

## INTRODUCTION

### Purpose

In this project, we examined the impact of COVID-19 pandemic on students’ academic performance in Alberta. This is part of a pan Canadian project commissioned by The Royal Society of Canada and the Canadian Commission UNESCO Canada and funded by the Social Sciences and Humanities Research Council of Canada.

### Methods

In order to estimate the impact of COVID-19, we first obtained anonymized Provincial Achievement Test (PAT) scores by Alberta Education. We then averaged the PAT scores in language arts and mathematics from the years 2016-2024. When calculating the averages, we only included those participants who were present for both their mathematics and language arts PATs; if a participant missed one or both exams, they were not included in the analysis.

Our participants were Grade 6 (n=39267) and Grade 9 students (n=35,163) in Alberta in 2016, Grade 6 (n=40,686) and Grade 9 (n=36,554) students in Alberta in 2017, Grade 6 (n=42,504) and Grade 9 (n=37,612) students in Alberta in 2018, Grade 6 (n=42,504) and Grade 9 (n=37,846) students in Alberta in 2019, Grade 6 (42,391) and Grade 9 (n=13,617) students in Alberta in 2022 and Grade 6 (n=38,587) and Grade 9 (n=41,846) students in Alberta in 2023. Because the PAT exams were postponed during the pandemic, there were no data available from the years 2020-2021.

## RESULTS

Table 1.1

Years	Grade	Subject	Average	Sample Size
2016	6	LA	66.77	39,267
		Math	64.22	
	9	LA	66.13	35,163
		Math	61.81	
2017	6	LA	66.55	40,686
		Math	61.58	
	9	LA	65.68	36,554
		Math	58.68	
2018	6	LA	68.21	42,504
		Math	59.69	
	9	LA	66.82	3,7612
		Math	54.41	
2019	6	LA	68.19	45,031
		Math	63.74	
	9	LA	65.73	37,846
		Math	58.45	
2022	6	LA	66.83	42,391
		Math	63.39	
	9	LA	65.55	13,617
		Math	55.37	
2023	6	LA	66.97	38,587
		Math	65.69	
	9	LA	65.15	41,846
		Math	57.34	

## RESULTS (CONT.)

Table 1.1 lists the mean (in percent) of the language arts and mathematics PAT score according to year and grade. We utilized the averages in Table 1.1 to calculate the average language arts and mathematics PAT scores for a range of years, specifically 2016-2019 and 2022-2023. These broader averages are provided in Table 1.2, side by side according to grade and subject so the differences between them can be easily observed.

Table 1.2

Grade	Subject	Years	Average	Difference
6	LA	2016-2019	67.43	-0.53
		2022-2023	66.90	
	Math	2016-2019	62.30	+2.24
		2022-2023	64.54	
9	LA	2016-2019	66.09	-0.75
		2022-2023	65.35	
	Math	2016-2019	58.34	-1.99
		2022-2023	56.35	

As can be seen from Table 1.2, there was a small decrease (<1%) in language arts in both grade levels. In mathematics, the results were mixed. Following COVID-19 there was a 2.24% improvement among the Grade 6 students and a 1.99% decrease among the Grade 9 students.

Additionally, the Grade 6 and Grade 9 language arts PATs contain both a reading and writing portion. We were given additional data that comprised a mark for each portion of the exam in order to examine if COVID-19 had any differential effect on the two parts. Table 1.3 compares the average Grade 6/9 reading and writing grade for the years 2016-2019 with the average Grade 6/9 reading and writing grade for the years 2022-2023

Table 1.3

Grade	Portion of LA PAT	Year	Average	Difference
6	Writing	2016-2019	66.70	-1.66
		2022-2023	65.04	
	Reading	2016-2019	68.16	+0.62
		2022-2023	68.78	
9	Writing	2016-2019	66.91	-0.57
		2022-2023	66.34	
	Reading	2016-2019	65.48	-1.71
		2022-2023	63.77	

Similar to Table 1.2, Table 1.3 shows minimal changes in the two parts of the language arts PAT average pre- and post- COVID-19. The Grade 6 reading portion of the language arts exam saw minimal (<1%) gains and the Grade 6 reading saw minimal decreases (<2%). Both Grade 9 reading and writing saw minimal (<2%) decreases.

## RESULTS (CONT.)

### What is the Effect of Gender and Location?

Next, we examined if gender moderated the impact of COVID-19 on the PAT scores. It’s relevant to note that the gender of some students who took both PATs was unspecified, and so they were not included in these results. Table 2.1 features the mean (in percent) PAT scores from the years 2016-2019 and 2022-2023 according to gender, year and grade.

Table 2.1

Grade	Gender	Subject	Year	Averages	Difference
6	Male	LA	2016-2019	65.11	-0.74
			2022-2023	64.37	
		Math	2016-2019	62.88	+2.35
			2022-2023	65.23	
	Female	LA	2016-2019	69.85	-0.30
			2022-2023	69.55	
		Math	2016-2019	61.70	+2.13
			2022-2023	63.83	
9	Male	LA	2016-2019	63.11	-0.41
			2022-2023	62.70	
		Math	2016-2019	58.34	-1.25
			2022-2023	57.08	
	Female	LA	2016-2019	69.19	-6.08
			2022-2023	63.11	
		Math	2016-2019	58.34	-0.00
			2022-2023	58.34	

As can be seen from Table 2.2, both male and female Grade 6 students saw minor decreases in language arts (<1%), and a 2.35% and 2.13% increase in mathematics, respectively. Grade 9 male students saw a slight decrease in both language arts and mathematics score (<2%), whereas Grade 9 female students experienced no change in their mathematics PAT score following COVID-19, and a 6.08% decrease in their language arts score—the largest difference found during our analyses.

Next, we examined if location moderated the impact of COVID-19 on PAT scores. Urban refers to those school authorities located in Calgary and Edmonton, and rural refers to those school authorities located outside Calgary and Edmonton. Table 3.1 features the mean (in percent) PAT scores from the years 2016-2019 and 2022-2023 according to gender, year and grade. As can be seen from Table 3.2, both urban and rural Grade 6 students saw minor decreases in language arts (<1%), and a 2.30% and 1.83% increase in mathematics, respectively.

## RESULTS (CONT.)

Table 3.1

Grade	Location	Subject	Year	Averages	Difference
6	Urban	LA	2016-2019	68.48	-0.43
			2022-2023	68.05	
		Math	2016-2019	64.02	+2.30
			2022-2023	66.32	
	Rural	LA	2016-2019	66.38	-0.83
			2022-2023	65.54	
		Math	2016-2019	60.58	+1.83
			2022-2023	62.41	
9	Urban	LA	2016-2019	67.00	+0.85
			2022-2023	67.85	
		Math	2016-2019	60.50	-0.22
			2022-2023	60.28	
	Rural	LA	2016-2019	65.16	-1.36
			2022-2023	63.81	
		Math	2016-2019	56.15	-2.39
			2022-2023	53.76	

Grade 9 urban students saw a slight decrease in mathematics (<1%), and a slight (<1%) gain in language arts. Grade 9 rural students experienced a 1.36% decrease in their language art scores and a 2.39% decrease in their mathematics score following COVID-19.

## CONCLUSION

Though there have been many concerns around the impact of COVID-19 on students’ academic performance, for Grade 6 and Grade 9 students in Alberta, COVID-19 minimally effected language arts and mathematics PAT scores. The majority of the differences found in PAT averages between the years 2016-2019 and 2022-2023 were below 3%, whether positive or negative, and regardless of other factors such as geographical location or gender. This level of difference in PAT averages between years is relatively typical, for example between 2016 and 2017 there was a 2.64% decline in the Grade 6 mathematics PAT average, and no pandemic to account for this drop. The largest decline we found in the dataset was the 6.08% drop in the language arts PAT scores of female students in Grade 9. However, this finding alone does not allow us to conclude that COVID-19 had a significant impact on academic performance, considering a similarly large 7.4% drop can be seen in the mathematics PAT scores of Grade 9 students between the years 2016-2018. Thus, based on the evidence presented here, it is reasonable to conclude that the COVID-19 pandemic did not have a significant impact on Grade 6 and 9 students’ academic performance in mathematics and language arts in the province of Alberta. It is important to note here that the role of two important factors in students’ academic achievement (schools’ socioeconomic status and First Nation, Metis and Inuit designation) were not examined as these data were not accessible.