

<https://doi.org/10.23913/ride.v13i26.1406>

Artículos científicos

Modalidades de aprendizaje y rendimiento académico en estudiantes universitarios

Modalities of Learning and Performance in Ecuadorian University Students

Modalidades de aprendizagem e desempenho acadêmico em universitários

José Marcelino Romero Gutiérrez

Pontificia Universidad Católica del Ecuador, Sede Santo Domingo, Ecuador

jromero343@pucesd.edu.ec

<https://orcid.org/0000-0001-5351-2593>

Teres Jesús Zambrano Ortega

Pontificia Universidad Católica del Ecuador, Sede Santo Domingo, Ecuador

tjambrano@pucesd.edu.ec

<https://orcid.org/0000-0003-4900-0469>

Resumen

La presente investigación realiza un análisis comparativo del rendimiento académico de los estudiantes de una asignatura transversal homologada en diferentes periodos académicos y en diferentes modalidades de estudio (*online*, *b-learning* y presencial). La investigación propuesta se ajusta al modelo no experimental, puesto que se analizó la incidencia de las modalidades de estudio en el rendimiento académico de los estudiantes en la asignatura en estudio. Se midió los resultados obtenidos de 361 estudiantes universitarios entre 17 a 25 años de edad (hombres = 54.5 %, mujeres= 45.4 %), en los periodos académicos 201801-201802-201901. Se realizó un procedimiento *ad hoc* y un tratamiento estadístico descriptivo, comprobación de hipótesis con análisis de varianza, prueba de heterogeneidad de las varianzas (Welch y Brown-Forsythe); finalmente una *post hoc* de comparación múltiple. Los resultados demuestran que existen diferencias significativas (> 0.05) con referencia a la modalidad de estudio y el rendimiento académico. Los estudiantes en la modalidad presencial

y *online* no muestran diferencias significativas entre calificaciones, pero los de la modalidad *b-learning* obtienen mejores resultados.

Palabras clave: análisis comparativo, *blended learning*, rendimiento escolar, TIC.

Abstract

The present research performs a comparative analysis of the academic performance of students in a cross-cutting subject homologated in different academic periods and in different study modalities (online, b-learning and face-to-face). The proposed research conforms to the non-experimental model since the incidence of study modalities on the academic performance of students in the subject under study was analyzed. The results obtained from 361 university students between 17 to 25 years of age (males = 54.5 %, females= 45.4 %), in the academic periods 201801-201802-201901 were measured. An *ad hoc* procedure and descriptive statistical treatment, hypothesis testing with analysis of variance, test of heterogeneity of variances (Welch and Brown-Forsythe); finally a *post hoc* of multiple comparison were performed. The results show that there are significant differences (> 0.05) with reference to the study modality and academic performance. Students in the face-to-face and online modality do not show significant differences between grades, but those in the b-learning modality obtain better results.

Keywords: comparative analysis, blended learning, school performance, ICT.

Resumo

A presente investigação procede a uma análise comparativa do desempenho académico dos alunos de uma disciplina transversal aprovada em diferentes períodos letivos e em diferentes modalidades de estudo (online, b-learning e presencial). A investigação proposta enquadra-se no modelo não experimental, uma vez que se analisou a incidência das modalidades de estudo no rendimento académico dos alunos da disciplina em estudo. Foram medidos os resultados obtidos de 361 universitários entre 17 e 25 anos (homens = 54,5%, mulheres = 45,4%), nos períodos letivos 201801-201802-201901. Foi realizado um procedimento ad hoc e um tratamento estatístico descritivo, teste de hipótese com análise de variância, teste de heterogeneidade de variância (Welch e Brown-Forsythe); finalmente uma comparação múltipla post hoc. Os resultados mostram que existem diferenças significativas ($> 0,05$) no que diz respeito ao tipo de estudo e rendimento académico. Os alunos da modalidade

presencial e online não apresentam diferenças significativas entre séries, mas os da modalidade b-learning obtêm melhores resultados.

Palavras-chave: análise comparativa, ensino híbrido, desempenho escolar, TIC.

Fecha Recepción: Septiembre 2022

Fecha Aceptación: Febrero 2023

Introduction

Information and communication technologies (ICT) are currently an essential part of human life. In the field of education, they represent an aid in knowledge management processes. Of course, the fulfillment of the learning results is articulated with the academic performance of the students. Authors such as Fajardo, Maestre, Felipe, León and Polo (2017) point out that it is a susceptible construct that adopts quantitative and qualitative values through which it is possible to establish evidence and size the profile of skills, knowledge, attitudes and values developed. by the student in the teaching-learning process.

However, the use of digital resources will depend on a correct choice of the teacher. In a range of possibilities, choosing well could guarantee the strengthening or not of the knowledge transmission process (Cabero, Llorente, & Vásquez, 2017; García, Ulloa, & Córdova, 2020). Likewise, the modality of study could be a determining factor in the transmission of knowledge. The most common learning environments or study modalities are face-to-face, online and b-learning, which transforms the teacher from transmitter to content facilitator.

The face-to-face or traditional mode is a consolidated model that specifies the roles of the teacher and the student. Ausubel (1963) points out that significant learning is the human mechanism par excellence to acquire and store an immense amount of ideas and information represented in any field of knowledge in formation. Since the arrival of ICT in education, the online mode emerges and transforms the traditional model of teaching. Dans (2009) points out that online education began its development in 2003. Since users had limitations on the Web, the initial tools consisted of blogs or wikis, which marked a path for learning management systems (LMS, for example). its acronym in English). This model works as a learning engine and transformation of teaching and formal education. This teaching-learning modality is on the rise. Allen and Seaman (2011, cited in Topper and Lancaster, 2016) found that 77% of a sample of people surveyed in public universities agree that this type of education, online, is essential for the future of institutions. In addition, the

aforementioned study reveals a significant increase in enrollment in this modality. Finally, the b-learning or blended learning mode is configured as a hybrid education model where traditional learning is combined with online learning. For Ramas (2015), this modality is a teaching design in which face-to-face (physical) and non-face-to-face (virtual) technologies converge in order to generate the learning process; It has its origins in distance education and has been evolving over the last few years. The distance model was the basis for the e-learning model, but its aspirations were high, which could not be consolidated due to the absence of face-to-face components and synchronous materials. (Llorente, 2009).

As mentioned above, in recent years a form of technological educational application has appeared that could guarantee quality training for all people, in an inclusive manner, regardless of place and space, often materialized in massive and open online courses (MOOCs), for its acronym in English) (Cabero et al., 2014). However, this teaching model that responds to the b-learning and online modalities should not fall into a simple business model and forget the quality of educational teaching (Aguaded and Medina, 2015; Aguaded, Vázquez and López, 2016; Zapata, 2013).

However, education is marked by two revolutions: the birth of universities and the incorporation of technologies into their processes. Technology is a term that not only defines the latest advances in science, but is also associated with knowledge that has slowly evolved since the mid-20th century. Since the 50s, this evolution begins to take a turn. By 1994, it achieved its optimization with the arrival of the Internet as a means of communication open to society, in what is called Web 1.0. The birth of Web 2.0 manages to change the paradigm of how we learn: users go from receivers to senders and information travels in both directions (Olelewe, Agomuo and Obichukwu, 2019).

The implementation of any technology goes through different stages. Cabero et al. (2014) point out that this process must be followed: a) launch of the technology; b) peak of oversized expectations; c) abyss of disappointment; d) consolidation ramp, and e) productivity plateau. It is there where educational institutions must double efforts from the field of media literacy to conclude the most appropriate modality according to the profile of the subjects, with the intention of ensuring consolidated and therefore significant learning (Sánchez, Pérez and Fandos, 2019).

Teaching methods become innovative to the extent that they are driven by ICT, always taking into account the correct selection of tools or applications by the teacher (Olelewe et al., 2019). Knowledge retention could be guaranteed by active participation in

multimedia platforms, which invites to redesign the school curriculum. For Hattie and Donoghue (2016), the ultimate goal of any educational activity must be to help students learn efficiently and effectively. Therefore, from the point of view of educational social responsibility, questions arise such as: does the modality of study guarantee meaningful learning? If so, which one is most suitable for the group and how should the ideal digital resources be chosen?

This entails evaluating the type of study as a motivational variable for school dropout (Korhonen, Tapola, Linnanmäki, & Aunio, 2016). Studies carried out show associations between both variables (Guo, Marsh, Morin, Parker, & Kaur, 2015; Korhonen et al., 2016; Li & Carroll, 2020; Widlund, Tuominen, Tapola, & Korhonen, 2020; Zabalza, 2013). That reconsiders the interpretation from its two perspectives: 1) sufficient academic performance and 2) satisfactory (Carrasco, 2004). Sufficient is an exact reflection of the grades obtained by students in exams and assigned work, which has a series of biases that affect its results, from the subjectivity of the teacher to the validity and reliability of the evaluation techniques and instruments used. , going through the student's state of mind. In contrast, satisfactory academic performance does not reflect the student's grades, but rather her performance, which is more important in the workplace (Carrasco, 2004). From this perspective, it is important to know which study modality has the greatest impact on the academic performance of the university student in order to make adjustments and corrections to the pedagogical process.

Method and materials

The present investigation has a quantitative approach, a cross-sectional non-experimental design. The modalities of study and their influence on the academic performance of students of the ICT subject with international certification from the Pontificia Universidad Católica del Ecuador (PUCE) Santo Domingo Campus in the periods 201801, 201802, 201901 were analyzed. requested access to the data to the higher education institution for treatment in the SPSS software.

The participating subjects make up a population of 361 university students between the ages of 17 and 25, distributed by academic period according to Table 1.

Table 1. Description of the sample

Academic Term	Men (%)	Woman (%)
201801	80 (74.7)	27 (25.3)
201802	62 (47.6)	68 (52.3)
201901	55 (44.3)	69 (55.7)
Total	197 (54.5)	164 (45.4)

Source: Dirección Académica PUCE Santo Domingo

The method used to collect the data was the analysis of the products of the pedagogical activity (Blanco and Valledor, 2018). In this case, the product analyzed consisted of the quantitative academic performance of students in a subject associated with an international ICT certification.

The data collection procedure consisted of requesting authorization from the directors of the higher education institution (HEI) to collect the necessary data; Subsequently, the variables were defined and an analysis sheet of the products of the activity was prepared as an ad hoc instrument, consisting of a matrix in which the notes of the students that reflected their performance were recorded.

Data were analyzed using a descriptive statistical treatment, hypothesis testing with variance analysis (Anova), variance heterogeneity test (Welch and Brown-Forsythe); finally, a multiple comparison post hoc. To solve the research problem, the following study hypothesis was proposed:

H1: Study modalities (face-to-face-b-learning-online) influence the academic performance of university students.

Results

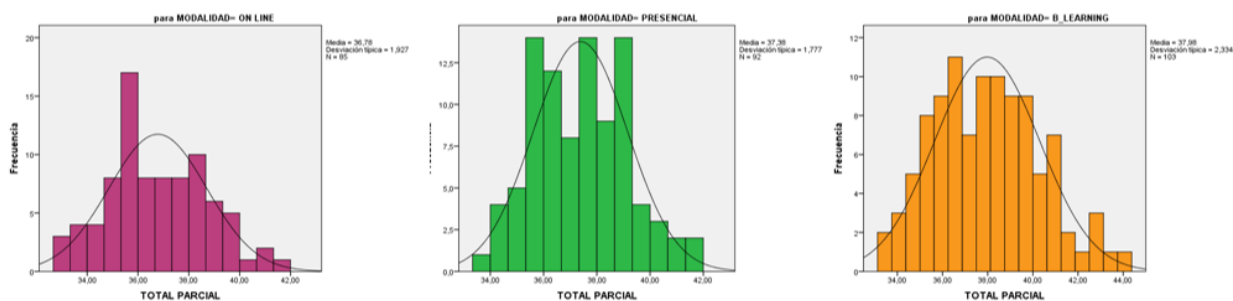
Table 2 and Figure 1 show the differences between the academic performance of university students in the modalities. The face-to-face indicated an average of 37.3 and a standard deviation of 1.7 performance; the online modality presented an average of 36.7 and a standard deviation of 1.9; Regarding the b-learning modality, an average of 37.9 and a standard deviation of 2.33 were expressed.

Table 2. Descriptive analysis by classroom modality - online - b-learning

Learning modality		Statistica 1	Typical error		
Total partials	Face-to-face	Mean	37.38	.18	
		Confidence interval for the mean at 95%	Lower limit	37.01	
			Upper limit	37.75	
		Median	37.42		
		Variance	3.15		
	SD	1.77			
	Online	Mean	36.77	.20	
		Confidence interval for the mean at 95%	Lower limit	36.36	
			Upper limit	37.19	
		Median	36.43		
		Variance	3.71		
	SD	1.92			
	B-learning	Mean	37.97	.23	
		Confidence interval for the mean at 95%	Lower limit	37.52	
			Upper limit	38.43	
Median		37.90			
Variance		5.44			
SD	2.33				

Source: Own elaboration

Figure 1. Relationship of overall averages and study modalities with learning outcomes.



Source: Own elaboration

Likewise, in Table 3 it can be seen that the data are being distributed normally according to the Lilliefors correction test and using the Kolmogorov-Smirnov statistics.

Table 3. Descriptive statistic Lilliefors / Kolmogorov-Smirnov

Normality tests							
	Learning modality	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Estadístico	Gl.	Sig.	Estadístico	Gl.	Sig.
Total partial	Face-to-face	.08	92	.19	.98	92	.40
	Online	.09	85	.04	.97	85	.16
	B-learning	.07	103	.17	.98	103	.30

a. Correction of the significance of lilliefors.

Source: Own elaboration

On the other hand, Table 4 shows the general percentage of students passing and failing in the different modalities. The face-to-face modality reached the highest number of approvals, 87% and failed 13%; The b-learning modality reported 82% of students passing, and 18% failing, of the three academic periods described in the method. Finally, the online modality registers 65% approval and 35% disapproval, being the highest in relation to the other modalities.

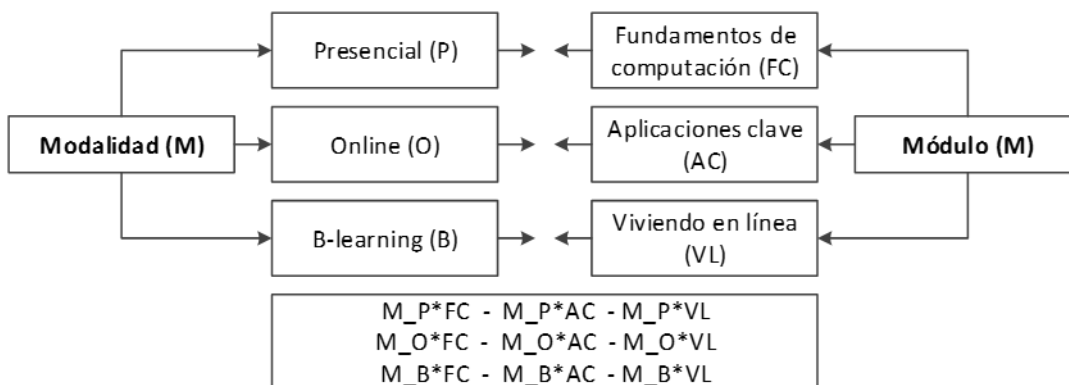
Table 4. Passed and failed students of the different partials in the three study modalities

State	Face-to- face	Online	B-learning
Approved	87%	65%	82%
Failed	13%	35%	18%

Source: Dirección Académica PUCE Santo Domingo

Next, in figure 2, the inferential statistics applied to the results obtained to determine the Anova are presented, according to the combination of variables between the internal modules of the chosen ICT subject.

Figure 2. Combination of study variables



Fuente: Own elaboration

The verification of hypotheses through the Anova of a factor has determined values that indicate the differences between the study modalities. The results are based on the quantitative analysis of the academic performance of the first, second and third partial; of course, the population (N), mean (M), standard deviation (SD), standard error (Et) are indicated between each one of them. Table 5 shows that in the second partial there was a significant increase of the same proportion between the study modalities.

Table 5. Hypothesis testing by ANOVA - academic performance by partial

		N	M	Ds	Et	Confidence interval for the mean at 95%		Min.	Max.
						Limit -	Limit +		
1st partial	Presencial	92	11.34	0.91	0.09	11.15	11.53	10.01	13.67
	Online	85	11.19	0.91	0.09	11.00	11.39	9.90	13.34
	B-learning	103	11.59	1.12	0.11	11.37	11.81	10.01	14.00
	Total	280	11.39	1.00	0.06	11.27	11.51	9.90	14.00
2nd partial	Presencial	92	12.30	0.87	0.09	12.12	12.49	10.82	13.95
	Online	85	12.05	0.79	0.08	11.88	12.22	10.82	14.30
	B-learning	103	12.17	0.89	0.08	11.99	12.34	10.82	14.30
	Total	280	12.18	0.86	0.05	12.07	12.28	10.82	14.30
3rd partial	Presencial	92	10.30	0.71	0.07	10.15	10.45	9.33	12.33
	Online	85	10.14	0.71	0.07	9.99	10.30	9.30	12.33
	B-learning	103	10.66	0.87	0.08	10.48	10.83	9.30	13.01
	Total	280	10.38	0.80	0.04	10.29	10.48	9.30	13.01
Total partial	Presencial	92	37.38	1.77	0.18	37.01	37.75	33.59	41.95
	Online	85	36.77	1.92	0.20	36.36	37.19	33.26	41.34
	B-learning	103	37.97	2.33	0.23	37.52	38.43	33.26	44.27
	Total	280	37.41	2.09	0.12	37.17	37.66	33.26	44.27

Source: Own elaboration

The test of homogeneity of variances was carried out through the Levene test in order to verify if the Anova responds to equal variances or not to verify the hypothesis. In the result, the alternative performance of the second and third partial presented values above the value of significance (> 0.05) described in table 6.

Table 6. Variance homogeneity test

	Levene Estadistical	GL1	GL2	Sig.
1st partial performance	4.47	2	277	0.012*
2nd partial performance	1.05	2	277	0.351
3st partial performance	2.33	2	277	0.099
Total partial ($p \leq 0,05$)	4.15	2	277	0.017

Source: Own elaboration

Table 7 shows the relationship between the modalities of study and the academic performance achieved. In this way, statistical significance ($p < 0.05$) was demonstrated for the face-to-face modality and b-learning in all the results. Now, the first partial presented significance; He highlighted the face-to-face modality and b-learning. The third part presents a statistical difference with a higher average in the face-to-face and b-learning modalities. Finally, the second part does not present a significant difference.

Table 7. Study modality-academic performance relationship

Performance	Study modalities	N	M	ED	P
1st partial	Face-to- face	92	11.34	.91	.022*
	Online	85	11.19	.91	
	B-learning	103	11.59	1.12	
	Total	280	11.39	1.00	
2nd partial	Face-to- face	92	12.30	.87	.142
	Online	85	12.05	.79	
	B-learning	103	12.17	.89	
	Total	280	12.18	.86	
3rd partial	Face-to- face	92	10.30	.71	.000*
	Online	85	10.14	.71	
	B-learning	103	10.66	.87	
	Total	280	10.38	.80	

Source: Own elaboration

Table 8 shows the multiple comparisons of the Games-Howell post hoc test at 0.05. The total performance of the partial demonstrated statistical significance for the b-learning

modality; the other learning modalities such as face-to-face and online did not present significance.

In this same sense, the performance of the first partial with respect to the study modalities only showed significance to the b-learning modality, not the face-to-face and online modalities. Additionally, the performance of the third partial indicated statistical significance, according to the Games-Howell test, in the face-to-face modality and in the b-learning modality; while the online modality did not register statistical significance. Finally, the performance of the second partial did not present significance with any of the learning modalities.

Tabla 8. Post-hoc analysis - study modalities and performance. Test Game Howell & Hochberg.

Performance	Study modalities	N	M	SD	P
Total	Face-to- face	92	37.38	1.77	.000
	Online	85	36.77	1.92	
	B-learning	103	37.97	2.33	
1st partial	Total	280	37.41	2.09	
	Face-to- face	92	11.34	.91	.022
	Online	85	11.19	.91	
2nd partial	B-learning	103	11.59	1.12	
	Total	280	11.39	1.00	
	Face-to- face	92	12.30	.87	.142
3rd partial	Online	85	12.05	.79	
	B-learning	103	12.17	.89	
	Total	280	12.18	.86	
	Face-to- face	92	13.73	.95	.000

Source: Own elaboration

Table 9 reports the relationship of the learning modality between the academic performance of the students by partials submitted to the Hochberg test, for an unpaired

sample, noting a significant difference between the face-to-face modality and b-learning, 95% confidence and at the 0.05 level of significance.

Table 9. Hochberg GT2 test, first, second and third partial

	Modality	N	Subset for alpha = 0.05	
			1	2
1st partial	Online	85	11.19	
	Face-to-face	92	11.34	11.34
	B-learning	103		11.59
	Sig. Online		0.69	0.23
2nd partial	Online	85	12.05	
	Face-to-face	103	12.17	
	B-learning	92	12.30	
	Sig. Online		0.126	
3rd partial	Online	85	10.14	
	Face-to-face	92	10.30	
	B-learning	103		10.66
	Sig. Online		0.45	1.00

Source: Own elaboration

Finally, Table 10 and Figure 3 show that the b-learning and face-to-face study modalities showed significant differences according to the Hochberg test, 95% confidence, but not the online modality in relation to the academic performance of the students. in the total of the partials. In this sense, this result presumes that the modalities that have greater academic acceptance in the university students intervened are the face-to-face modality and b-learning.

Table 10. Relationship of the study modality and performance of the three partials

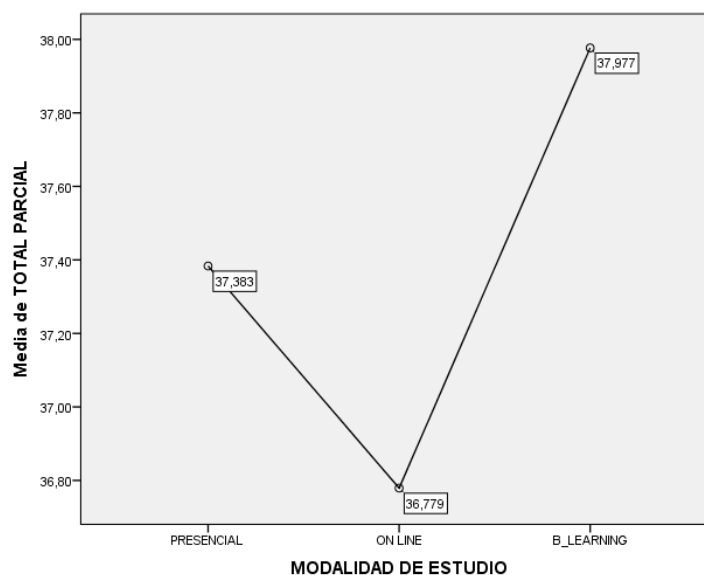
Total parcial				
	Learning modality d	N	Subset for alpha = 0.05	
			1	2
Hochberg a, b	Online	85	36.77	
	Face-to-face	92	37.38	37.38
	B-learning	103		37.97
	Sig.		0.12	0.13

Note: Means are shown for groups in homogeneous subsets.

a Uses the harmonic mean sample size = 92.756. b Group sizes are not equal. The harmonic mean of the group sizes will be used. Type I error levels are not guaranteed.

Source: Own elaboration

Figure 3. Fluctuation between modalities and performance



Source: Own elaboration

Discussion

The Welch and Brown-Forsythe (Field, 2013) tests for study units I (“Computer Fundamentals”) and III (“Living online”) found significant differences (> 0.05) with reference to the study modality and the academic performance. Unit II (“Key applications”) does not present significant differences. The constant is that students in the face-to-face and online modalities do not show significant differences between qualifications, but in b-learning, at a general level, they obtain better results. It is significant how these results differ from the findings found by Topper and Lancaster (2016), which did not reveal significant differences between learning modalities. These differences may be attributable to the effectiveness of combining the two methods over the use of only one, teacher experience, student dedication, or other factors that will emerge from future research. It is important to highlight the limitations of this study: the size of the sample and its heterogeneity.

The efforts by governmental and non-governmental entities such as the Inter-American Development Bank (Prats and Puig, 2017) to reduce the digital divide in Ecuador are dissonant if they are not articulated with strategies that modify the paradigm and concept that ICTs should be the means and not an end. Currently, these differences between study modalities could be attributed as a prominent element to the trend in reading habits in Ecuador compared to other Latin American countries. According to the Regional Center for the Promotion of Books in Latin America and the Caribbean [Cerlalc] (2012), Ecuador has an average reading of 0.5 books per year per inhabitant, below Chile's 5.4 and Argentina's 4.6, which reflects the absence of articulation between regulations and their application. Reading has been taken as a reference because it is an essential component for the management of digital resources and self-training in any of the chosen study modalities.

In conclusion, the study generates a contribution to the scientific community since it has been possible to analyze the academic variables and the modalities of study of the subjects that articulate the essential use of ICT in their learning. Currently, students prefer dynamic learning, outside the traditional context, since they are constantly exposed to digital screens, which promotes their attention. Therefore, the teacher is in the professional obligation to adapt knowledge to trends, that is, to internally promote media literacy practices with the intention of generating significant learning.

Conclusions

A high percentage of investigations in developed nations agree that there is no significance between study modalities in the teaching-learning process. However, in developing countries, particularly in Ecuador and in the province where the research was carried out, there is a lack in the culture for disciplined autonomous learning. The analyzes show that the student is dependent on the teacher for the appropriation of the contents, even though there are web resources of the certification with didactic means for learning.

It is concluded that the 2nd partial, referring to the learning unit "Key applications", does not present significant differences (> 0.05) between study modalities. This statement is based on the results of the Anova and is empirically corroborated with the hypothesis that students handle the contents of this exam with greater skill since, regardless of the major, they all use office automation tools for their academic work.

Once Anova and post hoc were applied to groups with variable subjects and with equal and unequal variances, by the Hochberg and Games-Howell GT2 tests respectively, the differences between modalities (first and third partial) were defined. To verify the results, the Tukey-B test (small groups) was used, which yielded homogeneous results, which implies that the thesis on the differences in the aforementioned partials is strengthened.

Once the significant differences (< 0.05) were defined in the first part ("Computer Science Fundamentals"), it is identified that this is located between the modalities *online* ($\bar{X} = 10.15$) and *b-learning* ($\bar{X} = 10.66$) with a value $p = 0.022$.

Once the significant differences (< 0.05) were defined in the third part ("Living online"), it is identified that these are located between the modalities *online* ($\bar{X} = 11.20$) and *b-learning* ($\bar{X} = 11.60$) with a value $p < 0.001$; *b-learning* ($\bar{X} = 11.60$) and face-to-face ($\bar{X} = 11.34$) with a value $p = 0.004$.

Future lines of research

As a result of the pandemic, the teaching-learning gaps have opened and closed in many aspects (social, economic, cultural, educational), therefore, it is imperative in the post-pandemic era to analyze before and after studying in different modalities. to assess progress and setbacks, especially in developing countries. The study being analyzed already demonstrated that cultural patterns in student training affected academic performance in modalities that demanded autonomy or that had to be self-directed with support from

platforms or asynchronous modalities.

As future lines of research, the impact on student performance can be analyzed once the health emergency has forced the actors in the educational process to migrate rapidly towards the acquisition of digital skills to face a model based on technologies. emerging.

References

- Aguaded, I. y Medina, R. (2015). Criterios de calidad para la valoración y gestión de MOOC. *RIED-Revista Iberoamericana de Educación a Distancia*, 18(2), 119-143. Recuperado de <https://doi.org/10.5944/ried.18.2.13579>.
- Aguaded, I., Vázquez, E. y López, E. (2016). El impacto bibliométrico del movimiento MOOC en la comunidad científica española. *Educación XX1*, 19(2), 77-103. Recuperado de <https://www.redalyc.org/articulo.oa?id=70645811003>.
- Ausubel, D. P (1963). *The Psychology of Meaningful Verbal Learning*. New York, United States: Grune & Stratton.
- Blanco, M. y Valledor, R. (2018). Las propiedades del método estudio de los productos del proceso pedagógico. *Opuntia Brava*, 6(4), 64-75.
- Cabero, J., Llorente, M. y Vázquez, A. I. (2014). Las tipologías de MOOC: su diseño e implicaciones educativas. *Profesorado. Revista de Currículum y Formación del Profesorado*, 18(1), 2-15. Recuperado de <http://www.ugr.es/local/recfpro/rev181ART1.pdf>.
- Cabero, J., Roig, R. y Mengual, S. (2017). Conocimientos tecnológicos, pedagógicos y disciplinares de los futuros docentes según el modelo TPACK. *Digital Education Review*, 32, 85-96. Recuperado de <http://hdl.handle.net/11441/69058>.
- Carrasco, J. (2004). *Estrategias de aprendizaje. Para aprender más y mejor*. Madrid, España: Ediciones Rialp.
- Centro Regional para el Fomento del Libro en América Latina y el Caribe [Cerlalc]. (2012). *El libro en cifras. Boletín estadístico del libro en Iberoamérica*. España: Centro Regional para el Fomento del Libro en América Latina y el Caribe. Recuperado de https://cerlalc.org/wp-content/uploads/publicaciones/olb/PUBLICACIONES_OLB_El-libro-en-cifras-1_v1_010812.pdf.

- Dans, E. (2009). Educación *online*: plataformas educativas y el dilema de la apertura. *RUSC. Revista de Universidad y Sociedad del Conocimiento*, 6(1), 22-30. Recuperado de <https://doi.org/10.7238/rusc.v6i1.26>.
- Fajardo, F., Maestre, M., Felipe, E., León, B. y Polo, M. I. (2017). Análisis del rendimiento académico de los alumnos de educación secundaria obligatoria según las variables familiares. *Educación XXI*, 20(1), 209-232. Recuperado de <https://doi.org/10.5944/educxx1.17509>.
- Field, A. (2013). *Discovering Statistics Using SPSS*. London, England: Sage publications.
- García, A., Ulloa, M. C. y Córdova, É. F. (2020). La era digital y la deshumanización a efectos de las TIC. *ReiDoCrea*, 9, 11-20. Recuperado de <https://digibug.ugr.es/bitstream/handle/10481/58663/9-2.pdf?sequence=4&isAllowed=y>.
- Guo, J., Marsh, H. W., Morin, A., Parker, P. and Kaur, G. (2015). Directionality of the Associations of High School Expectancy-Value, Aspirations, and Attainment: A Longitudinal Study. *American Educational Research Journal*, 52(2), 371-402. Retrieved from <https://doi.org/10.3102/0002831214565786>.
- Hattie, J. and Donoghue, G. (2016). Learning strategies: a synthesis and conceptual model. *npj Science Learn*, 1. Retrieved from <https://doi.org/10.1038/npjscilearn.2016.13>.
- Korhonen, J., Tapola, A., Linnanmäki, K. and Aunio, P. (2016). Gendered pathways to educational aspirations: The role of academic self-concept, school burnout, achievement and interest in mathematics and reading. *Learning and Instruction*, 46, 21-33. Retrieved from <https://doi.org/10.1016/j.learninstruc.2016.08.006>.
- Li, I. W. and Carroll, D. R. (2020). Factors Influencing Dropout and Academic Performance: An Australian Higher Education Equity Perspective. *Journal of Higher Education Policy and Management*, 42(1), 14-30.
- Llorente, M. (2009). Formación semipresencial apoyada en la red (blended learning): diseño de acciones para el aprendizaje. Alcalá de Guadaíra (Sevilla): MAD, 2009.
- Olelewe, C., Agomuo, E. and Obichukwu, P. U. (2019). Effects of B-learning and F2F on college students' engagement and retention in QBASIC programming. *Education and Information Technologies*, 24, 2701-2726. Retrieved from <https://doi.org/10.1007/s10639-019-09882-7>.

- Prats, J. y Puig, P. (2017). *La gobernanza de las telecomunicaciones. Hacia la economía digital*. Banco Interamericano de Desarrollo. Recuperado de <https://publications.iadb.org/en/telecommunications-governance-toward-digital-economy>.
- Ramas, F. E. (coord.) (2015). *TIC en educación. Escenarios y experiencias*. Ciudad de México, México: Ediciones Díaz de Santos.
- Sánchez, I., Pérez, A. y Fandos, M. (2019). Plataformas com-educativas: creatividad y comunidad para el aprendizaje. *Journal of New Approaches in Educational Research*, 8(2), 223-235.0. Recuperado de <https://doi.org/10.7821/naer.2019.7.437>.
- Topper, A. and Lancaster, S. (2016). Online graduate educational technology program: An illuminative evaluation. *Studies in Educational Evaluation*, 51, 108-115. Retrieved from <http://dx.doi.org/10.1016/j.stueduc.2016.10.002>.
- Widlund, A., Tuominen, H., Tapola, A. and Korhonen, J. (2020). Gendered pathways from academic performance, motivational beliefs, and school burnout to adolescents' educational and occupational aspirations. *Learning and Instruction*, 66(1). Retrieved from <https://doi.org/10.1016/j.learninstruc.2019.101299>.
- Zabalza, M. (2013). *Diseño y desarrollo curricular*. Madrid, España: Narcea.
- Zapata, M. (2013). MOOCs, una visión crítica y una alternativa complementaria: La individualización del aprendizaje y de la ayuda pedagógica. *Campus Virtuales*, 2(1), 20-38. Recuperado de <http://uajournals.com/ojs/index.php/campusvirtuales/article/view/26/25>.

Contribución	Autor (es)
Conceptualización	José Marcelino Romero Gutiérrez.
Metodología	José Marcelino Romero Gutiérrez (principal), Teresa Jesús Zambrano Ortega (apoya).
Software	José Marcelino Romero Gutiérrez.
Validación	Teresa Jesús Zambrano Ortega.
Análisis Formal	José Marcelino Romero Gutiérrez.
Investigación	José Marcelino Romero Gutiérrez (igual), Teresa Jesús Zambrano Ortega (igual).
Recursos	Teresa Jesús Zambrano Ortega.
Curación de datos	José Marcelino Romero Gutiérrez.
Escritura - Preparación del borrador original	Teresa Jesús Zambrano Ortega.
Escritura - Revisión y edición	Teresa Jesús Zambrano Ortega (principal), José Marcelino Romero Gutiérrez (apoya).
Visualización	Teresa Jesús Zambrano Ortega.
Supervisión	José Marcelino Romero Gutiérrez
Administración de Proyectos	José Marcelino Romero Gutiérrez (principal), Teresa Jesús Zambrano Ortega (apoya).
Adquisición de fondos	No aplica.