

Quality of service of technological tools for academic management systems in Peruvian educational institution

José Antonio Ogosi Auqui, Magister¹, David Hugo Obando Pacheco, Magister², Ricardo Jesús Carrasco García, Magister³, Even Deyser Pérez Rojas, Magister³, Pedro Ángel Molina Velarde, Magister¹, and Alex Ulises Morales Alvarado, Licenciado³

¹Universidad Tecnológica del Perú, Perú, c18793@utp.edu.pe, pmolina@utp.edu.pe

²Universidad Peruana de Ciencias Aplicadas, Perú, pcmdoba@upc.edu.pe

³Universidad César Vallejo, Perú, rcarrascog@ucvvirtual.edu.pe, evenperez@ucvvirtual.edu.pe, amoralesalv@ucvvirtual.edu.pe

Abstract– The objective of this work was to investigate which are the technological tools most used by school and university students and to identify how this influence their educational process. The methodology was quantitative. The instrument used was a survey using Google Forms. Among the results obtained, the use of Teams as communication software between students and teachers stands out. It was also possible to detect that students use more and more technological tools at school or university and that these do not necessarily agree with those recommended by the teacher.

Keywords-- Quality of service, technological tools, academic management, Peruvian educational institutions.

I. INTRODUCTION

"Education is facing a dynamic that requires it to incorporate the use of ICT in the development of teaching activities in the classroom. This need implies an innovation in classroom practices for the appropriation of ICT as facilitating tools. In order to address the proposed reality, a case study was carried out in the I.E.D. Rural Quiba Alta that asked how to manage the use of ICT resources as facilitating tools in the classroom practices of the teachers of cycle one of the Rural Quiba Alta? The institution is located in the rural area of Ciudad Bolívar, Bogotá D.C." [1]

"At the present time educational software around the world is facing the challenge of using new Information and Communication Technologies to provide its students with the necessary tools and knowledge required in the 21st century. The World Education Report of the (UNESCO, 2004) indicates that "Teachers and teaching in a changing world", described the impact of new technologies on traditional teaching-learning methods, predicting the transformation of this process and the way teachers access information" [2].

"Since several years ago, the ICT and the educational paradigms of the state that today are implemented in the country need a dynamic educational academic control that provide adequate information in the analysis so that the

results are optimal for the institutions. The school 6069 Pachacútec of Villa el Salvador, does not have a web platform for the academic control of the students, due to the processes used in the informative administration of the institution, several problems were found, where they originated from the deficiency of communication between the actors of the educational system." [3]

"In this new society, the use of new information technologies has become a very useful tool for the improvement of certain tasks that can be automated in order to improve indicators such as productivity, efficiency, service, quality, time, as the main ones. The great usefulness and adaptability of these technologies have made that their use has spread to all fields of human activity. One of these fields is management and being more specific the educational management and administration; this is how through the creation of web systems and educational control it is possible to automate tasks such as reporting in real time the record of grades of students, their daily attendance, student and institutional communications, consultation center, claims and complaints, among other functionalities." [4]

"To determine the causes that provoke dissatisfaction in the users of the educational institutions in the academic management. The results obtained showed that most of the educational institutions show needs in the area of administration, since many of them stated that they were not satisfied with the results that the educational centers located in this region have been providing lately. In order to eradicate this problem, a system was designed to manage academic activities and process information in an agile way, in such a way that both parents and administrative personnel are satisfied, taking into account the feasibilities for its correct operation in order to reflect the proposed objectives." [5]

"The most important objective of the integration of ICT and education is to improve educational quality; this integration is perceived as an innovation in educational institutions due to the changes that it originates in educational processes and in the behavior of its actors." [6]

"These tools for the management of educational projects with ICT are presented as a guide of proven usefulness for

Digital Object Identifier: (only for full papers, inserted by LEIRD).

ISSN, ISBN: (to be inserted by LEIRD).

DO NOT REMOVE

management teams, technological referents and other school actors who decide to carry out an innovative process with ICT in their institutions. The different steps proposed are the result of an integration: the experience of INTEGRA's European partners, especially NCTE (Ireland), in the light of the dynamics of Latin American educational institutions." [7]

The article will be developed based on questions that are going to be resolved throughout the article, in addition to presenting the theoretical framework that contains comments and thoughts of certain authors who have investigated part of the question posed.

RQ1. What is the impact of the use of technological tools on academic management systems in educational institutions in times of COVID-19 pandemic in Lima - Peru?

RQ2. As a consequence of the impact of the use of technological tools on the Academic Management Systems in educational institutions in times of COVID-19 pandemic in Lima - Peru, is an expansion trend of the business model of the educational sector expected?

II. THEORETICAL FRAMEWORK

A. *Technological tools*

"The use of interactive technological tools as a support for didactics has generated demands for strategies to facilitate and guide their use in interactive distance education. Faced with these demands, in 1999 the Universidad de Los Andes (ULA) created the Coordination of Interactive Distance Studies, CEIDIS, a unit attached to the academic vice-rectorate, which has among its functions, the training of teachers in the area of interactive distance studies, as well as advice and support to implement programs under this modality in the most effective way." [8]

"In today's globalized and competitive world, we are constantly required to use technological tools, because it allows us to develop and process information faster, so much so that our young people today apply information and communication technology more frequently in their daily lives. Likewise, promote the integration and use of the application of technological tools in all subjects and workshops addressing the pedagogical part to provide a new form of teaching and learning quality." [9]

"Day by day we find infinite possibilities to use various technological tools, thanks to Web 2.0, as it provides us with a variety of technological resources easy to use in the educational process as a complement. When integrating technology in education we must be aware that it is a gradual process and is related to various factors, ranging from the availability of resources to the correct use of the tools when applying them." [10]

"The use of ICTs constitutes a support tool for learning and teaching, which is why their implementation in teaching

can constitute not only a methodological resource for the teacher but also a motivation for students. Thus, the use of ICTs in education makes learning more flexible, since students can learn at any time and in any place, since in recent years the use of the Internet and mobile devices are within the reach of much of the population, especially in young students in higher education. Therefore, merging education with the use of technology allows regions to climb in global and regional competitiveness indexes, generating with this the efficient use of available resources for learning." [10].

B. *Academic management*

"It is that area of action aimed at facilitating and improving the training processes provided by higher education institutions. This includes the definition, implementation and monitoring of continuous improvement processes that allow them to respond and anticipate the training needs of their students, the demands of the environment, the labor market and public policy." [11]

"This management implies knowledge, skills and experiences of people about the institution in which they work and, above all, of the mechanisms and practices used in the educational task, in line with the institutional educational model." [12]

"Management plays a vitally important role in the higher education sector, in order to improve efficiency and effectiveness indexes, as a contribution to the improvement of the quality of education. Therefore, one of the competitive advantages of successful organizations lies not only in the quality management models they are implementing, but in the quality of their management" [13].

"It comprises the development of the academic and institutional management quality, the relevance of its Educational Model and the administrative support of the students' academic actions; in coherence with its mission, vision, policies and mechanisms that guarantee its permanent improvement.

The quality of academic management implies the development of a series of actions of great complexity and responsibility because it must contemplate all foreseeable aspects in the development of an educational project" [14].

C. *Academic management system in educational institutions*

"Academic indicators for virtual learning environments and the creation of an information system that integrates these indicators...The academic indicators made it possible to homogenize a large number of parameters present in the development of virtual classes in order to standardize and reuse them regardless of the teacher, the subject and even the institution. The test lasted two academic semesters, the piloting of the use of the system by the teachers had little acceptance since the platform promoted by the Universidad de la Salle is Moodle, the five teachers who used the system did

so because they knew the dimension of the system by having functionalities that they did not find in the institutional LMS." [15]

"...satisfy the needs highlighted in the management and treatment of academic information that periodically takes place in the Educational Institution "José Dammert Bellido" - Cajamarca, in order to streamline the processes, treatment and integrity of the data, which allow maintaining an updated database that benefits all participating actors of the academic community" [16].

With the optimization of the multiplatform system at I.E.P. Jireh, it will be possible to improve academic management; see grades, monthly and biweekly exams, workshop schedules and other educational activities in real time. This will also help to manage and interrelate with ICT objectives in modern technological life. [17]

The Activity Scheduling subsystem is part of a comprehensive administrative, academic and pedagogical management solution for educational institutions at the primary, secondary, higher non-university and higher university levels and aims to provide what is necessary to be able to facilitate tasks in relation to the scheduling of activities. [18] The quality of academic management implies the development of a series of actions of great complexity and responsibility because it must contemplate all foreseeable aspects in the development of an educational project" [14].

III. METHODOLOGY

This section details the methodology to be applied for the collection of information, with the purpose of evaluating and interpreting research related to the established problems, thematic area or phenomenon of interest; the objective of which is to present a reasonable evaluation of a research topic through the use of a reliable, rigorous and auditable methodology. Based on this, three points to consider in the application of the methodology were established.

Search strategy and study selection process.

The search strategy was based on the application of three research methodologies. The first one was based on searching for research sources related to the topic to be investigated, this first methodology will help us to have a better overview of the technologies that are optimal for the development of online education through virtual platforms. And thus be able to evaluate more accurately the academic management that is being carried out in each of the educational institutions. The second methodology allowed us to investigate in each of the educational institutions how online classes are being conducted in the midst of this pandemic, with the help of the students of each of these institutions. The third methodology was based on using a machine learning tool to identify the

trend for a possible globalization of the educational sector through statistical data obtained in our research.

A. Methodology I

We conducted a search to select related studies, which served as a basis for our research. These studies were: Jorge Rodas Silva and Jesennia Cárdenas Cobo.

It was determined to search for research that would support and guide the research process. The reviews were carried out to establish empirically the way in which technological tools have impacted to keep classes in operation in educational institutions by means of academic management systems regardless of the distance.

In relation to the search strategy, this involved determining the sources of information to be searched and the terms and conditions of the search. The source of information in which the search was conducted was the Web of Science electronic database, mainly because of the number of scientific journals indexed in that platform. To define the search terms, it was necessary to specify which technological tools used as academic management systems in educational institutions would be considered in the review. To determine the sources, it was necessary to establish certain parameters in addition to the key variables already mentioned:

- Technological educational tools used in times of pandemic COVID - 19.
- Optimization of the academic management process.
- Use of technological tools according to the type of educational institution.

The scope of this systematic review considered the in-depth review of 20 articles. It was established that if the sources complied with the above conditions and did not focus on times of COVID-19 pandemic, we would determine metrics that would allow us to determine how these technological tools would have impacted if applied in these times.

B. Methodology II

The work was carried out through field research since online surveys were applied to the students of each of the educational institutions that are part of the sample. It was descriptive since it allowed identifying the technological tools used by each of these educational institutions in the academic management process, determining whether they have adequate technology to provide the online education service, through the platforms of the respective institutions.

Delimitation of the population

For the information gathering process, five educational institutions classified into private and public Universities and private and public Colleges of Lima - Peru were chosen, where a descriptive type of research was developed taking as population the students of each of the educational institutions.

The research began with a visit to the website of each institution, then we contacted students from each educational institution where it was demonstrated that they used precarious technological tools, that they could barely maintain the online education service, and not all educational institutions had academic management systems.

Sample

The research was oriented to the study of four important components:

- Public universities
- Private universities
- Public schools
- Private schools

In which the students are the ones who provide us with all the necessary information to determine the satisfaction of the academic process managed by the respective educational institution where the student is being educated.

With respect to the size of the sample, 20 educational institutions were taken as the universe, comprising 5 institutions per type of institution. We determined that we will elaborate 10 surveys for each institution having a general sample of 200 students.

Survey Forms

Two types of surveys were carried out in order to answer the questions of this research.

- Forms focused on the impact of new technologies.
- Forms focused on the global growth trend of the education market.

Based on the results obtained in the previous methodologies, we used the Bigml tool in order to predict the trend of the globalization of the education sector market according to the opinion of the students of the educational institutions used as a sample.

B. Methodology III Quality Assessment

This evaluation was conducted with the purpose of verifying the level of detail provided by the articles selected for review. For this evaluation we asked ourselves questions that, when answered, will help us to know if the article is of quality for our research: In the article, did we find at least one

technological tool that has impacted academic management systems in educational institutions in the times of the COVID- 19 pandemic? And are there metrics that allow us to measure and determine if the business model of the educational sector has the tendency to expand globally as a result of the benefits brought by the need for the use of Academic Management Systems in online educational institutions?

Extraction and analysis process

The extraction and analysis process allowed obtaining and processing the information of interest for each of the relevant studies. For each article, data was extracted for its identification and the information to answer each of the research questions: Impact of the use of technological tools on the Academic Management Systems in educational institutions in times of COVID-19 pandemic and Trend of a globalized business model of the educational sector that allows market expansion as a result of the benefits brought by the need to use Academic Management Systems in online educational institutions.

IV. RESULTS ANALYSIS

RQ1. What is the impact of the use of technological tools on the Academic Management Systems in educational institutions in times of COVID-19 pandemic?

Statistical Results

The results obtained show that the educational institutions use the Meet tool the most, followed by Zoom, Teams and Blackboard respectively for conducting their online classes.

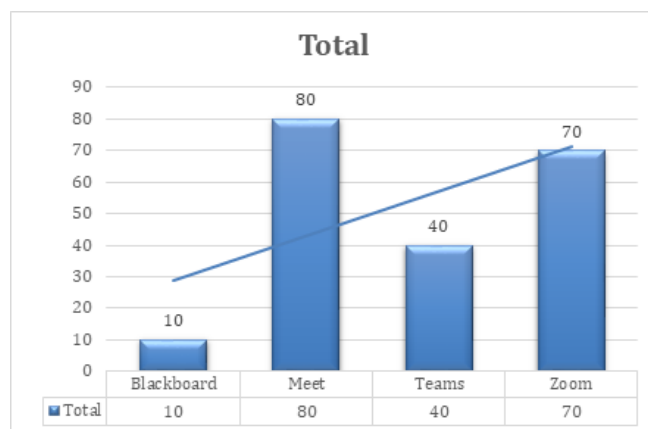


Fig. 1 Impact of the use of technological tools on the Academic Management Systems in educational institutions in times of COVID-19 pandemic for conducting their online classes.

Note: Comparative graph of the impact of academic management tools in the field of education for conducting their online classes.

The results obtained show that the educational institutions use the WhatsApp tool more to share information, which is evidence of the lack of technological resources in these institutions. This tool is used in the vast majority of the schools that are part of the research conducted.

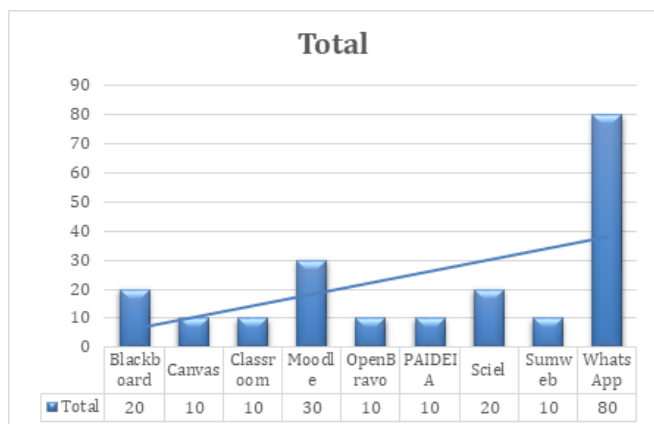


Fig. 2 Impact of the use of technological tools on the Academic Management Systems in educational institutions in times of COVID-19 pandemic to share information.

Note: Comparative graph of the impact of academic management tools in the field of education to share information.

In the elaborated question

How happy are you with the platforms used for distance learning?

These were the results, which show that at least 68% of the students are relatively happy with the platforms used for their virtual classes.

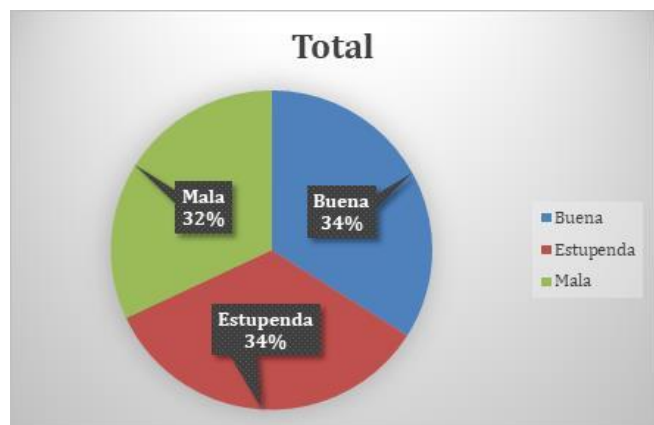


Fig. 3 graph of results for question 1

Note: Comparative graph of the results of the first question.

In the elaborated question

Do you feel that communication is fluid between students and teachers?

These were the results, which evidenced that at least 62% of the students consider that there is fluid communication

between students and teachers. Furthermore, in the research it was possible to visualize that, although some educational institutions did not have the necessary technological resources for the realization of their virtual classes, they felt that there was fluid communication between students and teachers. This led to the conclusion that communication between students and teachers did not necessarily depend on a good virtual platform.

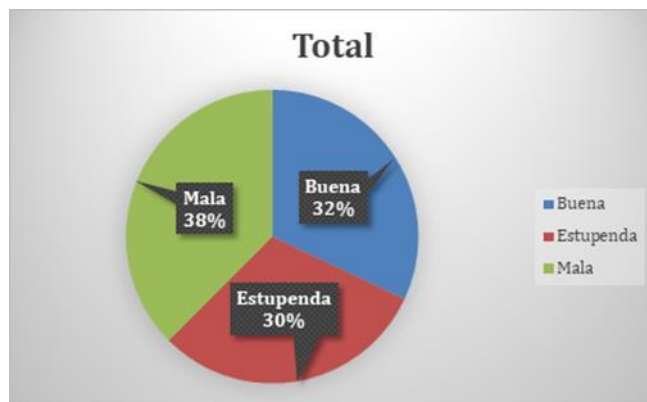


Fig. 4 graph of results for question 2

Note: Comparative graph of the results of the second question.

In the elaborated question

What is your general opinion about distance education?

These were the results, which show that at least 52% of the students are satisfied with distance education, another 24% are not so satisfied and the other 24% do not like distance education. The conclusion is that 76% of the students have adapted to distance education.

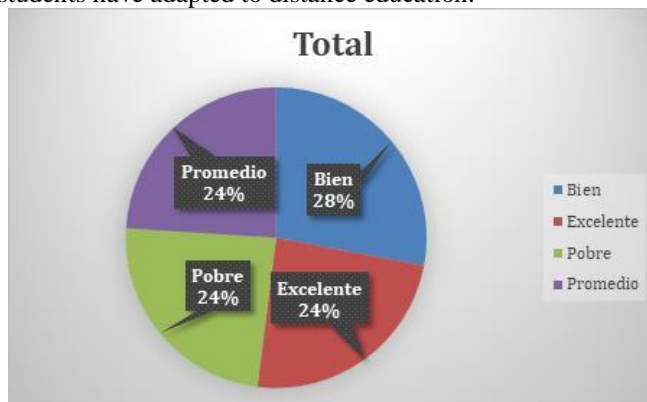


Fig. 5 graph of results for question 3

Note: Comparative graph of the results of the third question.

In the elaborated question

How effective has distance learning been for you?

These were the results, which show that at least 77% of the students consider that distance learning has been effective to some degree.

The conclusion is that distance learning for certain subjects is the same as face-to-face learning.

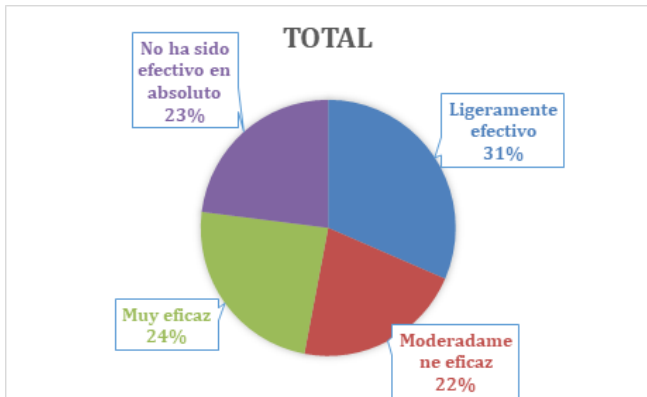


Fig. 6 graph of results for question 4
Note: Comparative graph of the results of the fourth question.

In the elaborated question

Do you enjoy distance learning?

These were the results, which show that the results in favor are 53% and against 47%. The conclusion is that the results are very even, given that there is not the same interaction as in face-to-face classes.

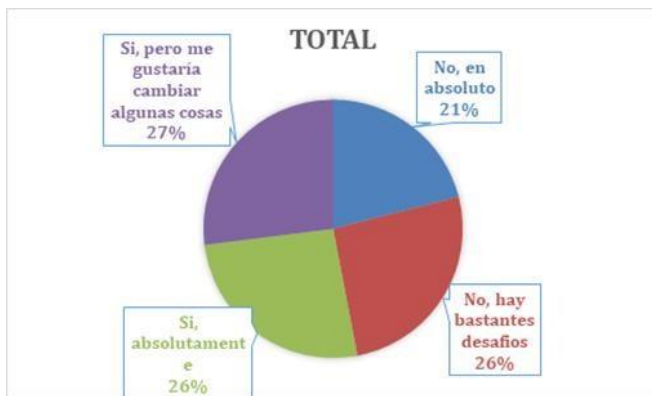


Fig. 7 graph of results for question 5
Note: Comparative graph of the results of the fifth question.

In the elaborated question

How useful has the School or University been in offering resources for learning at home?

These were the results, which show that at least 50% of the students consider that the technological resources used in their institution have been useful. This negative response is given in most cases of public schools that do not have the necessary technological resources.



Fig. 8 graph of results for question 6
Note: Comparative graph of the results of the sixth question.

TABLE I
COMPARISON OF RESEARCH RESULTS VS. RESULTS OF SPANISH-SPEAKING UNIVERSITIES

Educational Institutions in Research	Spanish speaking universities
19 of the 20 educational institutions, excluding UPN use a software tool for online classes and another software tool for sharing materials.	Each of the universities uses a single tool for online classes and for sharing materials.
All educational institutions conduct classes 100% online	All universities have the option of taking certain courses online and others face-to-face, taking precautionary measures to avoid the spread of COVID-19.
There are 3 universities that use one of the platforms (Moodle) used in Prestigious Spanish-speaking universities.	There are 2 universities out of the 5 studied that use Moodle platform
Most educational institutions are happy with the tools they use to conduct their virtual classes.	Most educational institutions are happy with the tools they use to conduct their virtual classes.
Most schools and a minority of universities in this study do not have the technological resources to carry out their virtual classes efficiently.	Universities have quality platforms to conduct their virtual classes.
The educational institutions do not have a back-up plan in place should they have to return to face-to-face classes.	Universities already conduct face-to-face classes with the necessary sanitation measures.

As a result, we conclude that the impact of technological tools on educational institutions has been, for the most part, a

competitive advantage that mainly private educational institutions have been able to take advantage of, given the financial resources that these institutions have, they have been able to give a quick response to give continuity to the business of the educational sector. This point has been key to not only give continuity to the business, but also to create a better image for their institution.

In addition, there has been an impact of technological tools not only nationally, but worldwide, however, focusing on this study, all institutions have had the need to adapt to the new business model, in some cases, the responses of the educational institutions in question have not had a contingency plan that could adapt to the new situation in which we find ourselves. However, over time, all the institutions have adapted to the new "normality" in which we currently live and have changed the business model by implementing technological tools that, for the most part, are not very efficient, having problems in specific cases, such as: enrollment, hiring of teaching staff, completion of procedures, among others.

In the results obtained, in addition, we can conclude that students have not immediately adapted to the new model of educational training, and more in the cases of institutions that before the arrival of the COVID-19 pandemic have not conducted virtual classes. This means that students are not comfortable with the new type of teaching, since there are practical courses that must necessarily be taken in person.

Another aspect is that some teachers were not trained for the new type of teaching, given their limited knowledge of the use of technological tools currently in use, forcing them to be trained in order to be able to teach their classes efficiently.

RQ2. As a consequence of the impact of the use of technological tools on the academic management systems in educational institutions in times of COVID-19 pandemic in Lima - Peru, is an expansion trend of the business model of the educational sector expected?

From the data obtained by the respective questionnaire, we use the bigml web page, through which we generate a data model to be able to predict whether or not there is a trend of global growth in the education sector market. Since, in these times of pandemic, we saw the need to make use of information technologies to be able to give continuity to the business of the educational sector through virtual platforms.

Within the decision tree model, we obtained the optimal route that allowed us to establish a prediction with 64.57% reliability and 91.81% probability.

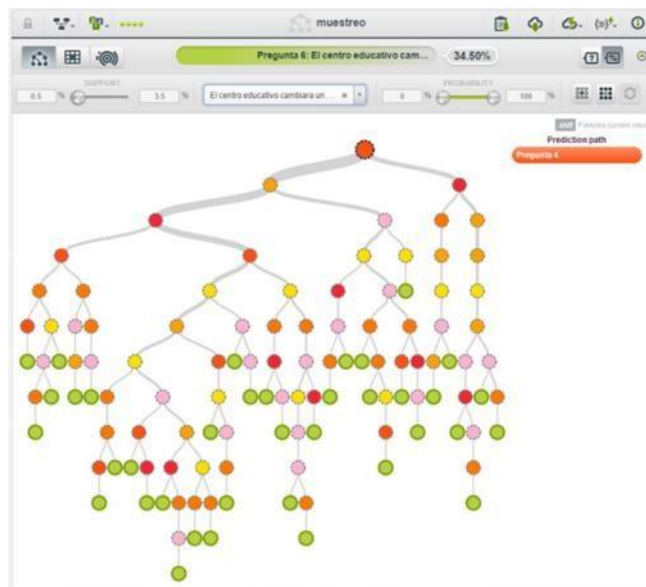


Fig. 9 Decision tree
Note: Comparative graph of the results of the first question.

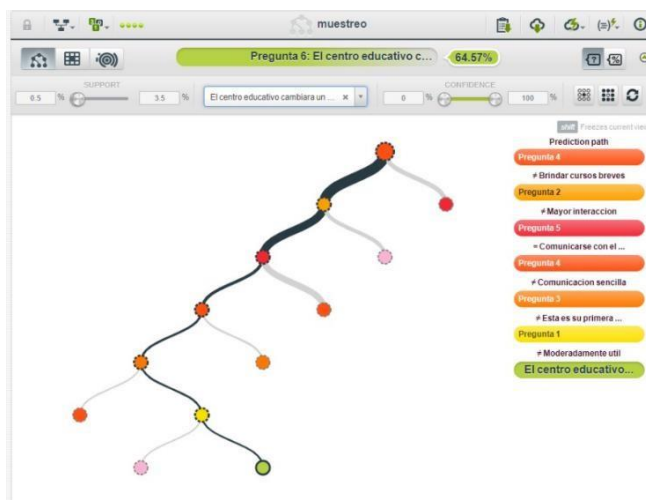


Fig. 10 Graph of the route with more reliability rate
Note: Optimum route with 64.57% of reliability

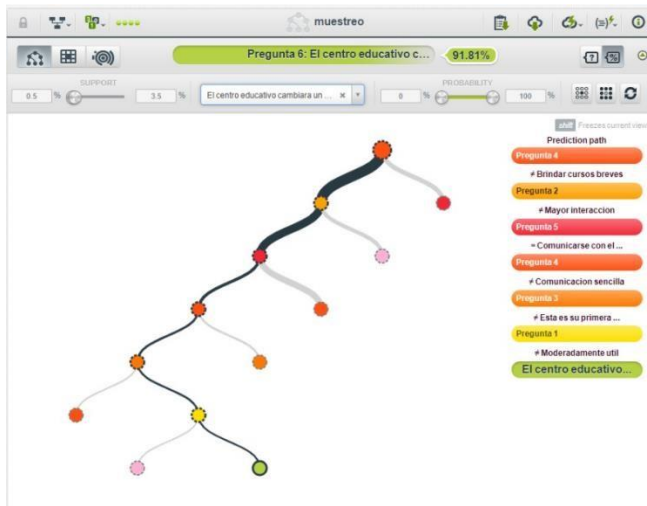


Fig. 11 Graph of the route with more probability rate
Note: Optimal route with 91.81% probability.

According to the results obtained from our research, it can be concluded that the trend of globalizing the educational sector market is still slightly distant, due to the lack of technological resources in certain educational institutions, especially in educational institutions belonging to the public sector.

However, our research allows us to affirm that there will not be a radical change in educational teaching, and by this we mean that educational institutions will not teach courses 100% online, but there is a tendency that some institutions will use a hybrid teaching methodology, in which there will be the possibility of studying certain subjects virtually and others in person.

V. CONCLUSIONS

Public educational institutions in Lima use more the Meet platform to conduct online classes and WhatsApp to share academic work, this is since access is free. This shows that the State does not invest for the improvement of online learning as these platforms are not as efficient compared to others that have more personalized tools for interaction with students.

The training of teachers is essential to teach virtual classes since some of them have never used technological learning tools before. Therefore, this time to adapt for both teacher and student influenced the quality of student learning in both public and private institutions.

It has been observed that virtual education has been more difficult to put into practice in public institutions than in private ones, since the private ones, having their own capital, can look for solutions to provide education to young people, as opposed to the public ones that depend on the State.

Despite all the difficulties that have arisen because of the COVID 19 pandemic, the entities that provide education services have been able to adapt, even if not 100%, they have managed to ensure that students do not lose the year and can complete their studies and thus be able to move forward.)

VI. RECOMMENDATIONS

The Peruvian state should be more concerned about the quality of learning in institutions outside of Lima since some do not conduct online classes due to the lack of technological equipment to access and even training has not been carried out to facilitate the use. There are institutions that only use WhatsApp and coordinate classes through texts, this shows that the country has a hard time adapting to technological tools for the good of society.

Universities in their incubation programs encourage the development of learning platforms, based on quality software used in other Spanish-speaking countries. These platforms even have science games for the improvement of children's education.

More emphasis should be placed on training workshops for teachers because they are the ones who have the closest relationship with students and if teachers are not well trained, they will never be able to ensure that the class they provide reaches all students.

Universities should have greater control in the use of the software they are going to use for teachers to teach their classes, since it depends on them that the students grasp all the lessons they take and that they will be useful in the future in a new environment that is no longer academic.

REFERENCES

- [1] O. Rincón Rey, "Gestión educativa para el uso de recursos tic como herramientas facilitadoras en las prácticas de aula de los docentes del ciclo uno de la I.E.D. Colegio Rural Quiba Alta", Universidad Libre, Bogotá, 2016.
- [2] L. C. Pacheco Sánchez, "Importancia del software educativo en la gestión académica- administrativa de la Unidad Educativa Alonso Veloz Malta", Universidad De Guayaquil, Ecuador, 2016.
- [3] L. A. Alvarez Santiago y C. A. Damasio Jara, "Propuesta de diseño para una plataforma web sobre el control académico de los alumnos del quinto grado de secundaria en el colegio 6069 Pachacútec de Villa el Salvador", Universidad Tecnológica del Perú, 2019.
- [4] Y. Acevedo, "IMPLEMENTACIÓN DE UN SISTEMA WEB PARA LA MEJORA DEL PROCESO ADMINISTRATIVO ACADÉMICO DE LA INSTITUCIÓN EDUCATIVA 'WARIVILCA'." Huancayo, Perú, 2018.
- [5] J. Rodas Silva y J. Cárdenas Cobo, "Sistemas de Gestión Digital para mejorar los procesos académicos en instituciones educativas", Univ. Cienc. Tecnol., vol. 18, núm. 73, pp. 143-155, 2014.
- [6] W. Moreno y N. Paredes, "La gestión de las TIC y la calidad de la educación, medida por los resultados de las evaluaciones escolares estandarizadas." Colombia, 2014.
- [7] Integra, "Herramientas para la gestión de proyectos educativos con TIC." Argentina, 2016.
- [8] G. Arias and G. Mora, "La didáctica y las herramientas tecnológicas web en la educación interactiva a distancia." Venezuela, 2012.

- [9] R. Mendoza, "Aplicación de Herramientas Tecnológicas para la enseñanza-aprendizaje de los estudiantes de la Facultad de Administración de la Universidad Nacional San Luis Gonzaga." Perú, 2019.
- [10] V. Marycarmen, "Herramientas Tecnológicas en la Educación." México, 2017.
- [11] C. Plascencia and Beltrán Cruz, 2016. "El uso de las TIC como herramienta de aprendizaje para alumnos de nivel superior." México.
- [12] CNA Chile, "FORMACIÓN EN GESTIÓN ACADÉMICA." Chile, 2018.
- [13] A. Flores and M. Castellanos, "Gestión académica en instituciones de educación superior: reflexiones y experiencias exitosas." Colombia, 2018.
- [14] I. Blanco and V. Quesada, "LA GESTIÓN ACADÉMICA, CRITERIO CLAVE DE LA CALIDAD DE LA GESTIÓN DE LAS INSTITUCIONES DE EDUCACIÓN SUPERIOR." Colombia, 2016.
- [15] Universidad Técnica del Norte. Gestión Académica. Ecuador. 2017.
- [16] G. Ortegón, "Optimización de sistemas de gestión académica. Una propuesta de gestión, medición y procesamiento de datos en un entorno virtual de aprendizaje para la toma de decisiones en instituciones educativas." Bogotá, 2017.
- [17] J. Coronel, "IMPLEMENTACIÓN DE UN SISTEMA WEB DE GESTIÓN ACADÉMICA PARA MEJORAR LOS PROCESOS ACADÉMICOS DE LA INSTITUCIÓN EDUCATIVA 'JOSÉ DAMMERT BELLIDO-CAJAMARCA'." Cajamarca, Perú, 2018.
- [18] R. Esperilla, "Sistema multiplataforma para la optimización del proceso de gestión académica de la IEP Jireh - Manchay (Pachacamac)". Lima - Perú, 2019.
- [19] J. Flores and L. Puccio, "Sistema de Gestión Académica Subsistema de Programación de Actividades." Lima. 2006