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# Factors affecting student academic performance during the pandemic in MOD. COMPUTING: ICT applied to the projects

Factores que afectan el rendimiento académico de los estudiantes durante la pandemia en MOD. COMPUTACIÓN: TIC aplicadas a los proyectos

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## Abstract

During the pandemic (COVID-19) an influential factor in academic performance may have an origin predominantly in internet access, however, it is not the only one, since there are many more factors that directly or indirectly affect academic performance in university students. This study was conducted during the first semester of the academic year 2021- 2022 in order to analyze relationships between; Factors affecting academic performance, Psychological reactions generated by classes in the virtual modality and Academic performance during the pandemic. It was shown that certain external and psychological factors such as: not having a well-equipped learning space, group work or overload of tasks in virtual platforms manage to affect academic performance negatively.

**Keyword:** Academic performance; online modality; teaching-learning process; COVID19.

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## Resumen

Durante la pandemia (COVID-19) un factor influyente en el rendimiento académico puede tener un origen predominantemente en el acceso a internet, sin embargo, no es el único, puesto que existen muchos más factores que afectan de manera directa o indirecta al rendimiento académico en estudiantes universitarios. Este estudio se realizó durante el primer semestre del año académico 2021- 2022 con el fin de analizar relaciones entre; Factores que afectan al rendimiento académico, Reacciones psicológicas generadas por las clases en la modalidad virtual y Rendimiento académico durante la pandemia. Se mostró que ciertos factores externos y psicológicos tales como: no tener un espacio de aprendizaje bien equipado, trabajos grupales o sobrecarga de tareas en plataformas virtuales logran afectar al rendimiento académico de forma negativa.

**Palabras clave:** Rendimiento académico; modalidad en línea; Proceso de enseñanza-aprendizaje; COVID19.

## Introduction

Currently, due to the pandemic (COVID-19), a series of far-reaching changes have occurred in all aspects and sectors of today's society such as health, economy, politics and education. At the same time, the pandemic has brought innovation in each of these areas in order to adjust to today's reality. Within education it is important to recognize that thanks to the pandemic the paradigm of learning has shifted globally from learning within institutions to the use of technology in online classes, providing a learning opportunity accessible to all and not only within a classroom. (Cahoon et al., 2021).

However, these new adaptations have led to drastic decisions and measures that have greatly affected the performance of students and teachers in the education sector worldwide. In this sense Zierer (2021) mentions that the result of these decisions with respect to academic performance in both young people and children is an appealing particularity from a pedagogical point of view, considering that it has been a significant event in society and history.

Undoubtedly, the pandemic has also generated enormous difficulties at the international and national levels, consequently, local and national governments have worked hard to detect and put an end to several of the problems that have arisen in some educational scenarios and that influence the development of skills in students. However, in the Ecuadorian context Mcalavay et al. (2021) in his recent research, he mentions that some institutions have remained closed because Covid-19 infection rates have been high, so it has not been possible to assess the success of the solutions proposed in this scenario.

On the other hand, since March 2020 Covid-19 has had a profound impact on universities in particular, Montacute and Holt-white (2021) they report that many

Institutes from 2020 to 2021 have modified their academic offerings, which involved college closures, sanitary control measures, online and hybrid classes.

This inescapably caused the teaching-learning process, students' performance and even teachers' pedagogy to be rapidly altered. As a result, the rapid transition Başal and Eryılmaz (2021). concluded that many teachers did not have sufficient knowledge in online education, which in turn made it difficult for them to practice in the classroom and create a learning environment that consistently engages high student performance.

From the perspective of (Oviedo, 2021) currently knows well that "Abruptly, the coronavirus parted waters and on one shore were those who could continue with their classes and on the other, those who did not have that opportunity." (p.219). It is thus understood that virtuality during the pandemic opened the way to active spaces for communication and learning, but it also gave way to the existence of limitations for some students, so that certain determining factors that may affect academic performance in university students are evident.

In addition, online classes in higher education at a certain point require having at least one computer to carry out the activities to be performed synchronously or asynchronously. Therefore, they emphasize that the "[. Cencia-Crispín et al. (2021). emphasize that "[...] online education is electronically supported learning, which relies on the Internet for teacher/student interaction and distribution of class materials beyond the university campus." (p.351). However, the reality is different and shows that at the University of Guayaquil many students who are in computer modules only have a mobile device, which is often uncomfortable for conducting class activities.

For this reason it is important to take into account that, when these virtualization processes are carried out within educational processes in universities together with the new adaptations, they cause fragmentation in the interaction and participation between teacher and student, which may have its origin predominantly in Internet access, although this is well known, at present it is not the only cause of this problem. For example, they indicate that it is essential to understand how to work with MALGANOVA et al. (2021) indicate that it is essential to understand how to work with pedagogical resources that are well processed by students at home, among others.

Therefore, there is a need to determine and expose those factors that in some way influence academic performance. In the present work, the problem formulated is: What are the factors that affect the performance of university students during the pandemic, having as objective to expose the determining factors that can influence the performance of students in times of pandemic, in order to identify those that can affect in a negative way and thus improve the academic performance of students during the pandemic in MOD. COMPUTATION: ICT applied to projects, in the career of Pedagogy of History and Social Sciences at the University of Guayaquil.

Likewise, this article aims to propose participatory activities to improve the academic performance of university students in online classes. Taking into consideration that virtuality in universities, the situation becomes a little more complex since, although the responsibility for good academic performance is assumed by each student, there is a lack of answers that show this good performance in online learning. (Arias, 2021). Since, universities should also take a significant role in the implementation of dynamic spaces that strengthen student achievement in online classes, as this would generate greater commitment, participation and better results. Additionally, this article suggests reflecting on the academic pedagogical efficiency of students at the University of Guayaquil, including motivation and activities with the use of educational resources in online classes.

### Materials and methods

In this research the sample is composed of a total of 42 university students of the third module of computer science between 17 and 30 years of age. A convenience sampling was used, from 7 different degrees and branches of knowledge corresponding to the University of Guayaquil. The participants were students of the following degrees: Pedagogy in Languages and Literature (31%), Psychology (19%), Pedagogy of History (17%), Basic Education (10%), Pedagogy in Mathematics and Physics (9%), Initial Education (7%), and Pedagogy of Languages (7%). Table 1 shows the distribution of the sample according to the variables age and degree.

**Table 1.** Number of students by degree and age

<i>Qualification</i>	<i>Age</i>	<i>Number</i>
Basic education	17-23	
	24-30	1
<b>Total Basic education</b>		
Initial Education	31-37	1
	24-30	
<b>Total Initial Education</b>		
Pedagogy of History	17-23	
	24-30	1
<b>Total Pedagogy of History</b>		
Language Pedagogy	17-23	
<b>Total Language Pedagogy</b>		
Pedagogy in Language and Literature	17-23	
	24-30	1
<b>Total Pedagogy in Language and Literature</b>		
Pedagogy in Mathematics and Physics	17-23	
<b>Total Pedagogy in Mathematics and Physics</b>		
Psychology	17-23	
<b>Total Psychology</b>		
<b>Grand total</b>		<b>42</b>

In order to fulfill the research question: What are the factors that affect the performance of university students during the pandemic? a survey designed with 10 closed questions on a Likert-type ordinal scale was applied concerning academic performance where the participants have the option to select with scores from 1 to 5, being 1-never; 2-rarely; 3-sometimes; 4-almost always; 5-always and satisfaction; very satisfied; satisfied; dissatisfied; very dissatisfied, corresponding to each of the listed questions. During the drafting of the questionnaire, certain questions were eliminated and modified in order to obtain better results when using the measuring instrument and to achieve an acceptable level of reliability.

Subsequently, based on the answers obtained from the sample, the following points would be collected: (1) Degree of satisfaction with virtual classes. (2) Influence of virtual classes on academic performance. (3) Perceived academic performance before and after virtuality. (4) Possibility of improving academic performance in virtuality. (5) Psychological reactions experienced during the virtual modality. (6) Situations that frequently disturb students in the virtual modality.

This research has a quantitative approach with qualitative analysis of the results and an exploratory-descriptive scope since it seeks to investigate and analyze factors that may affect academic performance in university students during the pandemic. The data collection was carried out within the academic schedule established by the University and in the virtual classrooms, each student of the different careers was informed that the data collected would be used only for academic purposes, so their intervention in this research was completely anonymous and voluntary.

On the other hand, the data collection was carried out in the fifth week of the first unit for the following reasons; (1) during this week the evaluations have not yet begun, so the possibility that the student relates stress or anxiety with the exam period is ruled out, (2) in this way the students can identify some possible reactions produced by taking their university studies in the virtual modality and produce more accurate results with respect to academic performance.

The survey was administered and sent online to the participants of the different careers, in a group created for academic purposes and under the supervision of the teacher in charge, since it offers easy accessibility to obtain information from the sample during the pandemic. Each student participated freely and voluntarily after communicating the purpose of disclosing the results of the survey in the research, subsequently it was indicated that a student would be designated to clarify any doubts that might arise.

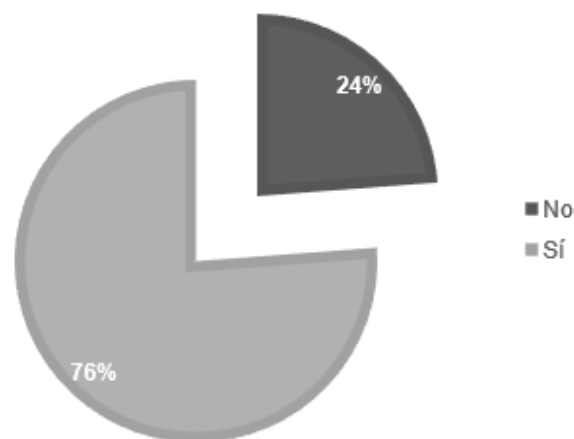
When collecting the data and carrying out the respective analysis of the results of the student survey, with the purpose of detecting the factors affecting the academic performance of students during the pandemic, several graphs were designed to know the percentage of each of the response options. The analysis is expressed below indicating the percentages in the most representative answers for each question, where many of the alternatives were Yes and No. Additionally, alternatives such as: Never,

Rarely, Sometimes, Almost always and Always were added, linking the answers with each of the stipulated variables in order to satisfactorily fulfill the research objectives.

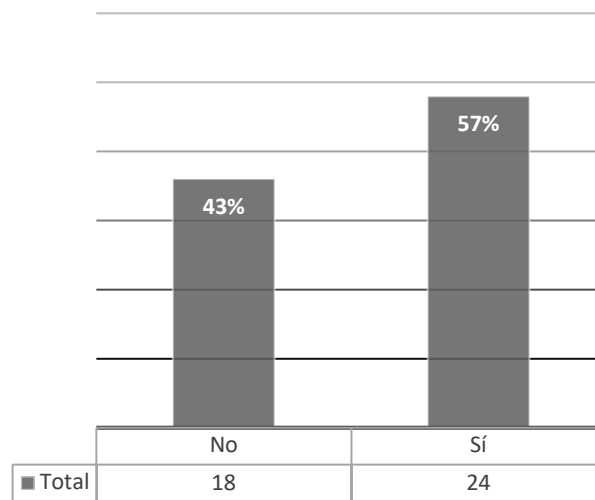
## Results

The intention of this research is to observe and analyze the relationships that exist between; Factors affecting academic performance, psychological reactions generated by classes in the virtual modality and the academic performance of university students during the pandemic (COVID-19). This study was conducted during the first semester of the academic year 2021- 2022. The following tables and graphs show the results of this research.

**Figure 1.** Pandemic as a factor influencing academic performance.



The information provided in Graph 1 positions the pandemic as a factor influencing or not influencing the academic performance of the students surveyed, reflecting a statistically significant result. Seventy-six percent of the surveyed population recorded that "Yes" they consider the pandemic to have been a factor by which their academic performance has been influenced, regardless of whether favorably or unfavorably, while 24% of the students consider the pandemic "No" to have intervened at all in their academic performance.

**Figure 2.** Study space equipped to successfully fulfill academic obligations.

Fifty-seven percent of the students surveyed stated that their space has all the necessary materials to carry out their tasks; however, 43% of the students commented that they do not have a well-equipped study space. Thus, Graph 2 shows that although the majority of the population has a well-equipped study space with everything necessary to fulfill their tasks and responsibilities as students, there is still a significant percentage that does not have the basic study materials, which can be a crucial factor that influences academic performance.

**Table 2.** Level of student satisfaction during the pandemic in virtual classes

Satisfaction level in virtual classes		
Items	No.	%
Very satisfied		
Satisfied		
Dissatisfied		
Very dissatisfied		5
<b>TOTAL</b>	<b>42</b>	

The level of satisfaction of the surveyed population with respect to virtual classes was found. In which 52% of the surveyed students responded that they feel satisfied with the aforementioned modality, while 33% register that they feel dissatisfied with this form of work. 10% of the population belongs to those who feel very satisfied and 5% of the students register feeling very dissatisfied with the virtual modality. However, 88% of the students stated that the teaching strategies in the virtual modality could be improved

in order to guarantee a better academic performance, while 12% belong to the population that chose "No" as an answer to the question of improving the strategies. These responses can be interpreted in such a way that the surveyed population thinks that an improvement in the teaching strategies during the pandemic could be beneficial, since there is still a large percentage of students who feel dissatisfied with the virtual modality.

**Table 3.** Academic performance of students before the pandemic and currently.

Academic performance level	Formerly		Currently	
	No.	%	No.	%
1. Very good				
2. Good				
3. Regular	5			
4. Malo	0	0	1	
5. Very bad	0	0	0	0
<b>TOTAL</b>	<b>42</b>		<b>42</b>	

Within the data shown in Table 3 we can see that 15 people considered their academic performance to be Very Good before virtuality in contrast to the number of people who currently consider their academic performance to be Very Good. The figure dropped to 9 people who, although they may be the same, may also fall into this category people who previously considered their performance to be Good or Fair. In other words, there may be people whose performance has been positively affected by virtuality.

The number of people who considered their academic performance as Good before virtuality was 22. In relation to the number of people who currently consider their performance as Good, the figure dropped considerably. However, it should be taken into account that it is possible that many of the people who rated their performance as Good before virtuality were negatively affected and nowadays, their performance is Regular or Poor.

Additionally, there is the option of Regular performance before virtuality which, in relation to the number of people who chose the option of Regular to describe their current academic performance, is quite high. In other words, people have been affected with respect to their performance since the Regular option is the most chosen option in the current performance level question. It is very important to recognize that the figure for the Poor option is only 2% of the surveyed population. This shows that virtuality has had a high influence on academic performance, since before it, no one considered their level of performance to be Bad or Very Bad.

**Table 4.** *Distribution of students according to Disturbing Academic Situations and their Frequency*

Unsettling academic situations for students		
Frequency	Group work, overload of tasks in virtual platforms, personality or character of the teacher.	
	No.	%
Never	1	
Rarely	5	
Sometimes		
Almost always		
Always		
<b>TOTAL</b>	<b>42</b>	

Table 4 shows evidence of how often the population feels uneasy about situations such as: group work, overload of tasks in the virtual platforms, personality or character of the teacher. It is important to mention that there is a possibility that this is an influential factor in the academic performance of the students, since 26% of the population always feels uneasy, and the number of people who chose the option Almost always is 38%, that is, 16 of the students registered that they almost always feel uneasy in these situations. In contrast to the previous figure, there is an increase in the number of people who almost always feel uneasy about this type of situation in the educational environment. Although the frequency is lower than the previous figure, it can still be said that it is possible that it has a certain influence on academic performance.

On the other hand, of the 42 people surveyed, 9 of them (22%) chose the Sometimes option. Although this may have a certain degree of influence on the academic performance of these students, it is likely to be minimal in relation to the people who chose the options Always and Almost always.

The 5 people (12%) who selected the Rarely option and the one person who opted for the Never option, there is a high probability that their academic performance is not influenced by these factors.

**Table 5.** *Psychological reactions experienced during the virtual modality.*

Psychological reactions	No.	%
Concern	5	
Feelings of depression and sadness	1	
Anxiety, anguish or despair		
Concentration problems		
Irritability		
All of the above		
<b>TOTAL</b>	<b>42</b>	

Table 5 shows the psychological reactions experienced by people with the virtual modality during the pandemic. Twenty-nine percent of the population recorded that they have felt anxiety, distress or sadness, while 19% of the population belongs to the students who have had problems concentrating. The number who chose Anxiety, anguish or despair, is 12 people. Both options are influential factors in the academic performance of these students, since there could be a moment when students feel overwhelmed and overlook their educational responsibilities and are thus negatively affected.

On the other hand, 12% of the population has presented restlessness as a psychological reaction. It is worth mentioning that, although it is a relatively negative reaction, it is possible that it does not directly affect the students' academic performance. Although only 2% selected the option Feelings of depression and sadness, it is important to mention that it is a reaction that can influence the student's performance directly. The people who chose Irritability (7%) as an option, although it is also a negative reaction, it is likely that its influence on the academic performance of these students was minimal. Finally, the option of All of the above which was chosen by 13 of the 42 students surveyed that is, 31% of the population has experienced in virtual classes during the pandemic; Restlessness, anxiety, anguish or depression, irritability, feelings of depression and sadness, so it is vital to understand that, all the above reactions, individually, are factors that have some degree of influence on the student and, if 13 students present each and every one of them, it is necessary to recognize that it is a factor that does influence their academic performance.

There are many factors that affect students in virtual classes during the pandemic either directly or indirectly. In addition we must consider that the university stage is determinant so, since the student enters the university already generates a great change in their psychosocial development, often this means changing your lifestyle and get out of the comfort zone in which it is, to be able to adapt to new responsibilities and in

many cases decisions such as; to be a more autonomous person, this whole process should be carried progressively and properly, otherwise it triggers difficulties that later will affect not only within their social life but also the academic ones. (Briones et al., 2019). It is of utmost importance to recognize that especially when the whole process of adaptation mentioned above is carried out during a pandemic, which brought with it virtual learning environments.

This research process indicated that university students of different degrees consider the pandemic as an influential factor in their academic performance, regardless of whether it is positive or negative. On the other hand 57% of the population has an adequate study place and all the necessary materials to develop their academic tasks, however, 43% do not have a well equipped study place, so it is still a significant percentage and can be considered as another influential factor in the academic performance of students in virtual classes during the pandemic, since it is essential to surround themselves with a suitable environment with the right materials so that the student can develop and maintain a good performance within the online classes.

Regarding the level of satisfaction during the pandemic with online classes, despite the fact that 52% of the participants stated that they felt satisfied with virtual classes during the pandemic and only 33% felt dissatisfied they believe that teaching strategies could be improved in this modality, which could be favorable for their academic performance. For example, to improve this type of virtual environments, the flipped classroom could be applied, which adapts the different types of learning that may exist in each group of students while allowing the teacher to complement previous knowledge. It also positions students as the protagonist of their own learning process and allows them to responsibly lead a good academic performance. (Murcia et al., 2021). However, it is also important to remember that the different types of learning should not be used as an instrument to classify students, since they are not mutually exclusive. (Cárdenas-Palomino et al., 2021).

A negative correlation was found between academic performance before and now, since before the pandemic slightly more than half of the students considered their performance as Good, now 43% of the students considered it as Fair. In contrast, it was found that 36% of the participants who rated their performance as Very Good before the pandemic, although they may be the same as those who currently consider their performance as Good, and although the figure is lower, 22% of the population surveyed during the pandemic and virtual classes has been beneficial to their academic performance.

In addition, it was found that in online classes during the pandemic, situations such as: group work, overload of tasks in virtual platforms, personality or character of the teacher almost always cause uneasiness in university students, so it can be taken as a factor that indirectly influences students in their academic performance. Other factors were found through psychological reactions that students experienced such as: restlessness, feelings of depression and sadness, concentration problems, irritability, where a large part of the population reported having felt all these reactions, which is why it is possible

that there is a direct effect on their academic performance during the pandemic. It is important to note that according to Castañeda et al. (2021), in general, younger people are those who may suffer from these reactions in a moderate way, however, the older population is less prone to these psychological reactions.

The main limitation of this research is that the results were extracted from a very small sample, so generalizations cannot be made on all the results. It is suggested that future research address this issue in a broader way with variables that evaluate the performance and cognitive development of university students while they perform their respective academic activities during the pandemic, with more participants from different faculties and branches of knowledge, so that it is feasible to make possible relationships between academic performance and factors that may affect the performance of university students at the University of Guayaquil.

## Conclusions

In general, the factors that affect academic performance are usually directly associated with the psychological reactions that students may experience as they advance in their university stage, even more so when thanks to the pandemic the learning-teaching process has changed radically, which is why there is a negative correlation between academic performance before and now since it represents new challenges, new ways of imparting and acquiring knowledge, responsibilities, and uses of Tics, all this combined with what the University expects from each of the students. It is concluded that, although for many students the pandemic has affected them in a positive way and they consider their performance to be "Good", there is still a considerable percentage of people who; (1) Feel dissatisfied; (2) Their performance dropped to "Fair" or "Poor"; (3) Think that teaching strategies within virtual classes could be improved. (3) They think that the teaching strategies within the virtual classes could be improved. It should be noted that factors such as age and lifestyle can also affect academic performance, however, they were not explored in depth in this research. However, this research showed that there may also be external reasons that can affect academic performance negatively, among which are: not having a conditioned learning space that provides everything necessary, group work, overload of tasks on virtual platforms, personality or character of the teacher. All these external factors can be unfavorable or have a great influence on academic performance and performance, given that it is quite difficult for the student not to have basic materials so that he/she can develop in the best possible way in virtual classes during the pandemic. In addition, situations such as the overload of work in virtual platforms cause concern among the university student population. Likewise, it is suggested to teachers that their relationship with students should be carried out in a positive way, so that their professional training is favored in view of the fact that they are facing new technologies. (Delgado, 2020).

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