

## PAPER

# Effect of Virtual Education on Academic Performance Generated by COVID-19

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## ABSTRACT

The aim of this research is to analyze the impact of implementing virtual education on the academic performance of primary and secondary school students in a private school in Ibagué, Colombia, during the COVID-19 pandemic crisis. The survey was administered to 183 parents and nine teachers at the school as a data collection technique for the study. The research results revealed that the school maintained its quality in conducting virtual classes at the elementary and high school levels. Similarly, the students' performance was maintained compared to the previous year of the pandemic. As a conclusion, it has been determined that the school directors' implementation of the virtual education model and the capabilities of the teaching staff were successful in maintaining the quality of education during the pandemic.

## KEYWORDS

basic education, quality of teaching, school, progress, school success, school activities

## 1 INTRODUCTION

The global community had to make adjustments to mitigate the spread and impact of the virus during the health emergency caused by COVID-19. One of the adaptations involves implementing social distancing, which includes limiting non-essential face-to-face work activities. Additionally, it involves allowing children to attend in-person classes at all levels.

In light of the shift to remote learning as a new norm, virtual education strategies have been adopted globally, including within the Colombian educational system. At this point, it is important to highlight the English American School of Ibagué, which transitioned from conducting 20% of its school activities virtually to conducting 100% of its activities within just one week. That is, since March 17, 2020, when the director informed parents and students about the new modality to be implemented in order to ensure continuity of the educational service.

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The differences in the provision of educational services mentioned above make it essential for this study to determine whether the decisions made by the administration of the English American School of Ibagué truly meet the quality standards mandated by the Ministry of National Education in Law 115 of 1994 (Colombia's General Law of Education). Consequently, we aim to assess the impact of transitioning from face-to-face to virtual education on its educational quality.

## 1.1 Education in pandemic

The closure of schools worldwide due to COVID-19 has led to the adoption of virtual or distance education models. However, this situation can have negative effects on students, including reduced time dedicated to learning, increased stress, difficulties in interacting with peers and teachers, and a loss of motivation [1]. This has made virtual education a challenge, especially in developing countries where access to resources and technology can hinder home study [2].

From this point onward, school administrators have continued to work diligently to maintain academic instruction. To address this issue, they have had to employ first- and second-generation strategies. The first ones consist of radio and television, which are typically utilized by the government. The second involves digital learning tools, including educational platforms, live broadcasting, and simulated laboratories, among others. These materials have enabled the study process to continue from home [3].

Despite the aforementioned issues, some authors, such as [4], argue that the pandemic has prompted teachers and managers to develop innovative solutions despite the challenges. To guide their classes, teachers must utilize digital tools and innovative educational games and activities that aim to sustain students' interest. Governments have also had to implement measures to support home study, such as the digital platform "Learn Digital." This educational television program broadcasts academic content for 12 hours a day [5].

On the other hand, there is a historical advantage based on the fact that the new generations of students are already digitally connected and have ample skills for its management, even though these skills have not been utilized for learning [6]. According to [7], the Internet contains a vast amount of information that offers the opportunity to enhance the quality of education. This information is accessible at all times. All of this indicates that pandemic education has raised numerous concerns. However, the way it is approached also suggests that it can be a valuable tool for enhancing learning.

In addition, households are also facing new situations where parents must balance work and economic commitments with the care and support of their children's school activities, which they are now receiving at home [8]. This suggests that both students and guardians are under additional stress, necessitating a reorganization of their activities to strike a balance and fulfill all tasks.

## 1.2 Pandemic situation in Colombia

The implementation of national-level virtual education was adopted in response to the National Government's establishment of social isolation measures through the Ministry of Health and Social Protection. [9], declared the sanitary emergency due to the COVID-19 coronavirus and issued measures for the population to follow in order to reduce the spread of the virus. Thus, the sanitary measures included the

prohibition of crowds, the requirement of biosecurity protocols for entering commercial establishments, and the suspension of face-to-face classes.

As mentioned in [10], the Colombian government has been implementing a strategy of providing technical assistance to education secretariats to support and enhance their collaboration with teachers from various educational institutions. This illustrates the national government's commitment to ensuring the right to education, as outlined in [11], through collaborative efforts between the Ministry of Information and Communication Technologies (ICT) and the Ministry of Education to uphold educational plans.

Similarly, numerous schools nationwide were preparing their virtual education programs in response to external factors such as strikes and class suspensions [12]. Consequently, some schools that had adopted remote education models were able to adapt to the new virtual education system introduced during the pandemic. Thus, the concept of a virtual classroom arises as a space for interaction and learning, in which ICT-mediated training conditions are created [13].

According to [14], about 12% of private school principals believe that their teachers lack the skills and competencies for virtual teaching, whereas 48% of public schools share this concern. On the other hand, when it comes to basic primary education, there are significant challenges that require adaptable curricula and a more flexible approach to rebuilding education systems [15]. In the case of Colombia, schools had to propose immediate reforms to meet the challenge of virtual education.

It is expected that digital education will continue to play a significant role in academia in the future, enhancing crucial aspects such as reach and educational content and ultimately leading to increased competitiveness [16]. Indeed, it is considered that while physical education may be impacted by virtual learning, other areas of knowledge, such as second language acquisition, can be strengthened through this approach, providing greater opportunities for students.

Likewise, there is an anticipation that upon the resumption of in-person education, the influence of virtuality will endure, and new study designs will be suggested wherein the two modalities can be integrated. This approach aims to leverage their respective strengths while addressing their weaknesses, as outlined in reference [17]. Although some schools have returned to 100% face-to-face teaching in the post-confinement period, it is expected that other models, such as alternating between in-person and virtual classes, will help maintain social distancing measures. This hybrid approach allows for the simultaneous delivery of virtual and face-to-face classes.

### 1.3 Virtual education

In today's world, access to education is becoming increasingly essential, and people are showing more and more interest in training. However, various difficulties are encountered, such as the limited access to education due to the possibility of in-person classes [18]. Consequently, virtual education is emerging as a viable alternative, propelled by the growing utilization of information and communication technologies (ICTs). According to the above, virtual education has been increasingly implemented worldwide, although it has primarily focused on professional-level learning [19].

However, several schools have been implementing virtual platforms to complement face-to-face education, creating what is known as "new literacy." This approach involves developing new competencies for participation and collaboration and fostering collective intelligence to facilitate learning. Therefore, its approach must

begin with administrative initiatives aimed at establishing new business missions and visions [20].

This is because ICTs are often seen as competitive advantages in themselves, with their access alone being sufficient for virtual learning to take place. At this point, it is important to note that these tools must be integrated into academic plans that effectively utilize them and the resources of the organizations. Students should play an active role in reinforcing collaborative and interactive activities and participate in the development of classes. Additionally, management should be involved in supporting and monitoring the implementation of ICT [21].

Educational institutions have adopted diverse responses amid the ongoing global situation, prompted by the pandemic and the enforcement of preventive isolation. These responses range from the complete suspension of classes in some schools to an abrupt transition to virtual learning. Some authors argue that these changes have occurred without proper consideration of an institutional framework. They emphasize that the transition from face-to-face to virtual learning involves distinct objectives, processes, methodologies, and a different business approach. These aspects need to be adapted to reality and the new virtual learning environment [22–23]. Additionally, they highlight the importance of bidirectional information transmission between the student and their tutor as the central element [24].

## 2 METHODOLOGY

The following methodological aspects are presented as a guide to assess the impact of implementing virtual education on the academic quality of a private school in the city of Ibagué, Colombia.

### 2.1 Population

The study population consists of students from the English American School in the city of Ibagué, Colombia. This private institution offers educational services at the elementary and high school levels. The group consists of 260 elementary and high school students, 22 teachers, and 260 guardians, with one guardian assigned to each student. Only one guardian is considered, as one of the parents is typically more involved in the educational process. It is also assumed that when surveying, only one guardian is sufficiently representative of the sample.

### 2.2 Sampling frame

The sample frame for this research consists of a list of students, parents, and teachers from the English American School in the city of Ibagué. For confidentiality reasons, the list cannot be published in this manuscript. However, its accuracy can be verified by confirming the number of enrolled students.

### 2.3 Sample

To select the parent sample, one parent per student was chosen using the following formula, with a margin of error of 4% and a confidence level of 95%:

$$n = \frac{N * Z_{\alpha}^2 * p * q}{d^2 * (N - 1) + Z_{\alpha}^2 * p * q} \quad (1)$$

Where:

$N$  = Total population (260)

$Z$  = 1, 96 squared (if safety is 95%)

$P$  = expected rate (in this case 5% = 0, 05)

$q$  = 1-p (1-0, 05 = 0,95)

$d$  = accuracy (5% = 0, 05)

By applying this formula, a sample of 183 parents was obtained. For the teacher sample, a non-probabilistic convenience sampling method was used, and 9 elementary school teachers were selected. Elementary school teachers were selected because they typically experience higher levels of family involvement in academic content development. Therefore, it is believed that by focusing on these subjects, we can establish a standard for comparing parental perceptions.

## 2.4 Instrument

The chosen method for gathering information is a survey, which involves administering a questionnaire to the selected sample. This approach enables efficient and rapid data collection, covering a wide range of perspectives and variables simultaneously. The present study aims to determine if there is a correlation between the transition from a face-to-face to a virtual model and its impact on educational quality.

Accordingly, two different surveys were administered with content tailored to the study groups, namely teachers and guardians. Since each group has different characteristics, the language used in each case needs to be different. As a result of the COVID-19 emergency, the survey was conducted using the digital tool Google Forms. Each survey included questions aimed at exploring perceptions of educational quality, student performance levels, and teachers' abilities to implement virtual classes.

## 2.5 Treatment of the information

Based on the survey results, the data was tabulated using the SPSS program. A descriptive analysis was conducted using graphs and then compared with theories related to pandemic education.

The data were collected in accordance with the methodology, which organized the data into three groups: educational quality, students' performance level, and teachers' capacities for implementing virtual education.

## 3 RESULTS

Of the two surveys, each consisting of nine questions for the respective groups, three questions were allocated to address each of the objectives. Three questions were formulated to assess the perception of educational quality by guardians and teachers. Thus, 80% of the guardians have a favorable perception, while 20% express some form of disagreement. On the other hand, teachers have shown a 100% approval rate regarding educational quality.

However, when comparing this perception of the guardians with the actual academic performance of the school, discrepancies are found. According to the ranking of schools by department on educational quality [25], the English American School dropped 24 places in the ranking of schools in the department of Tolima. This is based on the results of the saber tests, showing a decline from 17th place in 2019 with a weighted average of 58.923 to 41st place in 2020 with an average of 54.385.

The second group of questions was related to the academic performance of students as perceived by guardians and teachers. The most significant finding here is that 97% of the guardians are satisfied with the level of student performance during virtual education, while only 3% of the sample are dissatisfied with the results obtained. In contrast, according to [26], 25% of primary school students have shown a decrease in basic competencies. It is believed that 1/3 of children have experienced a decline in their learning abilities, with long-term consequences, such as 72% of these students being unable to learn by the time they reach the tenth grade.

On the other hand, there was a difference in the teachers' perception of the students' performance. They considered that 56% of the students maintained a superior level of performance. 22 percent achieved a high level, while the remaining 22% had a basic or low average. Despite this, it is observed that the results of the Saber Pro tests were lower than the previous year. This is in contrast to the findings of [27], who pointed out that there have been learning problems with a marked decrease in academic performance caused by the pandemic.

Finally, the survey conducted on the perception of teachers' abilities to manage platforms and applications and implement virtual education revealed that 89% of the sample is satisfied with their capabilities, while the remaining 11% expressed dissatisfaction with the teachers' role during virtual education amid the pandemic.

Contrary to the above, 89% of the teachers believe that they have attained a satisfactory level for conducting classes and managing the platforms and applications mandated by the school's guidelines. This integration of knowledge in ICT technologies is important, as research has shown that teachers' proficiency in these skills contributes to improved student performance and learning, enhancing communication and technological skills [28].

The latest results indicate satisfaction levels regarding the capabilities of elementary-level teachers in developing virtual classes and implementing technology. This difference may be attributed to the school's access to technological tools and training, which equipped teachers with the skills to maintain a high academic standard. However, it is important to note that this situation may not reflect the national reality, as research [29] indicates that teachers have received minimal training in technology proficiency.

## 4 DISCUSSION

This study has enabled us to assess the satisfaction of the guardians of the English American School with the virtual education model implemented during the COVID-19 pandemic, considering that the virtualization of the educational process is a result of national regulations. This situation results in rapid changes, which prevent or limit the teaching staff from acquiring the necessary skills to effectively conduct classes during a digital transformation. This problem is not new, but it has been occurring due to the lack of training for teachers in virtual competencies [30–31].

In this sense, one of the primary challenges that has been globally recognized is the misconception that the utilization and administration of technological tools by

educators and students in their daily activities are adequate for providing a virtual education [32]. It is evident at this point that possessing skills for managing ICT tools alone does not equip teachers with the necessary skills for effective teaching. It is essential for the school to provide its teachers with the necessary training to acquire these skills.

On the other hand, the swift implementation of a virtual model within a short timeframe to ensure continuity during the school term meant that the school did not thoroughly analyze the curriculum. It remained unchanged despite the swiftness of the educational model. As indicated in the report [33], the utilization of digital platforms and the necessity to employ additional competencies for virtual teaching necessitate a reevaluation and adjustment of curricular models to suit the virtual teaching context. This includes the consideration of competencies such as autonomous learning and self-discipline in the curriculum.

Similarly, there are discrepancies between the perceptions of guardians and teachers regarding the educational quality of the school and the national results. This may be attributed to the increased number of students from other institutions in 2020, whose performance may have impacted the results of the Saber Pro tests. It is important to note that the national tests were only administered to grade 11 students, which limits our understanding of the performance of students in other grades [34]. For example, researchers have stated that there is a directly proportional relationship between home support and academic performance. They also found that this support is provided with greater intensity in basic education, where national results are not available.

Likewise, it has been found that students have experienced learning difficulties due to various factors, such as the loss of access to a learning environment, social interaction, motivation, and self-efficacy [35]. This situation has prompted the school to implement innovative strategies to ensure that learning primarily takes place with elementary school students, maintain their interest in class development, and ensure effective teaching. These strategies are designed to enhance academic autonomy and self-management [36].

However, as mentioned above, there are no exams for grades one to ten. Therefore, it is possible that the school's educational standards were maintained, especially if there were favorable conditions for academic continuity, such as the school directors obtaining rights to the Zoom platform to ensure uninterrupted connectivity. It's noteworthy that uninterrupted continuity can be maintained by adhering to the thematic content provided by the Ministry of Education and implementing schedules and routines for the use of digital environments.

Similarly, studies such as those referenced in [37–39] have found that educational innovation is crucial in the educational process. It has enabled students in the field of mathematics to achieve better results and a deeper understanding of the topics when taught in an innovative and participatory manner. Similarly, the importance of incorporating academic strategies into virtual education is emphasized in [40–41]. It also underscores the significance of strengthening skills such as creativity, inclusion, empathy, teamwork, and participation, which are essential for mediating and intervening in educational processes.

However, one aspect that was not taken into account in this study was the accessibility of digital tools for the students. It is important to consider that the students at the English American School generally come from middle and low socioeconomic backgrounds, which could have limited their access to the internet, platforms, and applications used by the school for virtual classes. The present study did not investigate the challenges that students and their families may have faced in the development of the thematic content.

## 5 CONCLUSION

The above analysis leads to the conclusion that additional information is required regarding the academic performance of students in primary and secondary grades (first through tenth) to more accurately assess their learning status. Similarly, it is essential to assess the assistance offered to students at home to develop strategies for providing additional support to those who lack it. It is also essential to review both the curriculum and the teachers' teaching strategies to identify the most successful ones.

Certainly, it is established that numerous processes are involved in learning, and factors such as the implementation of strategies such as dynamics, games, and tools enable greater interaction with students. These methodologies can have a significant impact on the acquisition of knowledge and, consequently, on students' academic performance. It is necessary to enhance the academic skills of teachers, considering that their professional experience has traditionally been rooted in a face-to-face model.

Finally, virtual education opens up a formative opportunity that provides multiple learning opportunities. The pandemic accelerated the shift to virtual education in a short period of time, revealing the strengths and weaknesses in both the private and public sectors. This significantly alters traditional educational models and fosters the development of new skills such as teamwork, innovation, creativity, and communication skills, which are essential for students to integrate with their teachers.

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