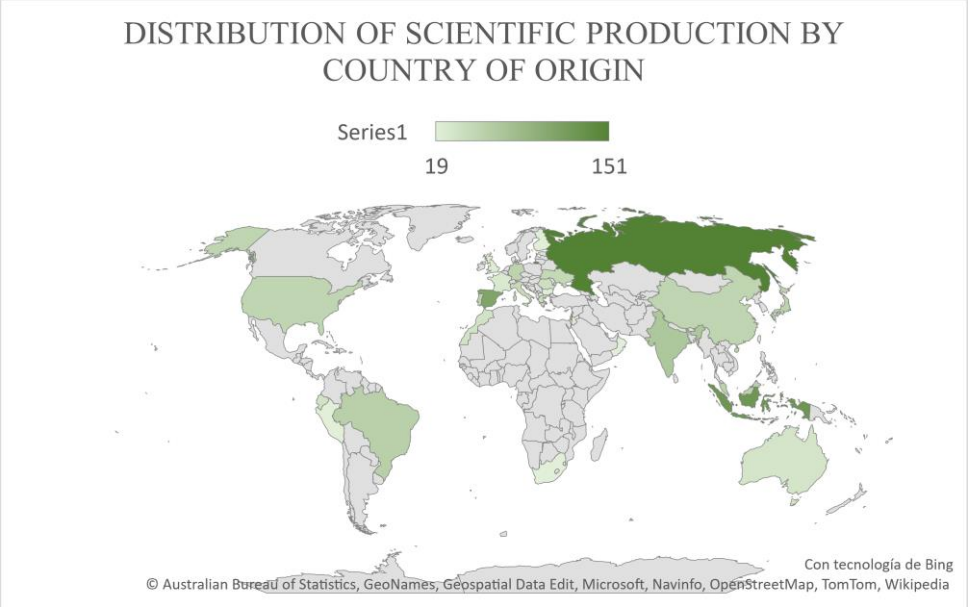

Figure 4*. Distribution of scientific production by country of origin.*
Source: Own elaboration (2023); based on data provided by Scopus.

In the study of the variables object of this analysis, we can observe that the country of Russian Federation leads the number of authors affiliated to institutions of that nation with a total of 151 publications, followed by the country Indonesia with a total of 126 documents and in third place we find Spain with a total of 109 publications respectively.

The analysis of the proposed topic in the face of the variables raised, are developed by hundreds of authors around the world, since it is necessary to give breadth to the issues related to education and its improvement as a field for progress, so it is necessary to highlight the article of authors registered to institutions of the Colombian country entitled "Exploring the Colombian digital divide using Moodle records through supervised learning", which consisted of determining, through the methodology of intersectoral standard process for data mining, which includes the development of six phases (understanding the problem, understanding the data, data preparation, modeling, evaluation and implementation), to the Moodle platform of the UNAD Distance University of the municipality of Antioquia, in Colombia. Study that showed that there is a significant digital divide between students belonging to regions outside the metropolitan area and those who find their domicile in this, this in light of the implementation of ICT as study tools in the country, however, this crack may be reduced provided that good models are replicated and with the representation of the state, on the other hand, it is necessary to personalize the particular needs of students, by the Moodle platform. (Morales, Leon, Garcia-Bedoya, & Galpin, 2022)

They also have great contributions to the analysis of these variables, authors affiliated with the countries of India, Brazil and Malaysia.

4.4 Distribution of scientific production by area of knowledge

Figure 5 shows the distribution of the elaboration of scientific publications from the area of knowledge through which the different research methodologies are implemented.

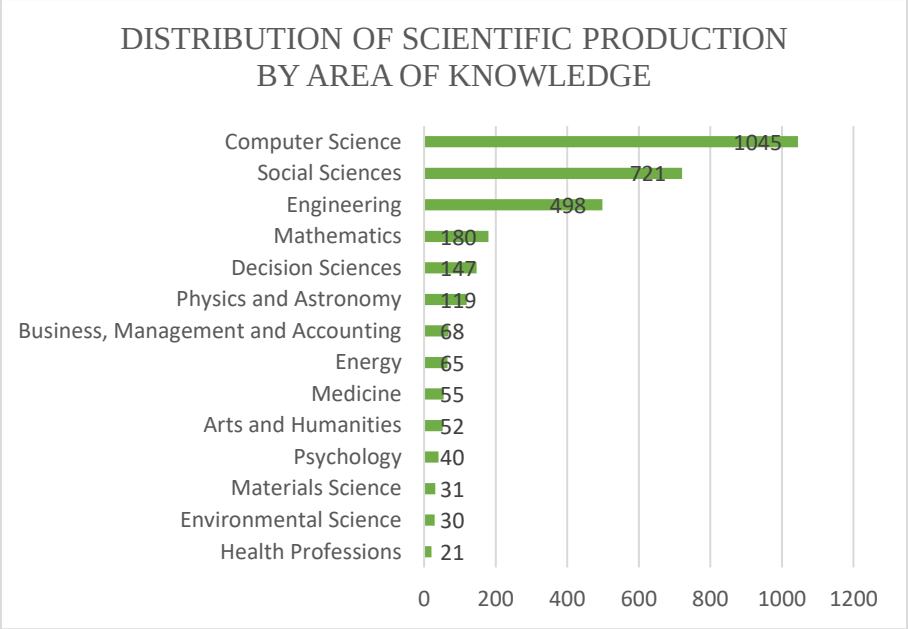

***Figure 5**. Distribution of scientific production by area of knowledge.*
Source: Own elaboration (2023); based on data provided by Scopus.

Figure 5 shows how the different areas of knowledge focus their research on the study of the variables of this debt, as it is highlighted the importance of the analysis of these topics, to obtain new, truthful and complete information that helps the optimization of learning management systems through the use of technological applications.

It is for this reason that it is not surprising that Computer Science as an area of knowledge, make the greatest contribution with a total of 1045 documents in Scopus Database, likewise, in this study converges the human component as an asset of society, so, Social Sciences as an area, It has a total of 721 documents indexed in the analyzed Database and in a third place Engineering as a science makes its contribution with 498 documents. In this sense, the Computer Science article called "Proposal to improve the design of the interface and user experience (UX) in Moodle: student feedback" stands out, which concentrated its efforts on determining the obstacles faced by students, through the use of the Learning Management System (LMS), among which the inadaptability of virtual media stands out, with applications of difficult access and interpretation, for the same, questionnaires that integrate the User Experience Questionnaire (UEQ) scale were applied to the students of a Distance Education Institution, finding dissatisfaction on the part of the same, a situation that led to the implementation of a renewed and redesigned interface for an optimal academic experience, for which it is concluded that, it is not only about implementing Software to the academy that allows to expand the educational panorama, but that they must have a design that facilitates the synergy that is intended and that covers fundamental aspects such as Transparency, Controllability and Effectiveness. (Segovia-García, 2022)

4.5 Type of publication

In the following graph, you will observe the distribution of the bibliographic finding according to the type of publication made by each of the authors found in Scopus.

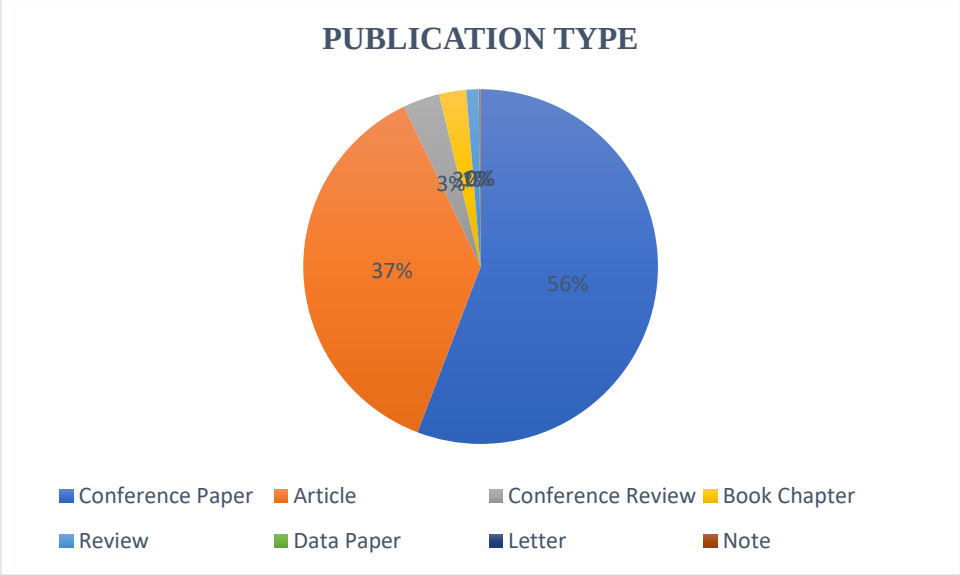

***Figure 6**. Type of publication.*
Source: Own elaboration (2023); based on data provided by Scopus.

In order to find new knowledge, study, analyze and interpret them, the different authors have different methodologies and types that are used as vehicles for the transmission of such knowledge, in observance of Figure 6, we find that the Conference Article, is the most used by the different authors with 56% of the total, followed by the Article with 37% and in third place the Conference Review with 3% in Scopus Database.

It is preponderant to highlight the conference article entitled "The use of Moodle as a learning management system to improve student learning outcomes", whose study found its need, once the repercussions of COVID -19 as a global health emergency became evident, confinement as a preventive measure of contagion, forced the educational institutions of the world, to turn to distance education and with it to virtuality, so this study found as a purpose to establish improvements in the Moodle platform as a Learning Management system, through the use of a quasi-experimental method to a population of 301 eighth grade students of SMP Negeri in Medan, Taking a sample of 28 students and applying a multiple choice test with 4 options for measurement in the cognitive domain. This study concluded that the implementation of Moodle as a learning management system, generates benefits and advantages when acquiring knowledge and is reflected in the gain of results and acquisition of long-term memory. (Simanjuntak, Marpaung, Sinaga, & Siagian, 2022)

5. CONCLUSIONS

From the bibliometric analysis carried out in the present research work, it was established that the Russian Federation and Indonesia were the countries with the highest number of records published in relation to the variables Learning Systems, Moodle with 151 and 126 publications respectively, in attention to the Scopus database during the period 2017-2022 and that the area of knowledge with the greatest contribution was Computer Science with a Total of 1045 texts.

It is then, that once reviewed the bibliometric analysis proposed in this scientific document in front of the study of the variables, we can conclude that; With the implementation of ICT tools as a learning management system and the use of Moodle for educational practice, we face a universe of challenges and that through the analysis of the different writings of the different authors in this debt, we managed to identify to understand and explain their impact on learning management systems, Studies that promote the construction of improvements to the competency development of the application itself and likewise of the students as an active part in the learning process. This impulse is transfigured into an effort to delve into the organizational, methodological and application implications of Moodle in university teaching and how to optimize efforts to reach more effective and dynamic academic environments.

The digital divide, the little information and training on its use and scope, are one of the few problems identified in the use of Moodle in the academic environment, but that, with the active and massive participation of the entire academic conglomerate, can join forces for the potentialization of everything that this tool offers us. And it is that education will always be an unavoidable topic of discussion for the governments of the countries, its application, consolidation and development is essential for its improvement and impulse; the integration of ICT, is to approach a new educational horizon.

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