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Academic performance in the subject of Morphology 2 in the Medical career at the University of Cuenca, before, during, and after the COVID-19 pandemic

Rendimiento académico en la asignatura de Morfología 2 de la carrera de Medicina de la Universidad de Cuenca, antes, durante y después de la pandemia COVID-19

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SUMMARY

Introduction: It is essential to consider how to teach or learn morphology, as various methods and resources are available for understanding it, all of which are typically framed within the context of face-to-face teaching. In the year 2020 (COVID-19 pandemic), the way learning was organized changed abruptly, moving from traditional (face-to-face) methods to a virtual format, which undoubtedly had an impact on both learning and teaching, as well as on summative assessments and, in this area, on student pass/fail rates.

Objective: to determine whether there is a difference in academic performance in the subject Morphology 2, pre-pandemic, during the pandemic, and post-pandemic, in the March-August academic cycles, between 2019 and 2022, in the medical degree program at the University of Cuenca.

Methodology: The anonymized database provided by the vice dean of the Faculty of Medical Sciences was used. Final grades and pass rates for students in the March–August academic cycles of 2019, 2020, and 2022 were selected. The data are presented in tables showing frequencies, means, and standard deviations. For data analysis and to determine differences, the one-way ANOVA test and Bonferroni post hoc test were used.

Results: In the March–August 2020 school year (the first school year of the pandemic), there was an increase in the pass rate (98.6%) compared to other school years. In the post-pandemic cycle, the pass rate decreased (88.7%), becoming similar to that of the pre-pandemic cycle (87%). The final grades in the pre-pandemic, pandemic, and post-pandemic cycles were 64.80, 74.55, and 69.43, respectively, with a statistically significant difference between them.

Conclusion: The performance of morphology students during the COVID-19 pandemic period was higher than in the pre- and post-pandemic cycles analyzed.

Keywords: academic performance; COVID-19; education, medical.

RESUMEN

Introducción: es importante reflexionar cómo enseñar o aprender la morfología, pues esto se dispone de varias formas y recursos para su aprendizaje, los mismos que se encuentran enmarcados en la presencialidad. En el año 2020 (pandemia COVID-19), cambió bruscamente la forma de organizar el aprendizaje, pasando de una manera abrupta de las formas tradicionales (presencial) a una manera virtual, lo que indudablemente repercutió tanto en el aprendizaje como en la enseñanza; así también en las evaluaciones sumativas y, en este ámbito, en la aprobación o reprobación estudiantil.

Objetivo: determinar la existencia de diferencia en el rendimiento académico en la asignatura morfología 2, pre pandemia, en pandemia y pospandemia, en los ciclos lectivos marzo-agosto, comprendidos dentro del período 2019 – 2022, de la carrera de medicina de la Universidad de Cuenca.

Metodología: se utilizó la base de datos anonimizada proporcionada por el vicedecanato de la Facultad de Ciencias Médicas. Se seleccionaron los datos de nota final y aprobación de estudiantes de los ciclos lectivos, marzo – agosto de los años 2019, 2020 y 2022. Los datos se presentan en tablas de frecuencias, medias, desviación estándar. Para el análisis de datos, y la determinación de diferencias, se utilizó el test ANOVA para un factor y el test post hoc de Bonferroni.

Resultados: en el ciclo lectivo marzo – agosto 2020 (primer ciclo lectivo de pandemia) se observa un aumento del porcentaje de aprobación (98.6%), respecto de otros ciclos lectivos. En el ciclo pospandemia disminuye el porcentaje de aprobación (88.7%) que llegan a ser similar al de prepandemia (87%). La calificación final en los ciclos pre pandemia, de pandemia y pospandemia, fueron 64.80, 74.55 y 69.43, respectivamente; con diferencia estadísticamente significativa entre ellos.

Conclusión: el rendimiento de las y los estudiantes de morfología, durante el período de pandemia por COVID-19, fue mayor, con respecto a los ciclos pre y pospandemia analizados.

Palabras Clave: rendimiento académico; COVID-19; educación médica.

INTRODUCCIÓN

Morphology is a basic science that allows students to acquire knowledge and skills, serving as a gateway to other subjects and enabling them to understand and explain the human body, to interpret the alterations that may be observed in the future in the study of professional subjects such as semiology, internal medicine, surgery, and imaging. It is a fundamental pillar of training for health professionals, and specifically for future doctors[1,2].

In the learning of morphology, there has always been discussion about the leading role of the teacher-student relationship, mediated by forms of learning organization[3] that are fundamentally based on face-to-face teaching with a heavy workload, in which memory has been prioritized over reasoning.

For this reason, many educational institutions are discussing how to teach or learn morphology. To this end, various methods and resources are available for learning morphology[4], including books and atlases as fundamental study tools, with a predominantly book-based methodology, as well as cadavers and dissection, and a wide range of software, multimedia programs, and other virtual simulators[5].

Perhaps the following criterion provides adequate context: “Amid an increasingly innovative society and culture, where communication and new technologies now lead various teaching and instruction processes, it is difficult to imagine that the basic health sciences, including anatomy, have not evolved and migrated toward them. However, it is also true that this has been a slow but progressive process, not only in terms of adoption, but also in terms of application for both teachers and students”[6].

Therefore, it should be remembered that, during the pandemic in 2020, there was a sudden change in the way learning was organized, which disrupted the planning that had been in place, abruptly shifting from traditional forms of knowledge to virtual forms, which undoubtedly had an impact on both the learning and teaching of morphology. Creating uncertainty among students and teachers

In this specific case, we were particularly interested in determining the outcome of summative assessments and, specifically, the passing or failing of the morphology course in the medical degree program at the University of Cuenca.

Taking into account that summative assessment in the learning of morphology has undergone significant changes in recent times, especially as a result of the COVID-19 pandemic. Some studies, such as those by Valenzuela[7], mention that "during lockdown, anatomy was digitized in universities, which was a beautiful alternative for students" (p.250). It is within this framework that we aim to analyze the results of changes in teaching methods and assessment, as reflected in final grades, comparing face-to-face and virtual modalities, taking into account the particularities of the three moments observed in this study, which were marked by the COVID-19 pandemic.

Pre-pandemic:

Academic activities placed a strong emphasis on face-to-face assessment, which favors summative assessments focused on written, oral, and practical exams taken in the classroom or amphitheater. In these settings, students demonstrated their knowledge by identifying anatomical structures in anatomical specimens or through workshops with physical models or mock-ups. Due to limitations (including a lack of experience and mistrust of the platform, among others), virtual assessment was used very occasionally, primarily as a complement to face-to-face assessment, through written assignments or small online tests. It should be noted that assessments tended to be homogeneous in terms of their criteria, being standardized for all students, regardless of their learning styles or individual needs[8,9].

During the pandemic:

The transition to virtual learning was completed, with summative assessment moving entirely to the virtual environment, using educational platforms and digital tools. A variety of assessment formats were used, including online exams, virtual presentations, and written reports, all of which were submitted, reviewed, and graded on virtual platforms. It should be noted that there was little to no feedback, and although an attempt was made to implement project-based assessment, this effort was minimal. On the other hand, attempts were made to adjust the assessment criteria to account for the limitations of the virtual environment and the varying conditions of the students; however, this was not achieved[10].

It should be emphasized that the transition was abrupt, so there was no preparation, as would have been appropriate in such circumstances. This is supported by some studies[11].

Post-pandemic:

Hybridization of modalities: A combination of teaching activities was expected, integrating multiple ways of delivering classes and assessment, combining face-to-face and virtual methods, with a greater emphasis on flexibility in schedules and approaches to classes, and even more so, in assessment, tending toward personalized education[12].

Formative assessment is continuous, providing timely feedback to students (online feedback) and improving their learning. Improvements in digital skills are advocated and will be assessed in students, such as the ability to use technological tools for learning and assessment, promoting digital education and the digitization of assessment[13], taking into account that current students are digital natives and are very adept at using social networks, but have limitations when it comes to using digital educational platforms.

For all the above reasons, it is essential to take into account certain variables when determining academic performance in the subject of morphology 2, in the pre-pandemic, pandemic, and post-pandemic periods, for the academic years March–August, included in the period 2019–2022, in the medical degree program at the University of Cuenca.

Finally, we start with the following research question: How has the pandemic affected summative assessment processes in morphology?

METHODOLOGY

The method employed was descriptive, based on data provided by the Vice-Dean of the Faculty of Medical Sciences at the University of Cuenca. From the anonymized databases, the final grades of each medical student at the Faculty of Medical Sciences, University of Cuenca, were obtained for the academic years from March to August, between March 2019 and August 2022. The total number of records is 424.

The data were grouped by academic year and then categorized according to whether they fell within the pre-pandemic, pandemic (defined for this study

as March 2020 to August 2021), and post-pandemic periods of the COVID-19 pandemic.

The characteristic of the pandemic period, which serves as the basis for the comparative study, is the change in the mode of study: from face-to-face to virtual, through videoconferencing platforms and virtual classrooms.

It should be noted that, according to the current curriculum, the March-August academic cycle covers the content of morphology 2 (cardiovascular system, respiratory system, and neuroendocrine system) for students who have passed morphology 1, with a higher proportion of second- and third-year students enrolled for the first time. Passing the course in each academic year requires a minimum grade of 60/100.

SPSS version 25 software was used for the analysis. The data are presented in tables of frequencies, means, and standard deviations. For data analysis, a one-way ANOVA test was employed, followed by the Bonferroni post hoc test.

The variables used were: academic year (pre-pandemic, pandemic, and post-pandemic) and each student's final grade.

RESULTS

A comparison of the academic years reveals that the pass/fail rates for the pre- and post-pandemic years are similar, highlighting the higher pass rate during the pandemic, specifically from March to August 2020 (Table 1).

The measures of central tendency for the March-August 2020 school year (during the pandemic) show significant differences from the pre- and post-pandemic school years, with less dispersion of data. The ANOVA test indicated a statistically significant result (Table 2).

The most significant difference is observed between the final grades of the pre-pandemic cycle and the academic cycle during the pandemic, related to the change in study mode, from face-to-face to virtual (Table 3).

The post hoc analysis is corroborated graphically, with particular strength between the pre-pandemic school year (March-August 2019) and the school year during the pandemic (March-August 2020) (Graph 1).

DISCUSSION

Despite the difficulties reported in accessing devices and internet connections in several countries[14,15] and, of course, in our reality, as indicated by Bravo and Quezada[16], academic performance, expressed in the final grades that determined whether students passed or failed the course, during the COVID-19 pandemic, there was a significant increase in the pass rate and overall improvement in final grades in the March-August 2020 school year.

The results of this research indicate that, during the academic year during the pandemic, characterized by academic activities conducted entirely through

Table 1. *Distribution of morphology students, according to cycle and pass/fail status*.

School Year	Pass		Failed	
	n	%	n	%
March - August 2019	114	87.00	17	13.00
March - August 2020	141	98.60	2	1.40
March - August 2022	133	88.70	17	11.30

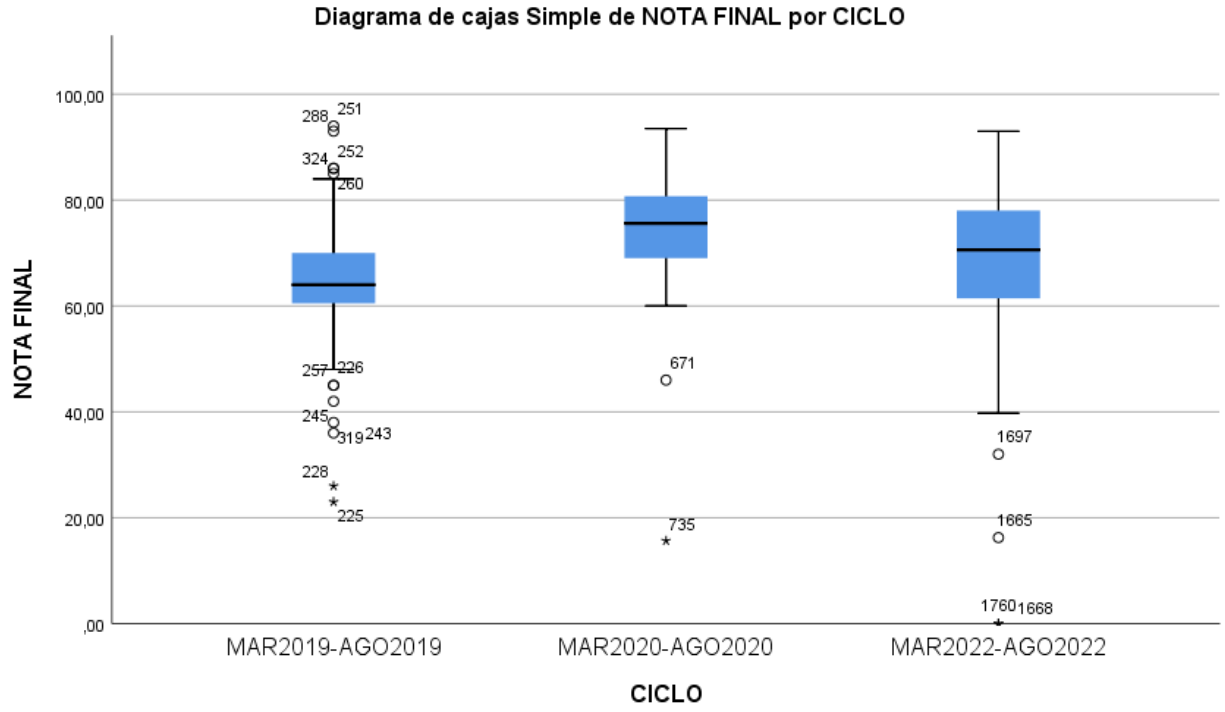
Table 2. *Comparison of measures of central tendency of final grades, by school year.*

SCHOOL YEAR	Mean	Median	Mode	Standard deviation	p†
March - August 2019	64.80	64.00	60	10.67	
March - August 2020	74 .55	75.58	72	9.21	0.000
March - August 2022	69 .43	70.59	60	14.44	

† Test ANOVA of a factor

Table 3. *Post hoc comparison of the difference between final grades, according to academic cycle, using the Bonferroni test.*

(I) CYCLE		Mean difference (I-J)	Std. error	Sig.	95% confidence interval	
				Lower limit	Upper limit	
Mar - Ago 2019	Mar - Ago 2020	-9.7451*	1.4188	0.000	-13.1552	-6.3349
	Mar - Ago 2022	-4.6330*	1.4029	0.003	-8.0049	-1.2611
Mar - Ago 2020	Mar - Ago 2019	9.7451*	1.4188	0.000	6.3349	13.1552
	Mar - Ago 2022	5.1120*	1.3711	0.001	1.8165	8.4076
Mar - Ago 2022	Mar - Ago 2019	4.6330*	1.4029	0.003	1.2611	8.0049
	Mar - Ago 2020	-5.1120*	1.3711	0.001	-8.4076	-1.8165



Graph 1. Comparison of the pre-pandemic, pandemic, and post-pandemic cycles.

virtual means, the performance of students in the Morphology 2 course in the medical program was higher compared to the pre- and post-pandemic academic years studied.

Sánchez-Almeida et al.[17] found in their analysis of the performance of students at a higher education institution in Ecuador that "students who entered the virtual remedial course performed significantly better academically than students who attended face-to-face classes. However, the results do not necessarily indicate that students in that period and modality obtained more knowledge." To understand this, we must consider that, due to various factors, grades do not always accurately reflect the level of knowledge that students possess. It is also worth mentioning the findings of Valenzuela-Ramos et al.[7], who studied the impact of virtual teaching and learning in human and dental anatomy during the COVID-19 lockdown and identified a greater negative impact from online sessions, which hindered the teaching and learning process.

The data from our research show that the first academic year of the pandemic (March–August 2020), which corresponded to morphology 2, had the highest pass rate for the subject within the entire period studied. In other words, within the four years covered by the analysis, such a high pass rate was not achieved, a fact that is related to the transition from face-to-face to virtual study. However, there was a decrease in the pass rate

after returning to face-to-face study. Concerns about the scope of these observations lead to questions such as the relationship between performance and learning, the characteristics of the teaching-learning process, and the attitudes of students in the context of the virtual study modality, among others, that reasonably emerge from the results found.

Surveys conducted by Martínez et al.[18] highlight that the students themselves, who were part of their study population, stated that face-to-face assessments are more honest and better evaluate knowledge. They also report feeling more pressure to study when they know the assessment is face-to-face. This is part of the perception and attitude of students towards the assessments of the two modalities in question[19].

No less critical among students' attitudes is the possibility of engaging in digital academic dishonesty, as defined in the work of Rivadeneira and Brun[20], as the use of new technologies that allow for the immediate availability of information and which, according to their results, is evident in 66.2% of students who used a virtual platform to take tests, a reality observed in several countries during the pandemic period[21,22]. Everything is also a learning environment for teachers, who have had to take on the challenge of abruptly changing from face-to-face work to work mediated by virtual environments.

CONCLUSIONS

The performance of morphology students during the COVID-19 pandemic period was higher, as evidenced by a significantly higher pass rate.

Academic performance, expressed in terms of course pass rates, increased during the pandemic period but showed a downward trend, with the pre- and post-pandemic periods being similar.

The average performance in each period studied is similar in the pre- and post-pandemic periods, with a significant increase during the pandemic; however, the trends in the pre- and post-pandemic periods are the same.

RECOMMENDATIONS

It is pertinent to continue with this line of study to clarify some concerns that have become research questions in the context of continuing this research, among which we propose: What are the advantages and disadvantages of virtual assessment compared to face-to-face assessment? What assessment criteria are most appropriate for each modality? How can the fairness and validity of evaluation be ensured in a hybrid context?

We believe that the implications for teaching practice include designing assessment activities that promote the development of key skills in morphology, utilizing technological tools that facilitate assessment and learning, adapting assessment criteria to meet the individual needs of students, and training teachers in the design and implementation of virtual assessments.

BIOETHICAL ASPECTS

Anonymized databases were used in this study to ensure confidentiality.

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AUTHOR CONTRIBUTIONS

Both authors contributed equally to the conception and design of the study, data analysis and interpretation, drafting and critical revision of the manuscript, and approval of the final version. They share full responsibility for all aspects of the article

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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