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Research Article

COVID-19 Pandemic, Impact on Preschoolers at our Lady of Mercy Integral Training Center

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Abstract

In this exploratory, non-experimental study, the virtual teaching modality is examined in the context of the COVID-19 pandemic, trying to infer its impact on Nuestra Señora de la Merced Comprehensive Training Center preschool students. This research has been developed under a methodology with a quantitative approach. The instruments used were the data of an evaluation format for measurement of use and performance (quantitative and qualitative aspects) concerning the contents taught during 2019 and 2021. The results of the tests applied to preschool students at the end of each period (2019 and 2021), constituted the element of statistical evaluation through which we tried to determine comparatively the presumed effects that the pandemic could have had on the teaching-learning process. The population was made up of 5-year-old children and preschool students. A survey was applied to parents regarding the teaching received by their attendees in pandemic conditions. Both the analysis of the statistical results of the performance measurements made to the students, as well as the information obtained from the survey, yielded quantitative results that suggest that preschool students, in pandemic conditions and non-contact classes were affected in their performance and that the accompaniment of the parents was decisive in the performance of the students of the year 2021.

Introduction

The unprecedented healthcare situation that emerged due to the COVID-19 pandemic and the impact of mandatory population lockdown measures to prevent personal contact that could lead to new infections presented an unprecedented scenario for humanity. "In education, this emergency led to mass closures and the suspension of in-person activities in educational institutions in over 190 countries to prevent the spread of the virus and mitigate its impact"[1]. At the national level, following the announcement by the World Health Organization on March 11, 2020, declaring the disease caused by the SARS-CoV-2 virus as having pandemic characteristics, the national government declared a State of National Emergency through Cabinet Resolution 11 on March 13, 2020, and Executive Decree No. 472 on March 13, 2020, mandating the implementation of stringent health measures, including the suspension of all activities that involved the gathering of people. As the situation that prompted the closures worsened over time, the Ministry of Education issued Executive Decree No. 564 on July 2, 2020, establishing a new temporary school calendar applicable to both official and private educational institutions at the Primary and Secondary levels within the regular and non-regular subsystems. This calendar was adapted to the circumstances and characterized by being conducted remotely [2,3].

The psychological impact of the COVID-19 pandemic and the resultant shift to remote learning on preschool children cannot be underestimated. Young children thrive on social interactions and experiential learning, both of which were severely limited during the pandemic-induced lockdowns. Studies have shown that isolation and reduced physical activity can lead to increased stress, anxiety, and depression in children [4]. Furthermore, the abrupt transition from traditional in-person classroom settings to remote learning may have disrupted the development of crucial socio-emotional skills in preschoolers, such as social cognition, emotional regulation, and peer interactions [5]. The psychological well-being of young children in this new educational landscape warrants close attention and investigation.

These closures brought about a transformation in traditional teaching methods, prompting us to investigate how the teaching-learning process for preschool children was affected in the absence of classroom interaction [6-8] (Ramirez et al. 2021). Following the above, this research aims to provide evidence that helps determine the impact of the change in pedagogical practice implemented in the education of the most vulnerable population, represented by preschool children, due to the impossibility of in-person instruction. We used data from an evaluation format applied to 5-year-old preschool students at the Center of Our Lady of Mercy to measure their academic performance and progress concerning the content taught during the 2019 and 2021 periods.

Research Objectives

General objective

To assess the impact of the COVID-19 pandemic on the teaching and learning process of the preschool population at our lady of mercy center.

Specific objectives

To analyze the impact of the COVID-19 pandemic on the development of the teaching and learning process at the preschool level through virtual modalities.



Research Design and Type of Study

This research has been conducted using a quantitative approach through tests applied to the results, enabling the comparison of the effects of the COVID-19 pandemic on the teaching and learning process using virtual modalities instead of traditional in-person methods. It involves comparing the process before and during the pandemic using a representative number of students. This is an exploratory study of a non-experimental design, as it deals with a phenomenon with very remote precedents, leading to limited literature related to this event. The study examines this teaching modality in the context of the pandemic, attempting to infer its impact on preschool students at our lady of mercy center.

Population

The population under investigation consisted of 5-year-old children, all of whom were preschool students (kindergarten or pre-kindergarten 3) at Our Lady of Mercy School, a public educational institution administered by the Mercedarian Community. This school is located in the city of Panama, in the "Chorrillo" neighborhood. To conduct this research, we requested authorization from the school authorities to use the data, and they, in turn, obtained consent from the parents of the students.

Subject or Study group

The study group consisted of a random sample of thirty-five (35) students out of the fifty (50) who were part of the two (2) preschool groups enrolled during the 2019 and 2021 periods.

Statistical sample type

Considering both groups of fifty (50) students per classroom as the study group, which represents the preschool enrollment during the 2019 and 2021 periods and serves as our sample universe, a random sample of thirty-five (35) students was obtained from them using procedures described in the manual of the spreadsheet program "Microsoft Excel" (2016). The value of this sample corresponded to their final evaluation scores for the 2019 and 2021 periods. In this case, it is a non-probabilistic statistical sample (Tables 1&2). The evaluation data obtained were analyzed using Welch's t-test to estimate the absence of a difference in the comparison of averages, based on the assumption of normality of the data as confirmed by the Shapiro-Wilk tests. All necessary conditions for applying this test were met, and the analysis was conducted using the R program.

Variables

The study variable corresponded to the grade or score obtained during the final evaluations for the 2019 and 2021 periods.

Quantitative variable: These values represent the grades obtained by each student and serve as a measure of their performance in the subjects taught during the evaluated periods, considering the specific conditions of each period. The tests were constructed by including the contents of the development areas specified in the Preschool Program of the Ministry of Education of Panama [9], namely:

Conceptual definition

Socio-affective area: "This dimension of development encourages a socialization process that starts with each child's image perception and extends to self-valuation as individuals. It also involves the development of personal, social, and national identity while respecting the values of diversity within their socio-cultural and historical context."

Cognitive-linguistic area: "This dimension considers children to have multiple capacities for reconstructing knowledge and acquiring knowledge through continuous interaction with their cultural environment, which is the product of all material and spiritual assets created by humanity."

Psychomotor area: "This development dimension stimulates motor and creative skills, which form the basis of knowledge acquisition. It allows children to discover the properties of objects and their qualities, establish relationships between them, make modifications, and enable the use of new technologies as support for new learning."

These development areas are grounded in the pedagogical and psychological contributions of authors such as Montessori, Decroly, Agazzi, Piaget, and Vygotsky,

among others [9]. The tests administered are divided into two parts, one assessing mathematics and the other Spanish, with a total value of 64 points, 38 for mathematics and 26 for Spanish. In the cognitive area test, specifically in the logical-mathematical sub-area, evaluations include spatial concepts, addition and subtraction exercises, numerical sequencing, body schema, and gross and fine motor skills. In the cognitive area test, specifically in the communication sub-area, the assessment covers the recognition of vowels, syllables, and word completion.

Operational Definition: These tests are conducted annually at the end of the course to assess the outcomes of the teaching process the objectives achieved by students, and to provide guidance and recommendations to parents and the teachers assigned for the following academic year.

Measurement Instruments

As instruments for measurement and data collection, an evaluation format was utilized to assess both quantitative and qualitative achievement and performance concerning the content taught during the 2019 and 2021 periods [9].

- a) The Spanish test (2019 and 2021) carried a value of 26 points.
- b) **Content:** Recognition and writing of vowels, syllables, and words.

- a) The mathematics test (2019 and 2021) valued 38 points.
- b) **Content:** Spatial concepts, laterality exercises, number writing, addition and subtraction exercises, recognition and drawing of the body schema, and one-legged hopping.

The tests were administered in small groups of 5 to 10 students each, and the team comprised three (3) teachers. During the test, children received individualized guidance and attention. Following the administration, the tests were reviewed, and each child was assigned a score based on their performance in solving them. As a complementary measure, and with the cooperation of parents or guardians, a ten (10)-question survey was conducted to gather parents' opinions regarding the teaching modality their children received during the pandemic conditions (view in results). Forms were given to the parents or guardians when they came to pick up their children from school. Their opinions were sought, and they voluntarily filled out the provided form, which contained ten (10) questions with closed-choice aspects to respond to each of them as requested.

Procedure

This procedure was carried out through a performance assessment based on areas of knowledge and skills that students should possess upon promotion at the end of the academic period. The process began with the preparation of the tests by the teachers of the groups, with the guidance of the preschool coordination of the school. Permission was requested from the school administration to schedule in-person tests for the students. On the day of the in-person testing, it was also opportune to administer the survey to the parents.

Each group conducted the tests on different days, and the testing process was organized in small groups to avoid gatherings and provide safe and individualized attention to the children. Each classroom had a total of twenty-five (25) students who took the test. After the tests were administered, the corresponding assessment process was conducted, and the data were statistically analyzed to infer possible similarities or differences. These values were then interpreted in light of the challenges faced by the students and their families. Regarding data collection, it was conducted using the opinion survey administered to parents regarding the teaching modality received by their children. This was the first time their children experienced this teaching modality due to the conditions of the Covid-19 pandemic.

Analysis of Results

The Covid-19 pandemic, the circumstances surrounding it, its effects on research, and the need to structure some form of experimental design to objectively address the analysis and obtain a consistent response regarding the effects the pandemic has had on the school population, particularly preschool-age children. For these purposes, the results obtained from analyzing data collected before the implementation of non-face-to-face education are presented, as well as the data typically collected when assessing groups of students in traditional face-to-face education.

Analysis

Table 1: Results obtained by preschool students in 2019.

List of Evaluated Students C.B.F.I. Our Lady Of Mercy			
Level: Preschool 2019 School Period			
No.	Evaluation	No.	Evaluation
1	85	19	91
2	70	20	96
3	66	21	96
4	73	22	86
5	84	23	86
6	66	24	80
7	82	25	78
8	91	26	86
9	48	27	86
10	63	28	84
11	97	29	91
12	82	30	71
13	99	31	90
14	98	32	80
15	70	33	88
16	71	24	100
17	87	35	70
18	67		

Table 2: Results obtained by preschool students in 2021.

List of Evaluated Students C.B.F.I. Our Lady of Mercy			
Level: Preschool 2021 School Period			
No.	Evaluation	No.	Evaluation
1	78	19	91
2	96	20	72
3	100	21	88
4	100	22	95
5	100	23	60
6	100	24	70
7	32	25	33
8	100	26	68
9	52	27	95
10	95	28	32
11	96	29	98
12	100	30	90
13	93	31	98
14	100	32	95
15	95	33	100
16	98	34	96
17	90	35	100
18	96		

Before processing the data presented in (Tables 1&2), we proceeded with their evaluation through visualization. For this purpose, functions, estimators, and packages in the R program were employed to identify potential trends related to the studied period and to detect the presence of outliers while attempting to elucidate why they occurred. The comparison of sample means was carried out to verify the existence of statistically significant differences between the assessments of the two periods, using the “Welch” t-test. Additionally, based on this probability distribution model, the Shapiro-Wilk test was used to assess the normal distribution of the data. This analysis was performed using the R program, which served to infer the effect of implementing the new learning model on the results obtained through the evaluations conducted at the end of both years. When evaluating the results, the normal probability distribution model was used, considering the nature of the data and the conditions under which the results were generated. The primary distinguishing factor was the implementation of non-face-to-face education through virtual means.

In line with the null hypothesis stated in the study formulation, the “p-value” was employed instead of the significance level as the decision rule in response to the values yielded by the tests applied to the results of the evaluations conducted by preschoolers in both periods. Therefore, the null hypothesis (H0) would be rejected whenever the “p-value” of the statistical tests was less than or equal to the alpha (α) significance level adopted for the study, which was five percent (5%, or α=0.05). In general, given an observed value of the test statistic (sample mean), the “p-value” corresponds to the minor significance level at which the null hypothesis (H0) could be rejected [10].

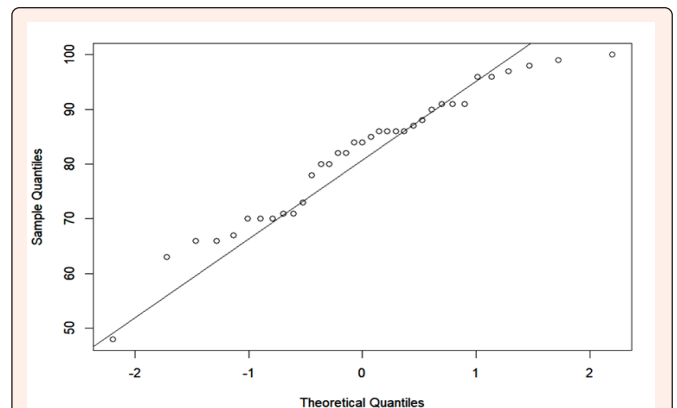


Figure 1: Served to visualize the trend of evaluation results through the distribution of points concerning the normality line for the values of these assessments conducted with groups of preschool students enrolled in the academic periods of 2019 and 2021, respectively.

Figure No. 2 represents the frequency distribution of the values of the assessments conducted with groups of preschool students enrolled in the academic periods of 2019 and 2021, respectively.

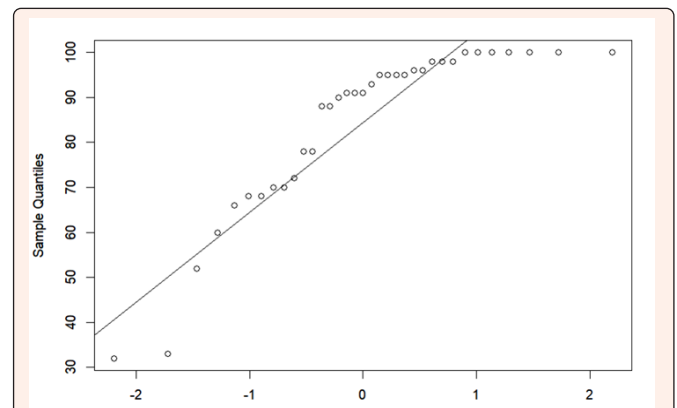


Figure 2: Distribution of points about the normality line for the values of the assessments conducted with the 2021 group.

On the other hand, Figure No. 3 compares the differences in standard deviation values of the results obtained in the respective assessments conducted at the end of the academic period for students enrolled in the years 2019 and 2021, respectively.

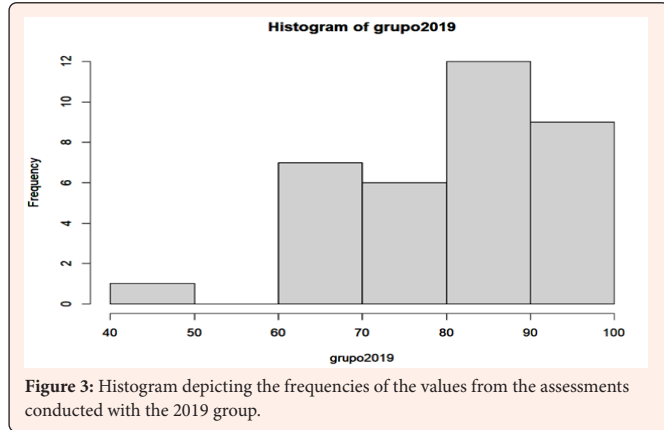


Figure 3: Histogram depicting the frequencies of the values from the assessments conducted with the 2019 group.

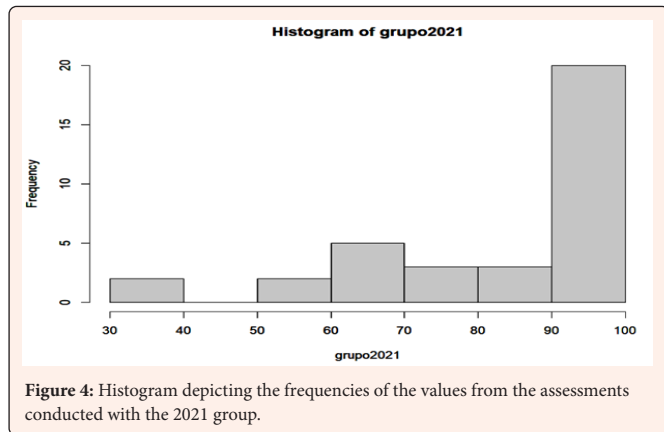


Figure 4: Histogram depicting the frequencies of the values from the assessments conducted with the 2021 group.

The fulfillment of the normal probability distribution model was demonstrated through the Shapiro-Wilk normality test [10]. Comparison of standard deviation values and others concerning the thirty-five (35) scores obtained by the two (2) groups of preschool students (Group A and B) enrolled in the two periods (2019 and 2021) under study. The table presents values of the standard error of the sample mean and the standard error deviation, which served as criteria for choosing the Welch t-test for the analysis of the test statistic (sample mean).

Table 3: Calculated values justifying the application of the Welch t-test to the samples.

Samples	Standard Error	Standard Error Deviation	Coefficient of Variation
Group 2019	12.08291	2.042384	14.79712
Group 2021	20.59567	3.481303	24.01227

Comparison of standard deviation values and others in relation to the thirty-five (35) scores obtained by the two (2) groups of preschool students (Group A and B) enrolled in the two periods (2019 and 2021) under study. The table presents values of the standard error of the sample mean and the standard error deviation, which served as criteria for choosing the Welch t-test for the analysis of the test statistic (sample mean).

Table 4: Calculated values justifying the application of the Welch t-test to the samples.

Samples	t cal	"p-value"	Confidence interval	Estimated measurement
Group 2019 and Group 2021	1.0193	0.3125	-14.8842 6.6556	81.657 85.771

Regarding the opinions elicited from parents or guardians, figures related to the survey conducted with parents of preschool students are presented.

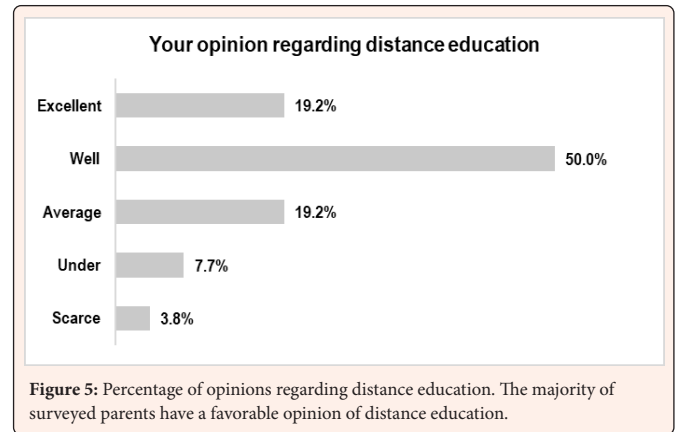


Figure 5: Percentage of opinions regarding distance education. The majority of surveyed parents have a favorable opinion of distance education.

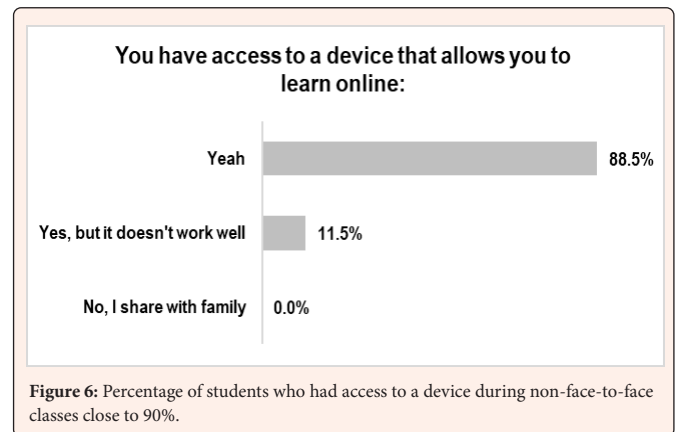


Figure 6: Percentage of students who had access to a device during non-face-to-face classes close to 90%.

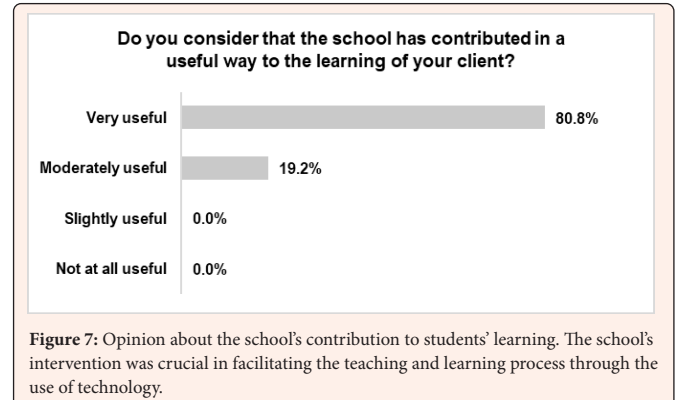


Figure 7: Opinion about the school's contribution to students' learning. The school's intervention was crucial in facilitating the teaching and learning process through the use of technology.

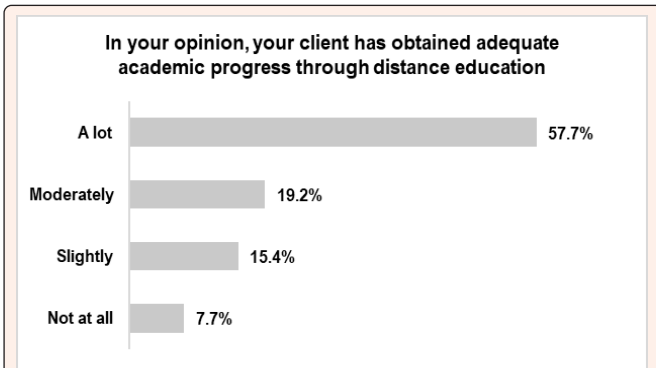


Figure 8: Regarding academic progress through distance education, there was a favorable consensus regarding student adaptation and progress.

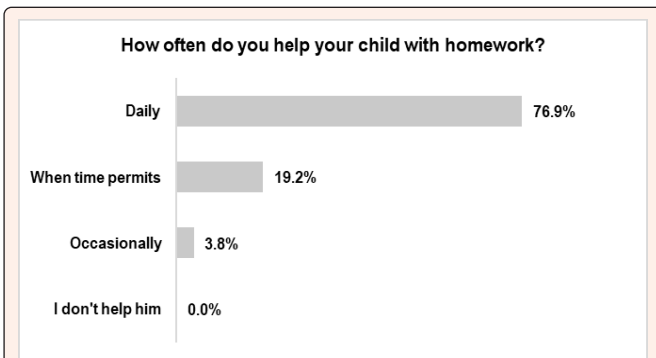


Figure 9: The majority of support came from parents, contributing to the improvement of the process.

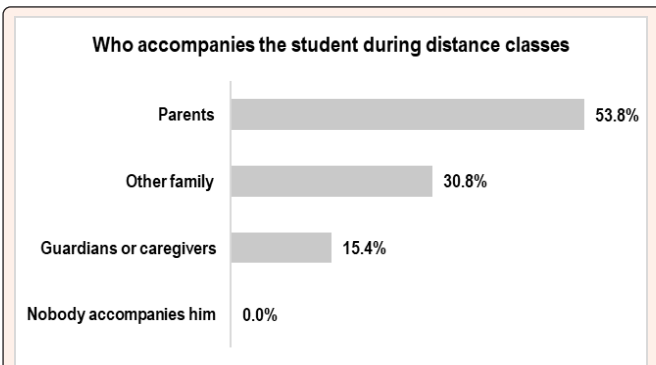


Figure 10: Frequency of student support. The majority indicated that it was provided daily.

Discussion

The graphical representation of the values in Tables 1&2 allowed us to observe the behavior of the datasets representing the academic years 2019 and 2021, respectively. Both Figure 1 with the distribution of points in relation to the normality line, and the histograms (Figures 2&3) depicting the frequencies of the values from the assessments conducted with preschool student groups, as well as Figure 4 representing the difference in standard deviation values of the results obtained, highlighted the effects of quarantine-related isolation conditions, the lack of classroom interaction, and the decrease in in-person monitoring of all aspects of the teaching and learning process [10-12].

To verify the differences between these two teaching models and their effects on the performance of preschool students who were subjects of this comparative evaluation, we can emphasize the application of the p-value obtained for the 2019 groups, both in the Shapiro-Wilk normality test and in the Welch t-test for comparing sample means. On

the one hand, the Shapiro-Wilk test determined that the distribution of evaluation values for preschool students in the 2019 groups complied with the normality condition for the chosen probability model, while the evaluation values for preschool students in the 2021 groups did not meet this condition (Tables 3&4).

It is worth noting the relative correspondence between the evaluation values of preschool students in the 2021 group and the frequency of the highest scores achieved, as well as the percentages reflected in the analysis of parent or guardian opinions in questions such as:

Question 9 (Figure 10): How often do you help your child with homework? 77% stated that they did so daily, evident in histogram No. 4 (specifically in the score ranges between 80 - 90 and 90 - 100), reaffirming the crucial role of daily parental support and assistance in home studying and its reflection in the assessment results. This trend aligns with the percentages shown in Question 8 (Figure 9) of the survey, which inquired about who accompanied the student during distance classes, with 54% being parents and 31% other family members. One question we consider highly relevant and highlights the crucial role played by the school is related to the availability of internet connection and electronic devices. Comparing the situation of the evaluated preschool students to that of students in the Panamanian public education system, parents responded to Question 4 (Figure 7), with 81% stating that the school's contribution was beneficial.

The contrast in the situation of the evaluated preschool students compared to the average situation of students in the Panamanian public education system was evident in Question 2 (Figure 6), where 88.5% of parents stated that they had a device that allowed their child to learn online. The findings underscore the crucial role of parental involvement and digital access in preschool students' remote learning experiences, aligning with psychological principles of family support and digital equity [13].

Conclusion

The results indicate that preschool students at Centro Nuestra Señora de la Merced were affected in their performance under pandemic conditions and non-presential classes. Daily parental support played a crucial role in the performance of the 2021 students. The contribution of Centro Nuestra Señora de la Merced helped bridge the existing technological gap between this school and private schools.

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