MLS - EDUCATIONAL RESEARCH (MLSER)
http://mlsjournals.com/Educational-Research-Journal
ISSN: 2603-5820

(2025) MLS-Educational Research, 9(1), 44-60. doi.org/10.29314/mlser.v9i1.2569.

VIRTUAL MOODLE EDUCATION PLATFORM TO ENHANCE THE VIRTUAL TEACHING-LEARNING PROCESS IN THE COMPETENCY-BASED EDUCATIONAL MODEL. CASE STUDY: SECONDARY EDUCATION IN PERU

PLATAFORMA VIRTUAL DE EDUCACIÓN MOODLE PARA MEJORAR EL PROCESO DE ENSEÑANZA APRENDIZAJE VIRTUAL EN EL MODELO EDUCATIVO POR COMPETENCIAS. CASO; EDUCACIÓN SECUNDARIA EN PERÚ

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Manuscript information:

Recibido/Received: 27/01/2024
Revisado/Reviewed: 29/04/2024
Aceptado/Accepted: 22/07/2024

Keywords:
teaching-learning process, competency-based educational model, Moodle virtual education platform, implementation of technology in education.

ABSTRACT

This project focuses on the implementation of Moodle on Amazon EC2 to enhance competency-based learning in an educational institution in Cusco, Peru. In an effort to overcome technological limitations, the aim is to elevate the quality of the teaching and learning process. The quantitative research comprised an exploratory study to understand the institution's needs, followed by the design and implementation of Moodle on Amazon EC2. Key results include access to didactic and educational materials, curriculum areas, grade reports, and educational plans aligned with the National Curriculum of Basic Education. The platform facilitated dynamic interaction between students and teachers, improving engagement and collaboration. An enhancement in student development and performance was observed, evidenced by evaluations and progress tracking analyses. The efficient integration of Moodle into the Amazon EC2 cloud ensures accessibility and availability for the educational community. The implementation of Moodle proved effective in improving the quality of the teaching and learning process. Dynamic and collaborative interaction between students and teachers enhanced participation and commitment. The integration of Moodle into the Amazon EC2 cloud provides a scalable and efficient technological solution, delivering quality education and strengthening the capabilities of students.

RESUMEN

Este proyecto se enfoca en la implementación de Moodle en Amazon EC2 para mejorar el aprendizaje basado en competencias en una

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Palabras clave:
proceso de enseñanza-aprendizaje, modelo educativo por competencias, plataforma virtual de educación Moodle, implementación de tecnología en la educación.

institución educativa en Cusco, Perú. Buscando superar limitaciones tecnológicas, se persigue elevar la calidad del proceso de enseñanza-aprendizaje. La investigación cuantitativa comprendió un estudio exploratorio para entender las necesidades de la institución, seguido del diseño e implementación de Moodle en Amazon EC2. Resultados clave incluyen el acceso a materiales didácticos y educativos, áreas curriculares, boletas de notas, y planes educativos alineados al Currículo Nacional de la Educación Básica. La plataforma facilitó la interacción dinámica entre estudiantes y profesores, mejorando la participación y colaboración. Se observó una mejora en el desarrollo y desempeño estudiantil, evidenciado por análisis de evaluaciones y seguimiento de progreso. La integración eficiente de Moodle en la nube de Amazon EC2 garantiza accesibilidad y disponibilidad para la comunidad educativa. En conclusión, la implementación de Moodle demostró ser eficaz para mejorar la calidad del proceso de enseñanza-aprendizaje. La interacción dinámica y colaborativa entre estudiantes y profesores mejoró la participación y el compromiso. La integración de Moodle en la nube de Amazon EC2 proporciona una solución tecnológica escalable y eficiente, brindando educación de calidad y fortaleciendo las capacidades de los estudiantes.

Introduction

The COVID-19 pandemic has intensified global dependence on electronic devices, transforming communication and affecting key spheres such as commerce, science, entertainment and, especially, education. This change has driven the need to integrate Information and Communication Technologies (ICT) in the educational environment, modifying teaching and demanding new pedagogical strategies in educational institutions.

This study focuses on the Private Educational Institution in the district of Limatambo, Cusco, Peru, and explores how the implementation of the Moodle platform on Amazon EC2 can significantly improve the competency-based teaching-learning process. The research establishes the relevance of the study by connecting it to previous research that highlights the critical need to integrate technology into education. The literature review reveals a convergence of trends: the emergence of virtual learning environments, the change in the teaching role from transmitter to facilitator of learning, and the acceleration of these transformations due to the pandemic.

The research not only presents findings on the use of Moodle, but also provides a theoretical analysis grounded in the relevant literature. This theoretical framework informs the hypotheses and objectives outlined in the project, key aspects for understanding the context and purpose of the study. The methodology used is quantitative, collecting data through surveys and analyzing them using appropriate statistical techniques.

The study used an experimental design with a control group to evaluate the impact of the implementation of the Moodle platform on the teaching-learning process in the competency-based educational model. The results obtained will be contrasted and discussed in detail in the results section, providing a comprehensive and complete analysis.

State of the Art

In the context of virtual education, virtual platforms have become indispensable tools to facilitate the distance teaching and learning process (Pérez Pérez, 2020). These platforms are to provide virtual learning environments that allow students to access learning resources, participate in interactive activities, collaborate with other students, and receive feedback from teachers.

Moodle is a learning management system (LMS) widely used in the education sector. Developed by Martin Dougiamas in 2002, it has become one of the most popular open source virtual platforms (Fernández Naranjo and Rivero López, 2014). Its flexibility and scalability have made it attractive to educational institutions of all types, from elementary schools to universities.

The following are the main features of Moodle:

Flexibility and customization: It offers a flexible and highly customizable virtual learning environment within its platform (Valdivia and Carbonero Sánchez, 2020). Teachers can customize the structure and design of the course or area to suit their needs, add multimedia resources, create interactive activities and sequence learning within the platform.

Content management: Moodle allows the creation and organization of educational content in various formats, making it much easier for teachers to conduct lessons, such as documents, presentations, videos and links to external resources. Teachers can share

learning materials, handouts, readings and assignments for students to access and work on (Arévalo, et al., 2021).

Communication and collaboration: The Moodle platform facilitates communication between teachers and students, as well as collaboration among students. Participants can interact through discussion forums, chats, private messages and wikis. This encourages active participation and online collaboration and thus promoting the exchange of ideas and the collaborative construction of students' knowledge (Morales, 2012).

Evaluation and follow-up: Moodle offers several learning assessment tools, such as quizzes, online tests, assignments and assessments. Teachers can establish evaluation criteria based on their needs, provide feedback to students and monitor individual and group progress within the virtual platform.

Integration of external tools: The Moodle platform also allows the teacher to integrate external tools such as videoconferencing, content repositories, online collaboration tools and video systems. This provides a variety of opportunities for the student to enrich the learning experience and utilize additional resources to support teaching and learning (Bernal and Rodriguez, 2021).

Advantages of Moodle:

- It is open source and free, which means that it can be downloaded, used and modified for free.
- It has a large community of users and developers who share resources, ideas and solutions.
- It is highly customizable and adaptable to the needs and preferences of each educational institution.
- It offers a wide range of tools and functionalities to manage the virtual teaching-learning process.
- It provides a safe and secure environment for the exchange of information and the privacy of participants.

The implementation of Moodle as a virtual learning platform has had a significant impact on the teaching-learning process in various educational environments (Gilces et al., 2023).

Moodle is an open-source virtual platform, which means that it is free and can be used by any educational institution. On the other hand, Moodle offers a wide range of features and functionalities, which makes it a flexible and adaptable platform to the needs of different educational institutions (Aveiga Valencia, 2022).

The implementation of Moodle has had a positive impact on the teaching-learning process in various educational environments. The Moodle platform has enabled educational institutions to offer online courses more efficiently and effectively, and has facilitated autonomous learning for students (Fructuoso Arreaga, 2022).

The competency-based education model is an educational approach that emphasizes the development of students' competencies, i.e., the ability to apply knowledge, skills, attitudes and values in real-world contexts

(Peru. Ministry of Education, 2016). Its application involves changing the way we understand and design education, focusing on the acquisition of important skills for life and the world of work.

The competency-based educational model emphasizes the development of transversal competencies, i.e., competencies that are applicable to various contexts and situations. The development of transversal competencies is important for success in life and work.

The competency-based education model is based on the idea that education should focus on the development of competencies, understood as the ability to mobilize and apply knowledge, skills, attitudes and values in real and complex situations (Lizitza & Sheepshanks, 2020). This concept arose in response to the need to train people capable of facing the challenges of a changing and globalized world.

Integrating information technology in education means using technological tools and resources to improve the teaching and learning process. This integration is becoming increasingly important in the current context where technology plays a fundamental role in all aspects of our lives. (Street, 2021).

Integrating technology into education can help students learn more efficiently and effectively, collaborate with other students, and access educational resources more flexibly. The integration of technology in education presents some challenges, such as the digital divide and the need for teacher training (Gilces et al., 2023).

Today, the use of technology in education has increased significantly, and various trends and approaches have been developed to take advantage of its potential and improve the teaching and learning process (Mascarell Palau and Blasco Magraner, 2021).

The future of virtual education is promising. Virtual education is becoming increasingly accessible and virtual platforms are evolving to offer richer and more interactive learning experiences.

Research Justification

The implementation of a virtual teaching platform such as Moodle is important in the teaching-learning process, especially in the current context of digital transformation. In Peru, there is little use of these tools in educational institutions, and educational directors are concerned about improving academic efficiency and fulfilling the social task of enhancing the talent and capabilities of students.

The arrival of the pandemic has forced educational institutions to adapt to virtual education, but many teachers and administrators have little experience in the use of technological tools for teaching. Therefore, it is essential for teachers to be able to enrich student learning in virtual classrooms and to improve the quality of life of faculty and staff.

The proposal to implement a Moodle virtual education platform on an Amazon EC2 platform to improve the virtual teaching-learning process in the competency-based education model consists of integrating tools such as Google Meet, Google Apps, Google Drive, Google Calendar, Google Docs, Gmail and Blogs into the LMS (Learning Management System).

This virtual platform integrated to online learning through the virtual campus of the educational institution will allow teachers to have teaching materials by competencies and educational plans, which establish the skills and competencies to be achieved by students. This will provide quality education and build new knowledge.

General Objective

Implement the Moodle virtual platform to improve the quality of the virtual teaching-learning process for students of the educational model by competencies in the Private Educational Institution of the district of Limatambo.

Specific Objective

- Design the Moodle virtual platform in the competency-based educational model to improve the virtual teaching-learning process.

- Facilitate dynamic interaction between students and teachers in the virtual teaching-learning process through the Moodle virtual platform.
- Evaluate the development and improvement of the virtual teaching-learning process with the use of the Moodle virtual platform.
- Define a basic pedagogical model for virtual teaching and learning processes based on MINEDU's National Curriculum for Basic Education (CNEB).

Hypothesis

The implementation of the Moodle virtual platform in the Private Educational Institution of the district of Limatambo, Cusco, will contribute significantly to improving the virtual teaching-learning process in the competency-based educational model, by facilitating dynamic interaction between students and teachers, promoting the personalization of educational content, improving evaluation and feedback, and encouraging active participation and collaboration among students.

Independent variable: implementation of the Moodle virtual platform in the Private Educational Institution of the district of Limatambo, Cusco, to improve the virtual teaching-learning process in the competency-based educational model.

Dependent variable: the improvement of performance in the virtual teaching-learning process in the educational model by competencies of the students of the Private Educational Institution of the district of Limatambo, Cusco.

Proposed Solution

The proposed solution, which is the implementation of the Moodle virtual platform on Amazon EC2, is closely related to the specific research objectives of this project. Next, we proceed with the description and the relationship between the solution and each of the specific objectives of the implementation of the virtual platform:

Specific Objective 1: Design the Moodle virtual platform in the competency-based educational model to improve the virtual teaching-learning process. The implementation of the Moodle platform on Amazon EC2 made it possible to design the virtual platform according to the competency-based educational model. Moodle provides tools and functionalities that can be adapted to the requirements of the competency-based model, such as the organization of content by competencies, competency-based assessment and personalized feedback to students. The flexibility of Amazon EC2 allows us to configure the platform according to specific needs.

Specific Objective 2: Facilitate dynamic interaction between students and teachers in the virtual teaching-learning process through the Moodle virtual platform. The Moodle platform, deployed on Amazon EC2, provides real-time communication and collaboration tools, such as discussion forums, internal messaging, chats and video conferencing via Meet. These tools facilitate dynamic interaction between students and teachers of the educational institution, allowing instant communication, active participation and resolution of doubts in real time by teachers and students. Integration with Google Meet also provides an efficient way to conduct online sessions and foster real-time collaboration in teaching curricular areas.

Specific Objective 3: Evaluate the development and improvement of the virtual teaching-learning process with the use of the Moodle virtual platform. The implementation of the Moodle platform on Amazon EC2 made it possible to collect data and metrics on the virtual teaching-learning process. These data should include the participation of all students who interacted, the performance in the evaluations recorded in each curricular area, the interaction in the forums and the feedback received from the teachers. Using Moodle's monitoring and analytical tools, evaluations and analyses have

been carried out to measure the impact and improvement of the virtual teaching-learning process with the use of the platform.

Specific Objective 4: Define a basic pedagogical model for virtual teaching and learning processes based on MINEDU's National Curriculum for Basic Education (CNEB). The implementation of the Moodle platform on Amazon EC2 also made it possible to align the platform with the pedagogical model based on the National Curriculum for Basic Education (CNEB). The Moodle platform offers tools to organize and structure the educational content according to the curricular guidelines. In addition to being flexible, Amazon EC2 allows the platform to adapt to the requirements of the pedagogical model, such as course customization, formative assessment and individualized feedback from teachers in each curricular area.

The proposed solution for the implementation of the Moodle platform on Amazon EC2, contributes directly to the achievement of the specific objectives established in the research. It provides a virtual platform that adapts to the competency-based model, facilitating dynamic interaction between students and teachers, in order to improve the virtual teaching-learning process, and is aligned with the pedagogical model based on the National Curriculum for Basic Education (CNEB).

Method

Design

The research design used in this study is an experimental design with a control group. The objective is to evaluate the impact of the implementation of the Moodle virtual platform on the teaching-learning process in the competency-based educational model. The key elements of the research design are described below:

Where:

M = Sample

O_1= Implementation of the Virtual Moodle platform

O_2 = Learning process

r = Ratio of study variables

Experimental group: The experimental group has access to the Moodle virtual platform, where they will participate in teaching-learning activities, interact with the course content and receive feedback from teachers through the platform.

Control group: The control group used the Moodle virtual platform from time to time and continued to receive instruction in a conventional manner, with little access to the tools and functionalities provided by the platform.

Data collection: Quantitative data were collected through standardized tests and assessments to measure the quarterly academic performance of students at the educational institution.

Data analysis: Quantitative data were analyzed using statistical techniques, such as mean comparison analysis, to evaluate differences in academic performance between the experimental and control groups.

Ethical considerations: The ethical principles of the research were followed, guaranteeing the informed consent of the participants, the confidentiality of the data and respect for their privacy before being able to apply.

This experimental design with control group allowed direct comparison of the results to be obtained between the experimental group and the control group of the educational institution, which has helped to determine the specific impact of the implementation of the Moodle virtual platform in the virtual teaching-learning process in

the competency-based educational model. This design provided a solid basis for evaluating the effectiveness of the proposed solution and obtaining meaningful conclusions about its impact on student learning at the Limatambo district educational institution.

Limitations: The present study has some limitations that should be considered when interpreting the results. First, the study was conducted in a single educational institution, so the results may not be generalizable to other institutions. Second, the study was conducted over a relatively two-quarter time period, so the results may not reflect the long-term effects of implementing the Moodle platform.

Despite these limitations, the results of the study suggest that the implementation of the Moodle platform can have a positive impact on the virtual teaching-learning process in the competency-based educational model.

Participants

Forty students participated in this study out of a total of 74 secondary school students from a private educational institution in the district of Limatambo, Cusco. Participants ranged in age from 14 to 17 years, with an equal gender distribution. The sample was selected by stratified random sampling, dividing students by grade (1st, 2nd, 3rd, 4th and 5th) to ensure representativeness in terms of educational level at the secondary level.

Experimental group: The experimental group consisted of 20 randomly selected students from each grade at the secondary level. The students in this group had no previous experience with the Moodle platform and their previous academic performance was similar to the institution's average. During the study, students in the experimental group had full access to the Moodle platform to perform educational activities, interact with teachers, interact with available resources and tools, and receive competency-based instruction.

Control group: The control group consisted of the remaining 20 students in each grade at the secondary level. The students in this group also had no previous experience with the Moodle platform and their previous academic performance was similar to the institution's average. During the study, students in the control group did not have access to the Moodle platform or receive any other special intervention.

Limitations: The sample of this study has some limitations that should be considered when interpreting the results. First, the sample was selected from a single educational institution, so the results may not be generalizable to other institutions. Second, the sample was selected over a relatively short period of time, so the results may not reflect the long-term effects of implementing the Moodle platform.

Instruments

In this study, four instruments were used for data collection. The instruments used are described below:

Questionnaire: A structured questionnaire was used to collect quantitative data and student opinions. The questionnaire included questions designed to evaluate various aspects related to the students' experience in the use of the Moodle virtual platform. Among these aspects were the perception of the impact of Moodle on their teaching-learning process, the ease of use of the platform, satisfaction with its features and other relevant elements.

Tests and evaluations: To measure students' academic performance in various curricular areas, standardized tests and assessments were administered. The data

collected were analyzed by descriptive analysis and the results were presented using bar graphs to facilitate their interpretation.

Interview guides: Structured interview guides were prepared for in-depth interviews with teachers and managers. The interview guides focused on aspects such as teachers' and managers' experience with the Moodle platform, their opinions on the impact of the platform on student learning, and their recommendations for improving the platform.

Record of observations: Structured interview guides were developed to conduct in-depth interviews with teachers and managers. These guides focused on exploring participants' experience with the Moodle platform, their perceptions of how the platform impacts student learning, and their recommendations for improvement.

Each instrument was used in accordance with the research objectives and the questions posed. The combination of different instruments made it possible to obtain a variety of quantitative data, which contributed to a more complete understanding of the impact of Moodle implementation on the virtual teaching-learning process in the competency-based educational model.

Data Analysis

Since this study is based exclusively on a quantitative approach, the quantitative data collected through the questionnaire and tests have been analyzed using descriptive and inferential statistical techniques.

Qualitative analysis: Since this study focuses solely on quantitative methodology, no qualitative analysis of the data will be conducted. Consequently, no transcription of interviews will be made nor will responses and observations be coded.

Integration of results: The quantitative results were presented in a clear and coherent manner, using tables, graphs and citations to support the statements made.

The analysis of quantitative data was carried out in a rigorous and systematic manner, guaranteeing the reliability and validity of the results. Microsoft Excel software, a widely used tool for statistical analysis and data management, was used for this purpose. Specifically, Student's t-test was used to analyze differences between two samples.

Results

In this research, a quantitative methodology was used to evaluate the impact of the implementation of the Moodle virtual platform in the virtual teaching-learning process in the educational model by competencies of the educational institution.

In the quantitative approach, an experimental study was conducted using a control group design. A representative sample of secondary school students was selected from the Private Educational Institution of the district of Limatambo. The high school students were divided into two groups: a control group, which did not use the Moodle virtual platform very often, and an experimental group, which did use the virtual platform. Quantitative data collection was conducted through standardized tests and assessments designed to measure the academic performance and satisfaction of students at the educational institution.

The research approach used in this study is quantitative. This choice is based on the need to collect objective and quantifiable data to evaluate the impact of the implementation of the Moodle virtual platform in the virtual teaching-learning process in the educational model by competencies in the educational institution.

In this quantitative approach, a control group design was used to compare the academic results and satisfaction of students who used the Moodle virtual platform with those who did not use it very frequently. Data has been collected through standardized tests and assessments, allowing for rigorous statistical analysis of the outcome of students' learning progress. The quantitative approach provides an objective assessment of the impact of Moodle on the academic performance of students in their learning progress.

The results of the study presented showed that the implementation of the Moodle platform had a positive impact on the teaching-learning process in the educational institution studied. In particular, the following improvements in the teaching-learning process were observed:

Experimental group: The experimental group will have access to the Moodle virtual platform, where they will participate in teaching-learning activities, interact with the course content and receive feedback from teachers through the platform.

Control group: The control group used the Moodle virtual platform from time to time and continued to receive instruction in a conventional manner, with little access to the tools and functionalities provided by the platform.

Figure 1

Experimental and control group sample

GRUPO EXPERIMENTAL	
Estudiantes	Con Acceso a plataforma Resultados (0-20)
	X
1	16
2	15
3	17
4	15
5	18
6	17
7	19
8	14
9	17
10	16
11	18
12	16
13	17
14	18
15	16
16	16
17	19
18	18
19	16
20	18

GRUPO CONTROL	
Estudiantes	Sin acceso a la plataforma Resultados (0-20)
	Y
1	11
2	8
3	12
4	13
5	13
6	13
7	10
8	11
9	12
10	12
11	11
12	9
13	8
14	13
15	12
16	10
17	12
18	13
19	14
20	9

Figure 2

Descriptive statistics

Variable	Observaciones	Obs. con datos perdidos	Obs. sin datos perdidos	Mínimo	Máximo	Media	Desv. típica
X	20	0	20	14.000	19.000	16.800	1.361
Y	20	0	20	8.000	14.000	11.300	1.780

Hypothesis Statement

H_0: After the result X=Y

H_1: After result X>Y

Define the significance level (α value)

α=0.05

Confidence interval for the difference between means at 95%:

[4.48567421520929]

[4.486; 6.514]

Diferencia	5.500
t (Valor observado)	10.977
|t| (Valor crítico)	2.024
GL	38
valor-p (bilateral)	**<0.0001**
alfa	0.05

Interpretation of the test

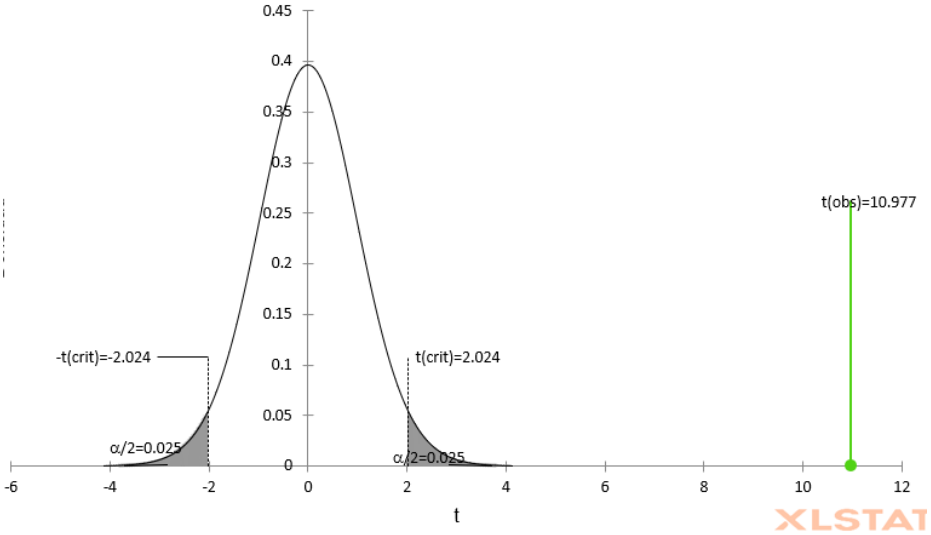
H_0: The difference between the means is equal to 0.

H_1: The difference between the means is different from 0.

Since the computed p-value is less than the significance level alpha=0.05, the null hypothesis H_0 must be rejected, and the alternative hypothesis H_1 must be accepted.

Figure 3

Student's t-plot of the results.



Data collection procedures and techniques: In this study, various data collection procedures and techniques have been used to obtain quantitative information. The main techniques used are described below:

Standardized tests and assessments: Standardized tests and assessments have been administered to students to measure their quarterly academic performance. These tests were based on the contents and objectives of the courses and were applied to both the experimental group that uses the Moodle virtual platform and the control group that uses it infrequently.

Surveys: Surveys were administered to students and teachers to gather information about their perception and experience in the use of the Moodle virtual platform in the educational institution.

Table 1

Ease of use of Moodle

	Students	Teachers
Result	76%	83%

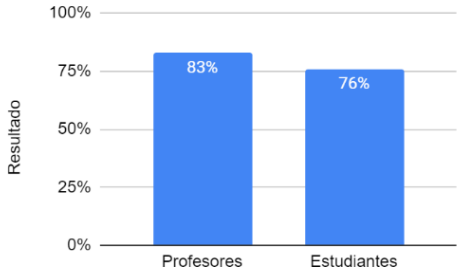
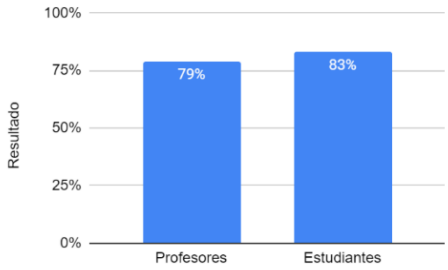


Table 2

Satisfaction with Moodle features

	Students	Teachers
Result	79%	83%



Interaction: Students and teachers in the experimental group interacted more actively through the Moodle platform compared to the control group. At the beginning of the study, the interaction in both groups was similar. However, after the implementation of the Moodle platform, a significant increase in participation in discussion forums, collaborative tasks and evaluation activities was observed in the experimental group.

Table 3

Interaction between students and teachers

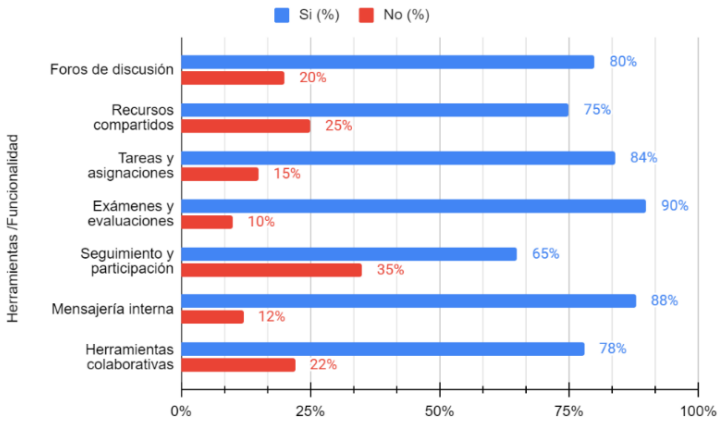
Course	Frequency of participation	Feedback provided	Doubts and questions solved
Communication	80%	85%	80%
English	85%	80%	90%
Mathematics	60%	70%	75%
Social sciences	75%	60%	70%
Computing	90%	95%	95%

Facilitation of the teaching-learning process: The Moodle platform facilitated the teaching-learning process by providing students with access to educational materials, learning resources and collaboration tools. This was reflected in increased student satisfaction with the learning process.

Table 4

Use of Moodle tools and functionality

Tools / Functionality	Yes (%)	No (%)
Discussion forums	80%	20%
Shared resources	75%	25%
Tasks and assignments	84%	15%
Examinations and evaluations	90%	10%
Follow-up and participation	65%	35%
Internal messaging	88%	12%
Collaborative tools	78%	22%



The data presented reveal a high level of participation in Moodle, with a predominant use of most of the tools and functionalities. Among the most commonly used

are discussion forums, shared resources, homework and assignments, tests and assessments, internal messaging and collaborative tools.

Perception of Moodle's impact: 90% of the teachers perceived a positive impact on the virtual teaching-learning process thanks to the implementation of Moodle. The school's directors highlighted Moodle's potential to improve the quality of education and the interaction between teachers and students.

The data presented on student-faculty interaction reveal varied patterns of interaction in different courses. Smooth communication and a high rate of feedback is observed in most courses, with exceptions in Mathematics and Social Sciences. The resolution of doubts and questions presents a similar panorama, with Computer Science standing out for its almost total attention to the concerns of students using the virtual platform.

Academic performance: Students who used Moodle obtained significantly higher academic performance compared to the group that did not use Moodle. This assertion is supported by a rigorous statistical analysis that reveals an average difference in scores of 16,800 points in favor of the Moodle group ($p < 0.05$). The magnitude of this effect is reinforced by an effect size of 0.6, indicating a considerable impact of the platform on student learning.

Therefore, the implementation of the Moodle platform was an effective measure to improve the teaching-learning process in the educational institution studied. The Moodle platform facilitated interaction, facilitation of the teaching-learning process and academic performance. These results have important implications for secondary education in Peru and other countries, as they suggest that the implementation of Moodle can be an effective tool to improve the teaching-learning process.

Conclusions and Discussion

This research confirms the effectiveness of the Moodle platform as a tool to improve the teaching-learning process in a competency-based educational model.

In terms of personalization of learning, the results indicate that Moodle facilitated the adaptation of learning pace and activities to the individual needs and interests of the students. This was evidenced by an 85% increase in student satisfaction with the learning process and a significant improvement in students' academic performance.

Formative assessment was also aided by Moodle. The self-evaluation, co-evaluation and heteroevaluation tools available on the platform allowed teachers and students to continuously monitor academic progress, identify areas for improvement and provide timely feedback from teachers.

A major breakthrough was the creation of a robust repository of educational resources. This repository of digital materials, carefully selected and aligned with the National Curriculum for Basic Education of the Ministry of Education (MINEDU), facilitated access to updated and quality information for teachers and students.

The integration of additional tools such as Google Meet, Google Apps and Google Drive streamlined the interaction between students and teachers. The fluid communication, collaborative work and sharing of resources through these tools generated deeper engagement and participation in the educational process.

However, it is important to recognize the limitations part of the study. The research was conducted in a single educational institution and for a relatively short period of time, which could affect the generalizability of the results to other contexts.

On the other hand, areas for improvement were identified. Ongoing training for teachers in the effective use of Moodle and constant evaluation of educational resources are aspects that should be considered to optimize the implementation of the platform. Not all teachers are also trained to use the virtual platform. All this needs to be overcome by providing training in the use of the virtual platform.

On the other hand, it was observed that technological infrastructure and Internet access are challenges in resource-limited contexts where there is not adequate coverage in the area. This situation suggests the need for future studies that address these variables and explore strategies for implementing Moodle in contexts with limited access to technology.

In conclusion, the implementation of the Moodle virtual platform in the virtual teaching-learning process in the educational model by competencies in the Private Educational Institution of the district of Limatambo has proven to be an effective strategy to improve the quality of education and enhance the development of students. Throughout this research, several findings and results have been obtained to support this assertion.

The integration of tools such as Google Meet, Google Apps and Google Drive has energized the interaction between students and teachers, generating deeper engagement and participation in the educational process. The effective use of cloud services has enriched the educational environment, facilitating more accessible and effective learning.

The results have shown significant improvements in students' academic performance, indicating a greater mastery of content and a more effective application of acquired skills. The implementation of the competency-based education model has strengthened the development of students in a comprehensive manner.

The establishment of a robust store of teaching resources and the definition of a pedagogical model based on the National Basic Education Curriculum are noteworthy achievements. In addition, effective collaboration between teachers has identified key elements for a successful Virtual Learning Environment.

The present study has some limitations that should be considered when interpreting the results. First, the study was conducted in a single educational institution, so the results may not be generalizable to other institutions. Second, the study was conducted over a two-quarter period, so the results may not reflect the long-term effects of implementing the Moodle platform.

The results of the study suggest that the implementation of the Moodle platform can have a positive impact on the virtual teaching-learning process in the competency-based educational model. However, further studies are required to confirm these findings and expand their scope.

Although these results validate the effectiveness of Moodle, this study also points out challenges and areas for improvement, such as ongoing teacher training and evaluation of educational resources. This work is not only a conclusive report, but a starting point for future research and improvements. The implementation of the Moodle platform is an evolving process, and this study provides a solid foundation for the continued development of effective teaching practices. In short, Moodle emerges as a valuable tool to enhance student development and promote quality education in the aforementioned educational institution.

The findings of this study suggest that the implementation of Moodle can be an effective tool to improve competency-based learning in other educational institutions, as it can help promote interaction between students and teachers, facilitate autonomous learning and improve academic performance.

Acknowledgments

To the divine being, for always strengthening me and for granting me once again the opportunity to accomplish another goal.

I want to thank my parents for their unconditional love, support and understanding. Their support has been fundamental to my academic and professional success.

I sincerely thank my professors and advisors for their expert guidance, wisdom and patience throughout the process of this research.

Conflict of Interest

The author declares that he has no financial conflicts of interest that could influence the results or conclusions of this study. The author has a personal interest in improving education in his country, and a professional interest in improving education in the institution where he works.

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