Schooling Methods in Student Test Scores*

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An increasing number of schools and universitities have adopted virtual or hybrid teaching methods ever since the COVID-19 pandemic in 2020. Using data from the National Center for Education Statistics and from various district-level assessements, this paper investigates the impact of schooling modes on students' pass rate in state standardized assessments in grades 3-8 during the 2020-2021 school year. The exploration of the data across 11 states suggests that the overall student pass rates declined during the pandemic school year. The pass rates have also seen more drastic changes in schools with larger share of black students as well as in schools who had a higher share of virtual and hybrid schooling. The results of this study are significant as they can be used by educational authorities and policymakers to support student learning.

NOTE TO SELF : I WANT TO CHANGE THE FIRST SENTENCE IN ABSTRACT

1 Introduction

In 2020, the World's Health Organization (WHO) declared the coronavirus disease, commonly known as COVID-19, a public health emergency of international concern (World Health Organization 2020). As an airborne disease, COVID-19 was highly contagious from person to person, which made virtually all lifestyle activities a health risk during the pandemic. During this time, hosting in-person classroom activities and instructional periods were also considered a health hazard and were strongly discouraged. It attempts to support students and staff despite the uncertainty and unpredictability of the pandemic, school leaders and authorities implemented alternative learning models which offered students the opportunity to continue their studies in a safe way. In the United States, hybrid and virtual schooling modes were commonly adopted in 2020-2021 in response to the pandemic. **ANOTHER TRANSITION SENTENCE?**

*Code and data are available at: LINK.

In this paper, I am interested in the impact of different schooling methods on US students' pass rates on state standardized exams in the pandemic school year in 2020-2021. Using district-level databases from 11 states and well as data from the Natiocal Center of Educational Statistics (NCES), I explore the changes in students' pass rates in 2020-2021 for more insights on the influence of the district's chosen learning model on the overall learning outcomes I find that, despite having the same curriculum, the decline in student pass rate is notably more obvious for schools who had a higher share in virtual or hybrid schooling modes. More specifically, (pass rates in English + Math) which results in an overall decline of _____% during the pandemic year. Also, I also find that schools with higher shares of black and hispanic students saw a greater decline in student pass rates. **MODIFY THIS IF NEEDED AFTER DISCUSSION** I can maybe show some stats here already??

The remainder of this paper is structured as follows. Section 2 discusses the data collection and the studied variables. Section 3 builds a model that suggests a relationship between learning models and student pass rates. Section 4 presents results and findings of the exploration for the dataset with the help of visualized data. Section 5 explores further insights from section 4 and discusses a few weaknesses and limitations of this study. This section also suggests potential next steps following this paper.

2 Data

Here do the shotgun package thanks..

2.1 Source and Data Collection

The paper and raw data used for replication is obtained from "Pandemic Schooling Modes and Student Test Scores: Evidence from US School Districts" (Jack et al. 2023), published in the American Economic Association's *American Economic Review: Insights* (AEA 2024). The downloaded data is built from district-level schooling mode data from the 2020-2021 schooling year and from district-level standardized assessment data from Spring 2019-2019 and 2021. I also downloaded additional district-level demographic data for this investigation. Detailed explanation of each data source and data collection method is given below.

2.1.1 District-Level Schooling Methods

Data on district-level schooling methods are downloaded from the COVID-19 School Data Hub (Hub 2021). This is a public database which aggregates state-sourced data to provide information on schooling modes and learning models by school districts during the 2020-2021 school year. Typically, the state-sourced data are State Education Agencies (SEA).

For each district in the United States, this database provides information on the percentage of the academic spent in each of type of schooling methods. To collect this data, the COVID-19 School Data Hub Team submitted data requests to state education agencies. They requested records of learning models used by schools and/or districts in the 2020-2021 academic school year. The renewal frequency of the data depends on on each school and districts where some would send new records weekly, while others would send the records in monthly. States who provided data monthly, bi-weekly or weekly during 2020-2021 year were included in this analysis.

2.1.2 District-Level Assessment Data

Data on students' pass rates by district

2.1.3 Source 3

Our final sample includes 11 states: Colorado, Connecticut, Massachusetts, Minnesota, Mississippi, Ohio, Rhode Island, Virginia, West Virginia, Wisconsin and Wyoming.

2.2 Variables of Interest

2.2.1 Schooling Modes

The possible schooling modes are in-person, virtual and hybrid learning models. In the analysis data, the schooling modes are defined and determined as follows:

- In-person: All or most students have access to traditional in-person instruction five days a week.
- Virtual: All or most students receive instruction online five days a week. Online instruction includes synchronous, asynchronous or a combination of synchronous and asynchronous activites.
- Hybrid: Schooling modes that do not correspond to any of the previous two models. Usually, this is a combination of the previous two.

2.2.2 Pass rates

2.2.3 Schooling Modes

2.2.4 Demographic Characteristics

2.2.5 Subject

Talk more about it.

Talk way more about it.

3 Model

The goal of our modelling strategy is twofold. Firstly,...

Here we briefly describe the Bayesian analysis model used to investigate... Background details and diagnostics are included in

3.1 Model set-up

Define y_i as the number of seconds that the plane remained aloft. Then β_i is the wing width and γ_i is the wing length, both measured in millimeters.

$$y_i|\mu_i, \sigma \sim \text{Normal}(\mu_i, \sigma) \tag{1}$$
$$\mu_i = \alpha + \beta_i + \gamma_i \tag{2}$$
$$\alpha \sim \text{Normal}(0, 2.5) \tag{3}$$
$$\beta \sim \text{Normal}(0, 2.5) \tag{4}$$
$$\gamma \sim \text{Normal}(0, 2.5) \tag{5}$$
$$\sigma \sim \text{Exponential}(1) \tag{6}$$

We run the model in R (R Core Team 2022) using the `rstanarm` package of Goodrich et al. (2022). We use the default priors from `rstanarm`.

3.1.1 Model justification

We expect a positive relationship between the size of the wings and time spent aloft. In particular...

We can use maths by including latex between dollar signs, for instance θ.

4 Results

Our results are summarized in.

5 Discussion

5.1 First discussion point

If my paper were 10 pages, then should be be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

5.2 Second discussion point

5.3 Third discussion point

5.4 Weaknesses and next steps

weakness 1 : missing data weakness 2 : definiton of in-person instruction. Access to in-perosn does not mean everyone actually did it online. Some may have opted to do it online for health reasons.

References

AEA. 2024. *The American Economic Association Portal. The American Economic Association.* https://www.aeaweb.org/.

Goodrich, Ben, Jonah Gabry, Imad Ali, and Sam Brilleman. 2022. "Rstanarm: Bayesian Applied Regression Modeling via Stan." https://mc-stan.org/rstanarm/.

Hub, COVID-19 School Data. 2021. *Percentage of School Year Spent in-Person, Hybrid, or Virtual, District Overall Shares.* https://www.covidschooldatahub.com/data-resources.

Jack, Rebecca, Clare Halloran, James Okun, and Emily Oster. 2023. *Pandemic Schooling Mode and Student Test Scores: Evidence from US School Districts.* American Economic Review: Insights. http://doi.org/10.3886/E168843V1.

R Core Team. 2022. *R: A Language and Environment for Statistical Computing.* Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

World Health Organization. 2020. *WHO Director-General's Opening Remarks at the Media Briefing on COVID-19 - 11 March 2020.* World Health Organization. https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020.