Web 2.0 Teachers And Web 3.0 Students A Challenge In Post-Pandemic Higher Education

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ABSTRACT

The objective of the research study is to determine how teachers' didactic methods affect students in the virtual learning environment Methods: The objective of this experimental study is to examine the relationship that exists between teachers and university students. The sample was of 150 people, these were sent through a link to be answered by the students, after which the data were processed to know the data of the different participants and the questionnaire that measures the factors of the study. The data collection was done through an online questionnaire in Google Forms; the same that was directed to customers who consume the enterprises, the link of the questionnaire was provided

to students and teachers Results: the alternative always teaching strategies reached 50.31%, pedagogical strategies 47.73%, and interactivity with 46.49% the other three dimensions: technological resources 41.22%, educational platforms 46.69% and virtual modality 48.97%. According to these general results, the qualification is very good; to accept or reject the general hypothesis, Spearman's Rho correlation was performed, finding a high relationship (RS: 0.811) and Sig (0.000), for this reason the null hypothesis is rejected and the alternative hypothesis is accepted. Conclusions: didactic strategies have a significant influence on the virtual learning of students and university teachers.

Keywords: didactic strategies, e-learning, virtual education, educational platforms, biplot

RESUMEN

El estudio investigativo tiene como **objetivo** determinar cómo afectan los métodos didácticos de los docentes a los estudiantes en el entorno virtual de aprendizaje **Métodos:** En este estudio experimental tiene como objetivo examinar a relación que existe entre los docentes y los estudiantes universitarios. La muestra fue de 150 personas, estas fueron enviadas a través de un link para ser contestadas por los estudiantes luego de esto se procesaron los datos para conocer los datos de los diferentes participantes y el cuestionario que mide los factores del estudio. La recolección de datos se la realizó mediante un cuestionario en línea en Google Forms; el mismo que estuvo dirigido a los clientes que consumen los emprendimientos, se facilitó el link del cuestionario a los estudiantes y docentes **Resultados:** la alternativa siempre las estrategias de enseñanza alcanzo el 50,31%, las estrategias pedagógicas el 47,73%, y la interactividad con 46,49% las otras tes dimensiones: recursos tecnológicos 41,22%, plataformas educativas 46,69% y modalidad virtual 48,97%. Según estos resultados generales la calificación es muy buena, para aceptar o rechazar la hipótesis general se realizó la correlación Rho de Spearman encontrando una relación alta (RS: 0,811) y Sig (0,000) por esta razón se rechaza la hipótesis nula y se acepta la alterna. **Conclusiones**: las estrategias didácticas influyen significativamente en el aprendizaje virtual de los estudiantes y docentes universitarios.

Palabras Claves: estrategias didácticas, aprendizaje virtual, educación virtual, plataformas educativas, biplot

INTRODUCTION

Virtual education is not new, it had just been incorporated in a very subtle way, and it was optional for both teachers and students. But the confinement accelerated the process in a few days, which was going to take several years. Barrientos et al (2022) adds that "The global pandemic generated by COVID-19, which has made the development of face-to-face educational activities impossible, has accelerated in a critical way an incipient process that today is already installed regarding the use of virtuality in education" (p.497).

When face-to-face attendance ceased to be an option, virtuality became indispensable. According to UNESCO (2020) more than 91% of the world's student population was affected by school closures in more than 191 countries; this was equivalent to more than 1,579 million children and young people in confinement. This was an essential measure to contain the spread of the HIV/AIDS pandemic. In addition, some 60.2 million teachers around the world were also unable to work in the classroom. In Latin America and the Caribbean, this situation affected more than 156 million students (Herrera, 2022).

In view of this reality, Pineda (2021) states that "Universities with face-to-face mode had to advocate in times of pandemic for a "virtual" reinvention, in the sense of continuing their academic semesters and ensuring the commitment they have with students and teachers" (p. 99). Like any change, it brought with it uncertainties, fears, unknowns, anxiety and stress process never seen before, in all areas of life. According to Flores et al (2020)

Social, economic and technological changes have pressured educational institutions to a process of adaptation to new circumstances, all accelerated by the urgencies of the unforeseen due to COVID-19, which has forced us to coexist with massification, diversity and combination of study-work (p. 35).

Likewise, Salcedo et al (2020), explains that,

After COVID 19 impacted humanity in 2020, by August 2020 the "new normality" is beginning to be spoken of as an emerging category, characterized among other things, because physical space becomes virtual space. Education not only does not escape from this new reality, but rather, makes use of it to enable the virtual classroom as the new educational method in times of pandemic (p.21).

This situation brought with it a great challenge for both teachers and students, since many of them were not prepared for virtualization. However, they had to experiment, learn and create alternatives that will allow the

continuity of education in the new normality. According to Cárdenas (2022) "to face the challenges of post-pandemic education, teachers must not only have the ability to apply technologies to the service of education, but also the skills, abilities and competencies to design new educational scenarios" (p.6). Likewise, Herrera et al (2022) explains that "in academic terms, self-management of knowledge allows students to explore the universe of knowledge from their own interests and also contributes with their own meaning of the world to their education" (p.4).

Education itself is a dynamic, complex and adaptable process. Today, the use of computers is indispensable. Silas et al (2020) explains that "the computer at home must take the formative, reflective, technical and even relational place of university campuses" (p.93). these computers have become the tools that enable distance learning and interaction.

For Gutiérrez et al (2023) points out that "Emergency remote education challenged the ways of teaching and learning during the critical global event of the covid-19 pandemic worldwide" (p.111). For Torregiani and Alonso (2021) "Distance education makes possible the construction of bridges from which it is possible to transcend what was considered so far, the inside and the outside of the University and establish another way of conversation between actors and knowledge" (p.68).

The use and management of technology have become indispensable nowadays. This is explained by Elosegui et al. (2022) when they say that "the need for the future education professional to interact with information and communication technologies becomes relatively important in the face of the challenges of contemporary society to demonstrate his or her level of competence" (p. 2). Furthermore, Núñez and Chancusig (2022) add that "technological tools allow students to communicate, interact and learn, implying updates in pedagogical practice as a current challenge" (p.143).

But, as every advance brings tools that serve as support, there are also some difficulties, one of them is the use of Web 2.0 and 3.0. In this regard, Vaquerizo (2011) explains that "Web 2.0 and Web 3.0 or Semantic Web constitute an important advance in the educational area offering great possibilities in distance education and in virtual educational spaces" (p. 116). However, we find teachers in 2.0 technology and students in 3.0. To understand the differences we must know what each of them means.

Vaquerizo (2011) defines Web 2.0, as

a collaborative Web, the content is created by the users, which has led to a revolution in the dissemination of information. It implies a greater participation and relationship between the students and the teacher, and this can be analyzed from two aspects, the technological and the social. In the technological aspect, Web 2.0 provides a set of sophisticated tools for publishing and content management. In the social aspect, it enables the emergence of a collective intelligence from the aggregation of individual contributions that are neither systematized nor explicitly guided (p. 118).

On the other hand, Salcedo et al (2020) adds that "when we talk about Web 2.0, we refer to a series of Internet applications and pages that use collective intelligence to provide interactive services on the Web giving the user control of their data". (p. 19). It refers to the interaction of people who think and have similar tastes no matter where they are in the world. Vaquerizo (2011) explains that:

Web 3.0 or Semantic Web is based on adding additional information to complement content and increase the meaning of data, achieving greater interoperability. This Web has emerged from the change in the form of social relations and communication between people, as is the case of social networks. The purpose of the Semantic Web at the educational level is to achieve software agents that interpret the meaning of the contents of the Web, to help users to develop their tasks (p.119).

Salcedo et al (2020) adds that "the 3.0 trend has had a great impact on education, and learners play a new role: the role of creators of knowledge, which they impart worldwide through social networks" (p. 20).

In short, Web 3.0 is the one most used by students, it is a decentralized and intelligent network, which makes it more attractive to young people, while Web 2.0 is dynamic and concentrated. The gap that they generate is none other than generational. At this point what is required is that teachers integrate technological tools, it implies that they design and select resources such as games, simulations, tutorials, exercises, presentations, audio and video resources, cognitive tools, through the use of web 2.0 and 3.0 tools, which allow the construction of learning and the evaluation of competencies (Paredes, 2018).

In this sense, according to Salcedo et al (2020) there is "the need to formulate concrete proposals, pedagogical guidelines and ultimately the analysis of the importance of web 2.0 and 3.0 in the pedagogical function of education" (p.15). In addition to them, public policies must make structural modifications to the curricular design and especially to the fact of pedagogy,

because in a 21st century characterized by permanent changes in the technological fact, students are immersed in a constant bombardment of information through networks, electronic media, telephone, and others. In this sense, the COVID 19 pandemic came to complete the leap towards a new pedagogy (Salcedo et al. 2020, p. 16). According to Herrera (2022) it is imperative that in

In the 21st century, learning in university education is managed within the framework of new elements: emerging digital technologies, the multiplication of study environments, new social structures (crowdsourcing), crowded online spaces that are self-regulating under new rules, and the unprecedented ubiquitous access to information that flows and is constantly evolving (p. 7).

On the other hand, digital educational content and the general use of ICT in teaching as the scenario to understand the link that each teacher establishes with technology in their specific pedagogical practices and contribute to the understanding of the processes of appropriation of ICT in education (Alvarez and Gonzalez 2021. p.3).

Currently there is an intention of continuity of virtual education, and to improve digital skills, thus demonstrating the importance of developing these skills in students, so it would be necessary to ensure by educational institutions the implementation of workshops, training, free courses, support and other actions that contribute to the development of digital skills that provide the possibility of increasing the intention of continuity of students and teachers (Ríos, 2022).

Technology has been one of the biggest drivers of change in education in recent years. With the emergence of Web 2.0 and Web 3.0, teachers and students have had to adapt to new ways of communicating, collaborating and learning. In this article, we will discuss the role of teachers and students in the era of Web 2.0 and Web 3.0, and how digital tools can enhance education.

METHODOLOGY

An empirical study was conducted, taking into account the objective and the research proposal based on the hypotheses tested, and the relationships between the variables: face-to-face and online modality. With the objective of the study already established, a quantitative approach was chosen. According to Carrasco et al (2019), a quantitative research is a numerical or statistical type of data study that aims to discover the causal connection or

strength of association between variables(Hernández Suárez et al., 2016).. A survey that used a questionnaire to collect data was used as a collection technique. The use of surveys aims to conduct research on a larger scale, allowing us to study phenomena from the data and draw conclusions from the findings(Gamboa et al., 2022).

For Heads (2018) the survey is an instrument this is used to collect information and through it to know the opinion of the respondents.(p,123) The survey was detailed according to the application of methods and techniques, for the absorption of knowledge of the curricular contents considering the face-to-face and online modality, the distance modality is also part of the strategic development of knowledge or where virtual learning is established as the main tool for pedagogical development,(Pambabay-Calero et al., 2018). intangible technologies were used to cover the research tasks of work teams within the computing environment and for educational purposes for excellence and quality in learning(Nieto-Librero et al., 2017)..

On the other hand, Web 3.0, also known as the Semantic Web, focuses on artificial intelligence and the interconnection of data. In education, this means that teachers can use data analytics tools to obtain information about student performance, and personalize learning for each student(Girondot, 2017).

A recent study conducted in Mexico used multivariate HJ Biplot analysis to analyze the relationship between teachers' use of technology and student achievement in mathematics. The results showed that teachers who use Web 2.0 tools, such as blogs and videos, have a positive impact on students' achievement(Tilak & Kumar, 2022).. In addition, a positive relationship was observed between teachers' use of technology, and students' motivation and interest in the subject matter(Peters, 2022). To use the internal consistency of the questionnaire, Cronbach's alpha was applied, which aims to evaluate the factors and magnitude of the same in case there is a correlation between the items, resulting in >9, indicating an excellent internal consistency and the authenticity factor 8. Authors recommend >9, with acceptable values ranging between 7 and 8 (Well et al., 2023) (Sisniegas Vergara et al., 2023) (Vega Martíneza et al., 2019) (Streiner, 2003). In the following Table 1, they indicate the Cronbach's alpha of each dimension.

Table 1 Cronbach's alpha α by dimension

Dimensions	Cronbach's alpha

Teaching Strategies.	0,8434
Pedagogical Strategies	0,8025
Interactivity	0,8623
Technological Resources	0,9243
Educational Platforms	0,9178
Virtual Modality	0,8797

Data collection and sampling.

Data extraction was by means of an online questionnaire in Google Forms, through this platform, information about the study to be conducted was described(Kaputa et al., 2022)followed by informed consent, in order to maintain anonymity and comply with ethical standards (Casas M., 2016). (Casas M., 2016) and finally the respective questions of the questionnaire to be answered by the users.

A descriptive and transactional study was conducted, with a population consisting of 1200 university students from the city of Guayaquil, from which a probability sample of 150 was selected. (Hernández Aguado & Ramírez Mena, 2019)..

The survey was taken by means of a closed-ended questionnaire, consisting of 48 items with Likert model alternatives(Shahjahan et al., 2022a).The questionnaire was designed in google drive and sent to the student base of the universities: Ecotec, Universidad Politécnica Salesiana, Católica, Universidad de Guayaquil through emails. (Zubizarreta et al., 2022).

The control of variables is established through online teaching and learning strategies. Here the application of the methods and techniques applied are explained in detail so that students have a broad and clear knowledge. The teachers apply their own strategies and the students take responsibility and help to attract the attraction.(P. D. C. C. L. C. Espinoza & Gutiérrez, 2022).. Be careful through them. The survey is detailed with four questions related to methods used, knowledge absorption, curriculum content, teacher proficiency in class, and teacher and student knowledge engagement in online learning(García-Peñalvo et al., 2022).. The supervision of each class taught through the online pathway is evaluated by the student based on the strategies imposed by the teacher and the results are applied to the knowledge that the student has and the quality of learning(Miranda-Molina, 2022).

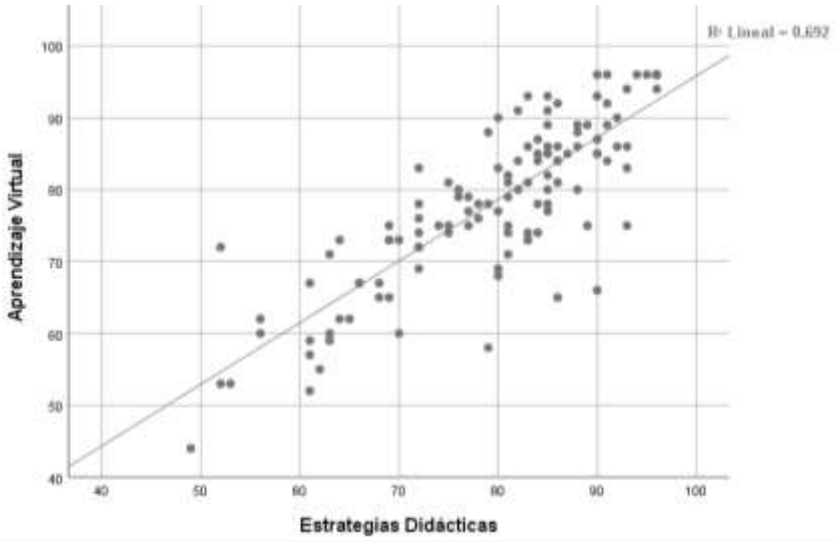
Web 2.0, which emerged in the early 2000s, is characterized by interactivity and user participation in the creation and distribution of content. Teachers can take advantage of this technology to create online educational resources, such as videos, presentations, and blogs, which can be shared with students(Guzman & Alvarez, 2022).. In addition, students can collaborate on online projects and share their ideas with peers and teachers.

Bivariate and multivariate analysis was performed to determine the normality of the data distribution and the Chi-square test for testing the hypotheses raised, the data were processed with the statistical package SPSS 25(Trejo et al., 2018).

RESULTS

Research results generally point to didactic strategies in e-learning for university students(López-Golán et al., 2022).. 50.31% rated the didactic strategy as very good in normal responses and 48.97% rated it as very good in virtual modalities. In the educational strategy, 47.73% explained this management by the good level achieved in the aspects of teaching and learning.

Figure 1. Functional relationship between variables

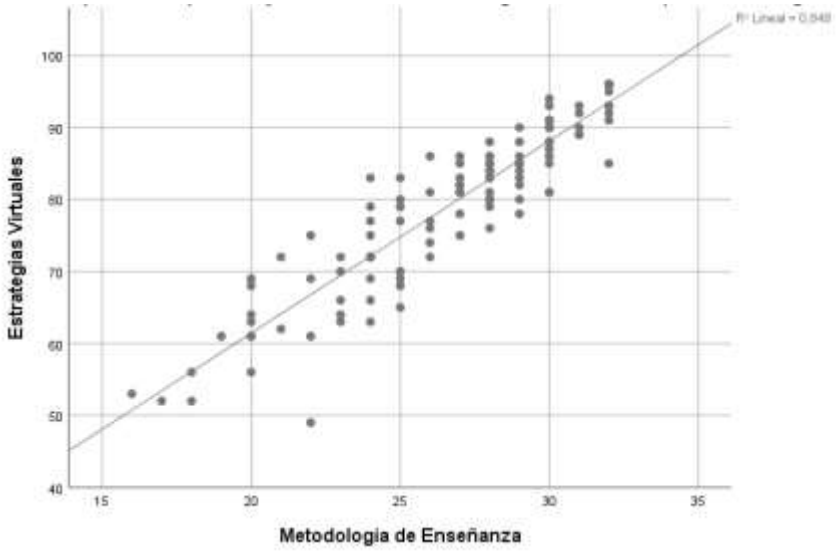


The figure above shows the behavior of the didactic strategy on undergraduates' e-learning. Here, lower ratings for the didactic strategy were also associated with lower ratings for e-learning, and the higher the rating for e-learning, the higher the rating for the didactic strategy over that of the teachers(O. Espinoza et al., 2022).. This behavior demonstrates that as

aspects of teaching and learning and educational platforms improve, so does virtual learning.

The results of the study show that, in general, didactic strategies in virtual learning of university students; educational platforms are rated as good with 46.69 %, interactivity with 46.49 %, technological resources with 41.22 % of good and aspects related to learning in the educational environment in general are rated as good by the students(Robertson & Nestore, 2022)..

Figure 2. Functional relationship between variables



According to the previous figure, in general, it is observed that the lowest scores in the teaching methodology are also associated with low scores in the dimension of virtual strategies, while the scores in both aspects also show the same relationship(Mier Pérez, 2022). This behavior makes it clear that in general, as the teaching methodology improves, virtual learning improves.

Table 1 Correlation analysis between variables

			Virtual Learning
Spearman's Rho	Didactic Strategies	Correlation coefficient	,811**
		Sig. (bilateral)	0

N	120

**. Correlation is significant at the 0.01 level (bilateral).

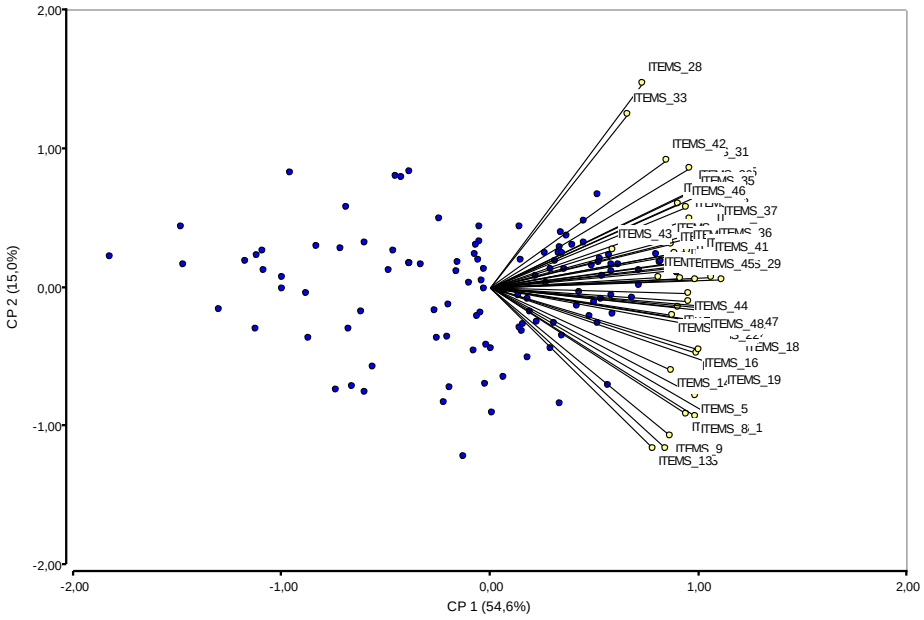
Upon finding non-parametric data, Spearman's Rho correlation was applied, finding a high relationship (RS: 0.811) between Didactic Strategies and Virtual Learning, which are also highly significant at (P<0.05).

According to the correlation analysis, the Didactic Strategies show a relatively high correlation with Virtual Learning and its dimensions respectively.

The correlations found evidenced a significance, Sig.=0.000, less than 0.05, which leads to reject the null hypothesis and accept the alternate research hypothesis, which point out the didactic strategy significantly influences e-learning in students(Shahjahan et al., 2022b)..

The positive sign of the correlations confirms the positive relationship that exists between the variables investigated, which allows inferring that as the Didactic Strategies improve, Virtual Learning improves.

Figure 3. Biplot



Teaching Methodologies and Virtual Strategies that are also highly significant at (P<0.05); these correlations are nevertheless significant, as deduced from the significance of the correlations, Sig.=0.000, less than 0.05, a situation that leads to accepting the alternate research hypothesis that the Teaching Methodologies dimension is significantly related to Virtual Strategies(Leyva Vázquez et al., 2022)..

A moderate-high relationship (RS:0.711) between teaching skills and e-learning is also highly significant (P<0.05); having sufficient evidence to reject the null hypothesis and accept the specific hypothesis of the study.

The positive and significant correlations confirm the fact that as Teaching Methodologies improve, Virtual Learning improves.

CONCLUSIONS

To better understand the relationship between Web 2.0 teachers and Web 3.0 students, a statistical tool called HJ Biplot multivariate analysis can be used. This technique allows visualizing the relationship between variables and observations in a two-dimensional graph. In the case of education, the relationships between the use of Web 2.0 tools by teachers and the academic performance of students can be analyzed.

In conclusion, Web 2.0 and Web 3.0 offer unique opportunities to improve education. Teachers can use digital tools to create interactive and collaborative educational resources, while the Semantic Web can help personalize learning for each student. HJ Biplot multivariate analysis is a useful tool to analyze the relationship between teachers' use of technology and student achievement. As a result, it can be seen that technology can have a positive impact on education, and it is important that teachers and students adapt to the new forms of communication and collaboration offered by digital technology.

To analyze the impact of Web 2.0 on teachers and Web 3.0 on students, HJ Biplots multivariate analysis can be used. This analysis is a statistical technique used to visualize patterns in multivariate data. HJ Biplots combines principal component analysis and correspondence analysis to show relationships between variables.

In terms of Web 2.0 teachers, an HJ Biplots can show the relationship between the use of Web 2.0 tools and student learning outcomes. For example, an HJ Biplots could show that teachers who use blogs and wikis have better learning outcomes than teachers who do not use these tools.

In terms of Web 3.0 students, an HJ Biplots can show the relationship between the use of Web 3.0 tools and students' ability to solve problems and process information. For example, an HJ Biplots could show that students who use augmented reality and virtual reality have a greater ability to process information and solve complex problems than students who do not use these tools.

In conclusion, Web 2.0 and Web 3.0 have changed the way teachers teach and students learn. Using Web 2.0 and Web 3.0 tools, teachers can improve students' motivation and engagement, as well as their ability to work in teams and solve problems. Students can enhance their learning experience by using Web 3.0 tools such as augmented reality, virtual reality, and virtual assistants. HJ Biplots multivariate analysis is a useful tool for analyzing the impact of Web 2.0 on teachers and Web 3.0 on students.

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