

Pupils' Reading and Numerical Literacy in the Pre-COVID-19 Pandemic and During the Pandemic with Modular and Face-to-Face Instructions

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Abstract— This descriptive-comparative study aimed to determine the grade school pupil's reading performance level in Filipino and numerical literacy in the pre-pandemic and during the pandemic with modular and face-to-face instructions. The participants were the 34 Grade six pupils, with 18 females and 16 males, enrolled in the School Year 2022-2023 in one of the public schools in the Division of Angeles City. Data on the pupils' reading level in Filipino based on Phil-IRI test and numerical literacy based on Numeracy Assessment results during the School Years 2019-2020, 2021-2022, and 2022-2023 were compared to track improvements on these areas. Data were analyzed using frequencies, percentages, mean, standard deviation and ranks. Wilcoxon Signed rank test was utilized to compare the variables of the study. Results show that there is a significant difference in the reading profile of the pupils between the periods of SY 2019-2020 (pre-pandemic face-to-face) and SY 2021-2022 (pandemic-modular), between SY 2019-2020 and SY 2022-2023 (pandemic face-to-face), and between SY 2021-2022 and SY 2022-2023 with the computed p-values of less than .05 level of significance. Further, data reveal more negative ranks during the SY 2022-2023 wherein the majority of the pupils are within the frustration level. Considering the pupils' numerical literacy level, results show a significant difference in this area between SY 2021-2022 (pandemic-modular) and SY 2022-2023 (pandemic-face to face) wherein majority of the pupils are classified as nearly numerates. The results of this study have implications for the enhancement of the intervention programs related to reading and numeracy of the elementary pupils.

Keywords— reading literacy, numerical literacy, modular, face-to-face, elementary.

INTRODUCTION

Education in countries around the world has undergone significant transformations as a result of the COVID-19 pandemic (Reimer et al., 2021). The outbreak led to the disruption of in-person classes for students starting School Year 2019-2020 (Kuhfeld et al., 2021). To mitigate the spread of the deadly virus, many nations implemented partial or complete closures of schools, reorganized learning groups, and necessitated varying periods of absence for students or teachers (Meinck et al., 2022; Woessmann et al., 2020).

Teachers were required to conduct learning activities without the normal face-to-face sessions, learners were required to self-regulate at home, and parents were required to assist their children's learning in a more active manner than previously. Furthermore, the widespread disruption of traditional teaching has raised global concerns about the potential detrimental impact on student learning as educators, school administrators, and students navigated online education (Burgess & Sievertsen, 2020; Hampshire, 2020; Joseph & Fahey, 2020).



Throughout the pandemic, parents have expressed various personal, technical, logistical, and financial challenges associated with online learning (Abuhammad, 2020). Particularly in early childhood settings, parents often held negative perceptions regarding the advantages of online learning and favored traditional methods (Dong et al., 2020). Parents expressed resistance to online learning for four main reasons: the limitations of online instruction, young children's inadequate self-regulation skills, time constraints, and a lack of professional knowledge to support their children's online learning (Dong et al., 2020). Research indicates a significant correlation between parental education level and the ability to facilitate children's remote learning during the pandemic (Azubuike et al., 2021).

On the other hand, there is widespread fear among parents, educators, and policymakers that the COVID-19 epidemic will result in significant learning deficits (Kuhfeld, Soland et al., 2020; Dorn et al., 2020). School closures may result in learning loss, particularly in formative abilities such as reading and math, with long-term consequences.

The acquisition of literacy skills is fundamental for young children, as it forms the basis for all academic learning. Developing the ability to read, write, and count plays a crucial role in a child's academic achievements and future success. The Department of Education (DepEd) recognizes the significance of enhancing literacy and considers it a top priority. This commitment is reflected in the DepEd's flagship initiative, the "Every Child a Reader Program," which seeks to make every Filipino child a reader and writer at his/her grade level (DepEd Order No. 14, series 2018).

Recent studies have revealed that the development of reading and mathematical skills is influenced by a combination of shared and unique factors, indicating a close interconnection between these processes (Purpura et al., 2011; Davidse et al., 2014; Purpura & Ganley, 2014; Purpura et al., 2017a; Korpipää, 2020; Vanbinst et al., 2020).

On the other hand, according to Lange (2006), numerical literacy is the ability to use a variety of numbers and symbols related to basic mathematics to solve practical problems in a variety of contexts of daily life and analyze information presented in a variety of forms (graphs, tables, diagrams, and charts), after which one can predict the future and make decisions based on the interpretation of the analysis's findings.

OBJECTIVES OF THE STUDY

The researcher intended to determine the reading performance and numerical literacy of grade school students before and during the COVID-19 pandemic, considering both modular and face-to-face instruction.

The objective was to gather data that could aid the Department of Education and school leaders in making informed decisions regarding the use of various teaching and learning modalities to enhance students' reading and numeracy skills.

METHODOLOGY

The researcher used the descriptive-comparative research design which aimed to describe the grade school pupil's reading performance in Filipino and numeracy literacy in the pre-pandemic and during the pandemic with modular and face-to-face instructions. The participants of the study involved a total of 54 grade three pupils, 28 females and 26 males, in one of the public schools in the Division of Angeles City.

The researcher analyzed the Philippine Informal Reading Inventory (Phil-IRI) results in Filipino reading while the Numeracy Assessment Tool (NumAT) results in numerical literacy of grade school students during the School Years 2019-2020, 2021-2022, and 2022-2023.

RESULTS AND DISCUSSION

Participants' Reading Performance Level in Filipino

The participants' reading performance level in Filipino during the pre-pandemic of SY 2019-2020 (face-to-face mode), pandemic of SY 2021-2022 (modular mode) and pandemic of SY 2022-2023 (face-to-face mode) is shown in Table 1.

During the pre-pandemic period, 9 or 26.5% of learners were in the frustration level, 13 or 38.2% were in the instructional level, and 12 or 35.3% were independent readers. Meanwhile, during the pandemic period where modular mode was implemented, it was reported that only 1 or 2.9% of learners were in the frustration level, 14 or 41.2% were in the instructional level, and majority (19 or 55.9%) of the learners were in the highest level of being independent.

On the other hand, come SY 2022-2023 where face-to-face classes were held during the pandemic period, 23 or 67.6% of learners were back in the frustration level, 10 or 29.4% in the instructional level, and only 1 or 2.9% of learners was categorized as independent reader.

Table 1. Participants' Reading Performance Level in Filipino during the Pre-Pandemic of SY 2019-2020 (Face-to-Face Mode), Pandemic SY 2021-2022 (Modular Mode) and SY 2022-2023 (Face-to-Face Mode)

Reading Profile	Pre-Pandemic S.Y. 2019-2020 (Face-to-Face Mode)	Pandemic S.Y. 2021-2022 (Modular Mode)	Pandemic S.Y. 2022-2023 (Face-to-Face Mode)
Frustration	9 (26.5%)	1 (2.9%)	23 (67.6%)
Instructional	13 (38.2%)	14 (41.2%)	10 (29.4%)
Independent	12 (35.3%)	19 (55.9%)	1 (2.9%)
Total	34 (100.0%)	34 (100.0%)	34 (100.0%)

Comparison of the Participants' Reading Performance Level in Filipino during the Pre-Pandemic (Face-To-Face Mode), Pandemic (Modular Mode) and Pandemic (Face-To-Face Mode) Periods

Table 2 shows the comparison of participants' reading performance level in Filipino during the pre-pandemic of SY 2019-2020 (face-to-face mode) and during the pandemic of SY 2021-2022 (modular mode).

Data show that with a p-value of .001 which is even less than .01, the null hypothesis is rejected since there is a significant difference in the reading performance level of the participants considering the two periods. It can be seen that two (2) out of 34 participants obtained negative ranks, 16 positive ranks while the remaining 16 participants remained in the same reading level.

Therefore, the result shows that the reading performance level in Filipino of the participants during the SY 2021-2022 (Grade Five) using modular mode is significantly higher over their reading performance level during the pre-pandemic of SY 2019-2020 using face-to-face instructions (Grade Three).

Table 2. Comparison of Participants' Reading Performance Level in Filipino during Pre-Pandemic of SY 2019-2020 (Face-to-Face Mode) and during the Pandemic of SY 2021-2022 (Modular Mode)

Reading Profile	Ranks	N	Mean Ranks	Sum of ranks	P value	Decision
Pre-Pandemic SY 2019-2020 (Face-to-Face Mode)	Negative ranks	2a	9.00	18.00	0.001	Reject Ho
	Positive ranks	16b	9.56	153.00		
	Ties	16c				
Pandemic SY 2021-2022 (Modular Mode)	Total	34				

Table 3 presents the comparison of participants' reading performance level in Filipino during the pre-pandemic of SY 2019-2020 (face-to-face mode) and the pandemic of SY 2022-2023(face-to-face mode).

Data reveal a p-value of .000 which is also less than .01 that leads to the rejection of the null hypothesis. This means that there is a significant difference in the reading performance level of the participants considering the two periods. Data further show that 20 were in the negative ranks, none in the positive ranks, and 14 participants remained in the same reading level.

Therefore, the result shows that the reading performance level in Filipino of the participants during the pre-pandemic SY 2019-2020 (Grade Three) is significantly higher over their reading performance level during the pandemic SY 2022-2023 (Grade Six), both with face-to-face mode of learning.

Table 3. Comparison of Participants' Reading Performance Level in Filipino during Pre-Pandemic SY 2019-2020 (Face-to-Face Mode) and Pandemic SY 2022-2023 (Face-to-Face Mode)

Reading Profile	Ranks	N	Mean Ranks	Sum of ranks	P value	Decision
	Negative ranks	20a	10.50	210.00	0.000	



Pre-Pandemic SY 2019-2020 (Face-to-Face Mode)	Positive ranks	0b	0.00	0.00	Reject Ho
	Ties	14c			
	Total	34			
Pandemic SY 2022-2023 (Face-to-Face Mode)					

- a. $R_{2022-2023} < R_{2019-2020}$
- b. $R_{2022-2023} > R_{2019-2020}$
- c. $R_{2022-2023} = R_{2019-2020}$

Table 4 presents the comparison of participants' reading performance level in Filipino during the pandemic of 2021-2022 (modular mode) and the pandemic of SY 2022-2023(face-to-face mode).

Data reveal a p-value of .000 which is also less than .01 that signifies rejection of the null hypothesis. This indicates that there is a significant difference in the reading performance level of the participants considering the two periods. Alarmingly, it was recorded that 30 out of 34 participants were in the negative ranks, none in the positive ranks, and only 4 participants remained in the same reading level. Therefore, the result shows that the reading performance level in Filipino of the participants during the pandemic SY 2021-2022 (Grade Five) using modular mode is significantly higher over their reading performance level during the pandemic SY 2022-2023 (Grade Six) with face-to-face instructions.

Table 4. Comparison of Participants Reading Performance Level in Filipino during Pandemic SY 2021-2022 (Modular Mode) and Pandemic SY 2022-2023 (Face-to-Face Mode)

Reading Profile	Ranks	N	Mean Ranks	Sum of ranks	P value	Decision
Pandemic SY 2021-2022 (Modular Mode)	Negative ranks	30a	15.50	465.00	0.000	Reject Ho
	Positive ranks	0b	0.00	0.00		
	Ties	4c				
	Total	34				
Pandemic SY 2022-2023 (Face-to-Face Mode)						

- a. $R_{2022-2023} < R_{2021-2022}$
- b. $R_{2022-2023} > R_{2021-2022}$
- c. $R_{2022-2023} = R_{2021-2022}$

Participants' Numerical Literacy

Table 5 shows the participants' numerical literacy level during the pre-pandemic SY 2019-2020 (face-to-face mode), pandemic SY 2021-2022 (modular mode) and pandemic SY 2022-2023 (face-to-face mode). During the pre-pandemic period, four or 11.8% of the participants were non-numerates, 17 or 50.0% were nearly numerates and 13 (38.2%) were classified as numerates.



During the pandemic period where modular mode was used for the delivery of education, it was recorded that only one (2.9%) was non-numerate, 16 (47.1%) were nearly numerates, and 17 (50.0%) participants were considered as numerates.

However, during the pandemic period where face-to-face classes were implemented, only eight (23.5%) were categorized as numerates, majority or 23 (67.6%) were nearly numerates, and three (8.8%) were in the non-numerate level.

Table 5. Participants' Numerical Literacy Level during SY 2019-2020, SY 2021-2022, and SY 2022-2023

Numerical Literacy Level	Pre-Pandemic S.Y. 2019-2020 (Face-to-Face Mode)	Pandemic S.Y. 2021-2022 (Modular Mode)	Pandemic S.Y. 2022-2023 (Face-to-Face Mode)
Non-Numerate	4 (11.8%)	1 (2.9%)	3 (8.8%)
Nearly Numerate	17 (50.0%)	16 (47.1%)	23 (67.6%)
Numerate	13 (38.2%)	17 (50.0%)	8 (23.5%)
Total	34 (100.0%)	34 (100.0%)	34 (100.0%)

Comparison of the Participants' Numerical Literacy in the Pre-Pandemic (Face-To-Face Mode), Pandemic (Modular Mode) and Pandemic (Face-To-Face Mode) Periods

Table 6 shows the comparison of participants' numerical literacy level during the pre-pandemic of SY 2019-2020 (face-to-face mode) and pandemic of SY 2021-2022 (modular mode).

Data show that the numerical literacy level of the participants in SY 2019-2020 and SY 2021-2022 have no significant difference having obtained a p-value of 0.151, hence, the researcher failed to reject the null hypothesis. Data further show that six out of 34 participants obtained negative ranks, ten recorded positive ranks, and 18 remained in the numerical literacy level.

Table 6. Comparison of Participants Numerical Literacy Level during the Pre-Pandemic of SY 2019-2020 (Face-to-Face Mode) and SY 2021-2022 (Modular Mode)

Numerical Literacy	Ranks	N	Mean Ranks	Sum of ranks	P value	Decision
Pre-Pandemic SY 2019-2020 (Face-to-Face Mode)	Negative ranks	6a	7.00	42.00	0.151	Failed to Reject Ho
	Positive ranks	10b	9.40	94.00		
Pandemic SY 2021-2022 (Modular Mode)	Ties	18c				
	Total	34				

- a. N2021-2022 < N2019-2020
- b. N2021-2022 > N2019-2020
- c. N2021-2022 = N2019-2020

Pre-Pandemic (Face-To-Face Mode) and Pandemic (Face-To-Face Mode) Periods

The comparison of participants' numerical literacy level during the pre-pandemic of SY 2019-2020 (face-to-face mode) and pandemic of SY 2022-2023 (face-to-face mode) is illustrated in Table 7.

With a recorded p-value of 0.285, the researcher also failed to reject the null hypothesis. This indicates that there is no significant difference in the numerical literacy level of the participants during the pre-pandemic of SY 2019-2020 (face-to-face mode) and pandemic of SY 2022-2023.

Data further reveal that nine obtained negative ranks, five positive ranks, and 20 remained in the same numerical literacy level.

Table 7. Comparison of Participants Numerical Literacy Level during the Pre-Pandemic of SY 2019-2020 (Face-to-Face Mode) and SY 2022-2023 (Face-to-Face Mode)

Numerical Literacy	Ranks	N	Mean Ranks	Sum of ranks	P value	Decision
Pre-Pandemic SY 2019-2020 (Face-to-Face Mode)	Negative ranks	9a	7.50	67.50	0.285	Failed to Reject Ho
	Positive ranks	5b	7.50	37.50		
	Ties	20c				
	Total	34				
Pandemic SY 2022-2023 (Face-to-Face Mode)						

- a. N2022-2023 < N2019-2020
- b. N2022-2023 > N2019-2020
- c. N2022-2023 = N2019-2020

Pandemic (Modular Mode) and Pandemic (Face-To-Face Mode) Periods.

Table 8 shows the comparison of participants' numerical literacy level during the pandemic of SY 2021-2022 (modular mode) and pandemic of SY 2022-2023 (face-to-face mode).

Having obtained a p-value of 0.002, a significant difference is established in the numerical literacy level of the participants during the SY 2021-2022 when modular mode was used in the delivery of education and SY 2022-2023 when face-to-face classes were implemented.

Data further show that 12 participants were recorded for negative ranks, only one for positive rank, and 21 remained in the same numerical literacy level.

Table 8. Comparison of Participants Numerical Literacy Level during the Pandemic of SY 2021-2022 (Modular Mode) and Pandemic SY 2022-2023 (Face-to-Face Mode)

Numerical Literacy	Ranks	N	Mean Ranks	Sum of ranks	P value	Decision
Pandemic SY 2021-2022 (Modular Mode)	Negative ranks	12a	7.00	84.00	0.002	Reject Ho
	Pandemic SY 2022-2023 (Face-to-Face Mode)	Positive ranks	1b	7.00		
	Ties	21c				
	Total	34				

a. $N_{2022-2023} < N_{2021-2022}$

b. $N_{2022-2023} > N_{2021-2022}$

c. $N_{2022-2023} = N_{2021-2022}$

CONCLUSION

Based on the results of the study, the following conclusions are drawn:

1. The majority of the participants are classified as instructional readers during the pre-pandemic period of SY 2019-2020 (face-to-face mode), independent readers during the pandemic period of SY 2021-2022 (modular mode), and within the frustration level during the pandemic period of SY 2022-2023 (face-to-face mode).
2. There is a significant difference in the participants' reading performance levels during the pre-pandemic period of SY 2019-2020 (face-to-face mode), pandemic period of SY 2021-2022 (modular mode), and pandemic period of SY 2022-2023 (face-to-face mode) where a decline in the reading performance level was recorded when transitioning from modular to face-to-face instructions.
3. The majority of the participants are classified as nearly numerates during the pre-pandemic of SY 2019-2020 (face-to-face mode), numerates during the pandemic of SY 2021-2022 (modular mode), and back to nearly numerates during the period of pandemic of SY 2022-2023 (face-to-face mode).
4. There is no significant difference in the participants' numerical literacy levels during the pre-pandemic of SY 2019-2020 (face-to-face mode) and pandemic SY 2021-2022 (modular mode); and during the pre-pandemic of SY 2019-2020 (face-to-face mode) and pandemic SY 2022-2023 (face-to-face mode). Significant difference was established in the participants' numerical literacy levels during the pandemic of SY 2021-2022 (modular mode) and SY 2022-2023 (face-to-face mode) periods where a decline from numerate to nearly numerate level was recorded when the mode of delivery shifted to the face-to-face from modular instructions.

RECOMMENDATION

The findings of the study lead to the following recommendations:



1. Reading and numeracy intervention programs should be enhanced to improve the reading ability of the pupils. The Department of Education should continuously organize different trainings and seminars that would enhance the teachers' effectiveness in teaching reading and numbers to the pupils and in producing effective modules.
2. Parents should have trainings and programs regarding the administration of the modules during home learning.
3. In terms of curriculum, school heads and teachers should conduct a curriculum review particularly on content areas being taught in terms of the reading and numerical literacy, specifically in areas which learners are weak at.
4. Future researchers may conduct studies about the effectiveness of the different alternative modes of learning which includes Modular Distance Learning (MDL).

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