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The impact of instructional modality on student attendance and chronic absenteeism: A multi-year analysis across school types and grades in New York State

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Abstract

This study examines how different teaching modalities affect chronic absenteeism and student attendance in New York State across grade levels, school types, and academic years. Chronic absenteeism exhibits an inverse trend, with the highest attendance rates seen in early grades (1–4) and a steady decline through high school (grades 9–12), according to the analysis, which uses data from 2016–17 to 2020–21. The shift toward remote or distant remote during the pandemic may be attributed to the notable decline in attendance during the 2019–20 academic year, even though the median attendance across onsite, hybrid, and online modalities is still above 91%. There are also minor gender differences, with absenteeism rates slightly higher among male students. These results show that attendance patterns are highly influenced by grade level, the way that instruction is delivered, and outside variables like the pandemic. The study emphasizes the necessity of focused approaches to address absenteeism, especially when it occurs during non-traditional learning environments and among high school students.

Keywords: Chronic absenteeism; Student attendance; Instructional modality; K-12 education; Hybrid learning

1. Introduction

Regular school attendance is essential to a student's development and success. When the COVID-19 pandemic struck, there was a significant shift as organizations had to devise strategies to curb the disease's spread. Social distancing was a popular remedy and as schools shifted to remote and hybrid learning models, chronic absenteeism became a problem. To re-engage young students, educational institutions and policymakers must analyze the potential effects of modalities on student attendance. The Department of Education, through its website suggested that chronic absenteeism occurs when a particular student absconds 10% or more of the scheduled school days regardless of the reasons. Instructions are delivered through instructional modalities, which can be fully remote, synchronous, or in-person.

1.1. Background of the study

[1], in a cross-sectional, quantitative study to examine reasons behind student absenteeism at a university in Pakistan, concluded that major factors influencing absenteeism were teachers' lack of appreciation, monotonous teaching methods, and exhaustion. The research used an exclusive sample of clinical students at one institution and was done prior to the adoption of hybrid and remote modalities, leaving room for further study. [2] conducted semi-structured interviews with school principals and their perceptions on the causes of student absenteeism and eventual dropout ranged from family-oriented (parental care and financial difficulties) to school-oriented (teacher-student relationships and oppressive administrative issues). Our decision to examine USA schools using USA data was prompted by the fact that this research was "context-bound" to the principals' pre-pandemic viewpoints and was restricted to Turkish school environments.

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In the UAE, [3] developed a model of school absenteeism determinants that emphasized the need for more study. The study was unique to Al Ain, United Arab Emirates, both geographically and culturally. This restricted the findings' relevance to educational systems in non-Gulf Cooperation Council (GCC) or Western contexts. Because the study's framework was created for a traditional schooling model, it failed to take into consideration how instructional modality changed the post-pandemic era's conceptions of school environment. A multi-year, cross-contextual study that explicitly examines the function of instructional modality as a defining feature of the contemporary educational experience and combines school-level and student-level variables is sorely lacking.

In their review of chronic absenteeism, [4] emphasized the close correlation between substance abuse and psychiatric comorbidities. They divided school refusal into two categories: truancy-based (older students, externalizing behaviors, and substance use) and anxiety-based (younger students, internalizing disorders). Their main discovery was that substance use, especially marijuana, and absenteeism were correlated in both directions, with complete abstinence being the only factor that improved attendance [4]. There is more space for research because this study, like some others previously mentioned, was conducted before instructional modality.

To determine whether cause-specific student absences could function as a useful early warning system for influenza activity in the community, [5] carried out a six-year prospective study. Categories of absenteeism were tracked by the researchers and according to the study's findings, tracking cause-specific absenteeism is a practical, efficient indicators of seasonal influenza outbreaks. One homogeneous, reasonably well-off school district with involved parents and strong IT support served as the study's site. Our desire to conduct research along this line was sparked by the study's complete disregard for instructional modalities.

1.2. Research objectives

- To assess the impact of instructional modality (Onsite, Online, Hybrid) on student attendance and chronic absenteeism over multiple years.
- To examine attendance and chronic absenteeism patterns across grade levels and school types under different instructional modalities.
- To explore gender differences in attendance and chronic absenteeism across instructional modalities.

1.3. Problem statement

While schools have since deployed various instructional modalities (in-person, hybrid, remote) since COVID-19 hit, there is a lack of comprehensive, multi-year, and comparative data on how these different delivery models have specifically impacted rates of student attendance and chronic absenteeism across different grade levels and school contexts. Without this understanding, districts are ill-equipped to make data-informed decisions about which instructional models to sustain, how to allocate resources for attendance, and how to support vulnerable student populations.

There is a dearth of thorough, multi-year and comparative data on how these various delivery models have affected student attendance rates and chronic absenteeism across different grade levels and school contexts, even though schools have implemented a variety of instructional modalities (in-person, hybrid, and remote) since COVID-19 struck. Districts are ill-prepared to make data-driven decisions regarding the best ways to support vulnerable student populations, allocate resources for attendance interventions, and decide which instructional models to maintain.

1.4. Purpose of the study

This quantitative, non-experimental, comparative study aims to examine how different teaching modalities—in-person, hybrid, and remote affect student attendance rates and chronic absenteeism New York State schools in a diverse suburban school district over a three-year period (2016–2021).

1.5. Relevance of the study

In the United States, research on chronic student absenteeism is a national issue and research on this improves social well-being, economic competitiveness and educational equity. It tackles a pervasive and deteriorating crisis as the U.S. Department of Education reports that the average nationwide absenteeism rate is over 20%, a statistic that has been worsened by the COVID-19 pandemic. This has created a "new normal" of low attendance that undoes decades of academic advancement. Policy makers ought to understand post-pandemic factors causing this and create scalable plans to re-engage a generation of students through research. One of the most potent early indicators of academic failure is persistent absences. [6] argued that absenteeism and dropping out are related. Chronic absenteeism between eighth

and twelfth grade increases students' rate of school dropout. Schools can improve students' life outcomes and increase high-school graduation rates by addressing chronic absenteeism on, thereby disrupting the dropout pipeline.

Vulnerable student populations suffer disproportionately from absenteeism, which exacerbates already-existing achievement gaps. Most of the chronic absenteeism occurs in schools with high levels of poverty. Obstacles for students from low-income families include the need to work or take care of family members, unstable housing and limited access to healthcare. Designing equitable interventions requires research on the underlying causes within these communities. One way to promote educational equity and create equal opportunity is to address absenteeism. Over the course of their lives, a single cohort of high school dropouts costs the American economy hundreds of billions of dollars in lost wages, taxes, and higher social service expenditures. A workforce that is educated and skilled is essential to the modern American economy.

The growth of a competitive labor pool is hampered by widespread absenteeism, which has an impact on innovation and national productivity. A large-scale, unforeseen experiment with remote and hybrid learning was compelled by the pandemic. The effect on attendance is complicated and still unclear. Numerous districts have chosen to continue offering hybrid or virtual education. Important information about how these teaching modalities affect attendance patterns differently than traditional in-person education is lacking. This is a highly urgent research topic which gives school administrators and policymakers in USA the data they need to select instructional models, organize and optimize student engagement and how to distribute educational resources.

2. Methodology and materials

2.1. Data Source

We used data drawn from the New York Department of Education's website [7]. Students from Districts 1–32 and District 75 (Special Education) are included in the dataset. Excluded are students enrolled in homeschooling, charter schools, home and hospital instruction, and District 79 (Alternative Schools & Programs). New York City Early Education Centers and District Pre-K Centers are not included in the Pre-K data, which is restricted to pupils enrolled in K–12 schools that offer Pre-K. Transfer schools are excluded from school-level data files but included in district, borough, and citywide computations.

A student's attendance is determined by the school they were enrolled in at the time. To prevent double counting, students who attended more than one school during a given school year only submitted data to their respective schools and were only tallied once in the district-, borough-, and citywide aggregate computations. For instance, a student would only be included once in the citywide absenteeism rate calculations if they were consistently absent from one school but not from another. Because of this, chronic absenteeism rates could not match up precisely at various data aggregation levels.

The NYC Department of Education began using the New York State Education Department's (NYSED) definition of chronic absenteeism for the 2020–2021 academic year. Students who have an attendance rate of 90% or less that is, who missed 10% or more of the enrolled school days are classified as chronically absent under this criterion. Students must have attended school for at least 10 days and been present for at least one day for the, to be considered for chronic absenteeism measurements. To ensure consistency amongst studies, this revised definition was applied retroactively to every year in the dataset.

To support the interpretation of findings and provide context regarding attendance trends, instructional modalities, and the COVID-19 pandemic's effects, pertinent peer-reviewed articles and research reports were reviewed in addition to the quantitative analysis of publicly available data from the state department's website.

2.2. Data Processing

For clarity, the variables for attendance and absence were removed and renamed: "% Attendance" was shortened to "attendance," and "% Chronically Absent" was shortened to "absence." Gender categories comprised male and female, and grades spanned from kindergarten to twelve. Missing data were removed prior to analysis to ensure the accuracy and validity of results. The average attendance and absence rates for each gender within each grade were calculated by aggregating the data to make comparisons easier.

2.3. Data Cleaning and Privacy Considerations

Student data rows that had five or fewer contributing students were suppressed in public files and denoted by a "s" according to the Family Educational Rights and Privacy Act (FERPA). As a stand-in for tiny cell size, the rows that constituted 900-less days of attendance were likewise suppressed. To avoid indirectly disclosing suppressed data through subtraction or aggregate, rows were occasionally further censored. To maintain the consistency and integrity of the data, all such suppressed rows were not included in the analysis for this study. Outliers were retained in the dataset to preserve variability introduced during pandemic-related disruptions in attendance. No imputation or removal was applied.

2.4. Limitations of the study

This study has several limitations despite its meticulous design. Firstly, because it is a non-experimental study, it can find correlations but cannot prove that modality and absenteeism are causally related. Second, the results from a single school district might not apply to other educational contexts (such as highly urban or rural districts). Third, not all confounding factors, including individual student and family factors (e.g., parental attitudes toward education, student motivation), which may affect both modality choice and attendance, can be considered by the study.

3. Results and discussion

The section covers results or findings derived from the data as well as the discussion regarding these results
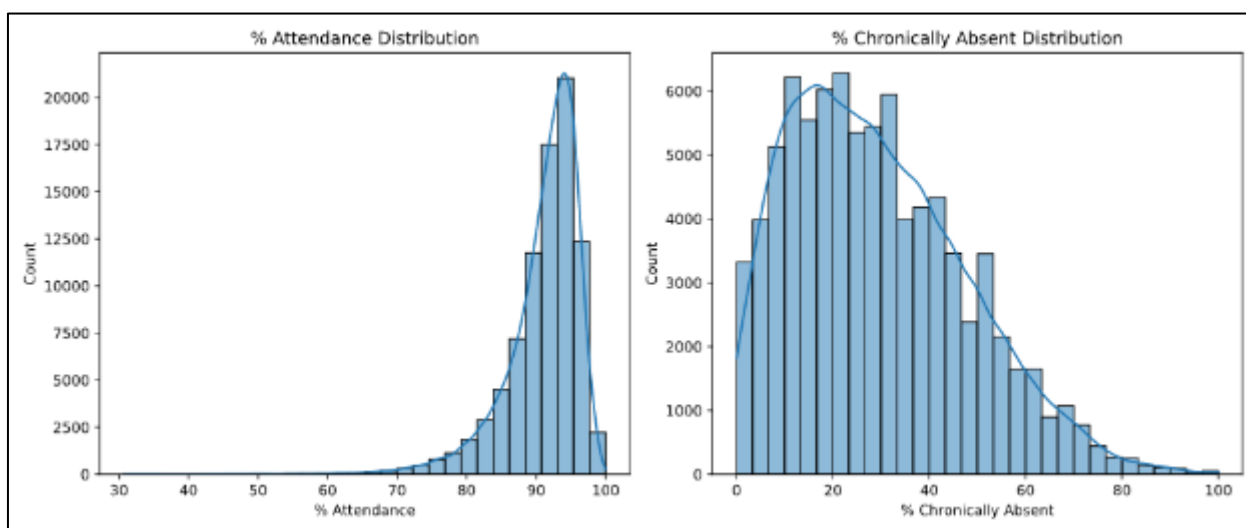

Figure 1 Attendance Distribution

The frequency of various attendance percentages is shown by this figure. With most of the counts focused around 90–100% attendance, the data is highly biased. With a steep peak around 95–100% and very few cases below 50%, this indicates that most students have high attendance rates.

The frequency of chronic absenteeism percentages is shown in this histogram. Compared to attendance, the distribution is more dispersed, with a discernible peak around 20–40% chronic absenteeism. Higher degrees of chronic absenteeism are less common, as evidenced by the count gradually declining as the proportion rises.
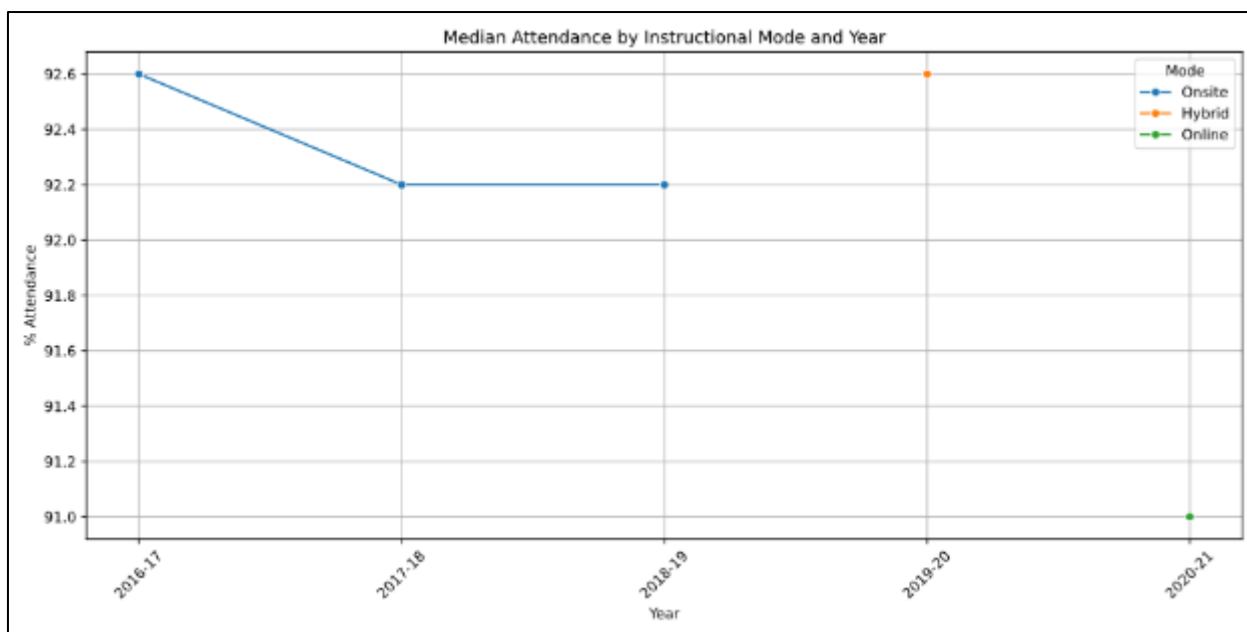
Figure 2 Median Attendance by instructional Mode and Year

The median percentage attendance for each instructional mode (online, hybrid, and onsite) during the various academic years from 2016–17 to 2020–21 is shown in the chart. Beginning at roughly 92.6% in 2016–17, the median attendance gradually decreases before leveling off at 92.2% in 2017–18 and 2020–21. This points to a gradual decline in onsite instruction attendance. The lone data point for 2019–20, which has a comparatively high median attendance of about 92.6%, shows that hybrid instruction data is only available for that year. The lowest of all the modes, the median attendance for online instruction in 2020–21 is 91.0%, which raises the possibility of a decline in attendance because of the shift to online learning, which may have been impacted by the pandemic.
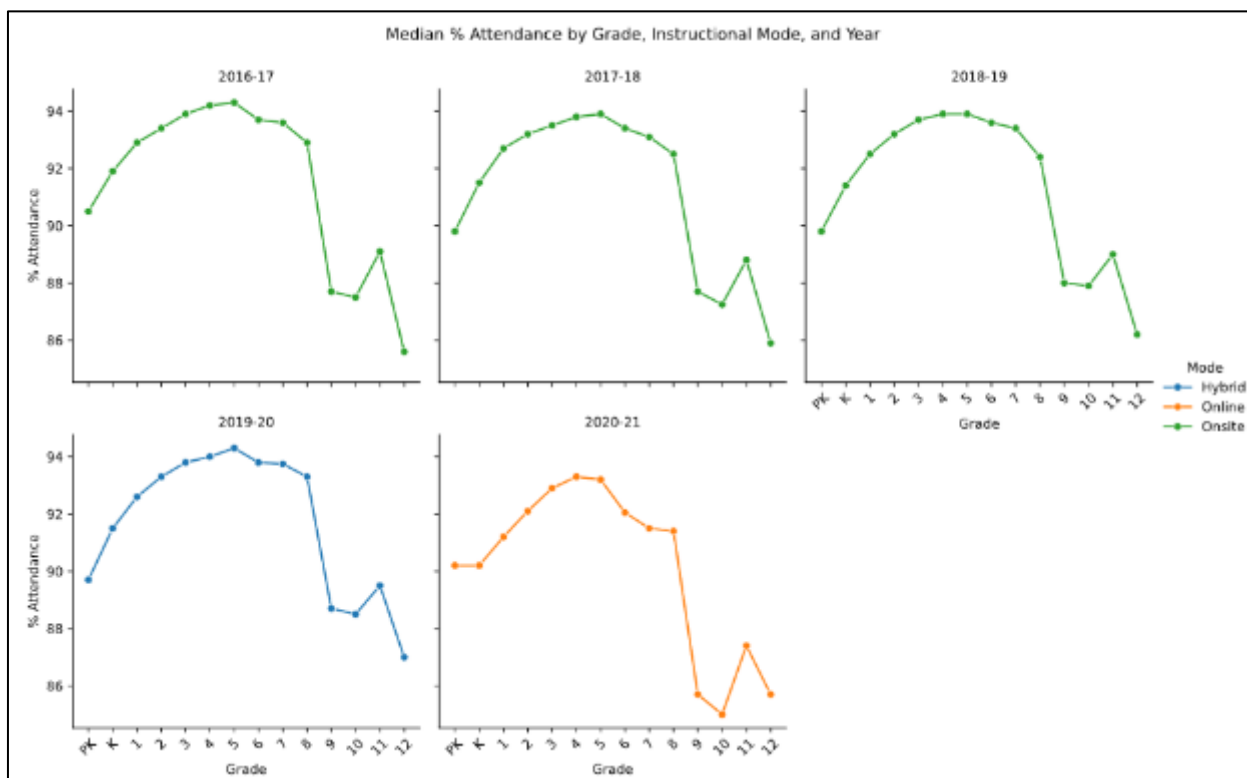

Figure 3 Median Attendance by Grade, Instructional Mode and Year

Across all years, attendance is highest in early elementary grades (1-4) and decreases as grade level increases, with the most significant drops in middle and high school years.

Instructional Mode Shift: From 2016-17 to 2018-19, data is primarily for onsite instruction. In 2019-20, hybrid data appears, and in 2020-21, onsite data is shown, likely reflecting a shift in instructional modes, possibly due to the COVID-19 pandemic starting in 2020.

There is a general decline in attendance over the years, with 2020-21 showing the lowest median attendance, especially in higher grades, which may indicate the impact of remote or hybrid learning challenges.

To investigate whether attendance levels have changed over the years, a simple linear regression was conducted with attendance as the dependent variable and year (numerically encoded) as the independent variable.

The results indicated a significant, negative relationship between year and attendance (β = -0.34, $p < 0.001$), suggesting a very slight decline in attendance over time. However, the magnitude of the effect was minimal, with attendance decreasing by approximately 0.34 units per year on average. The model's R-squared value was 0.008, indicating that less than 1% of the variance in attendance can be explained by the year alone. This suggests that while the temporal trend is statistically significant, it lacks practical significance and that other variables likely play a more substantial role in influencing attendance patterns.

Table 1 Average attendance and absence rates by grade and gender

Grade	Female Attendance (%)	Male attendance (%)	Female Absence (%)	Male Absence (%)
PK	89.4	89.2	39.9	40.6
K	90.7	90.5	33.6	34.2
1	91.7	91.7	28.7	29
2	92.4	92.4	25.5	26
3	84	92.9	23.3	23.7
4	92.3	93.2	21.9	22.6
5	93.5	93.2	23	22
6	92.8	92.5	23.5	22.2
7	92.5	92.6	24.3	24.2
8	91.8	92.3	26.2	25
9	87.4	91.6	34.1	26.8
10	87	85.7	37	37
11	88.2	87.5	35.3	38.5
12	85.5	84.6	45.4	44.7

As shown in Table 1 both males and females show comparable attendance patterns, rising from about 89% in pre-kindergarten to a peak of roughly 93% in grades 4-5 before falling to about 85% by the 12th grade, suggesting better attendance in the earlier grades, according to the analysis of attendance and absence by grade and gender. As a measure of chronic absenteeism, absence rates exhibit an inverse trend, going from 39.9–40.6% in PK to 21-22% in grade 5, then increasing to 44–45% by grade 12. Male absence rates are consistently marginally higher than female absence rates (less than 1-2 percentage points). Males exhibit slightly lower attendance and higher absenteeism across all grades, indicating slight but consistent gender differences.

4. Conclusion

Early grades see the highest attendance rates, while high school sees the lowest. The move to online and hybrid learning, particularly during the COVID-19 pandemic, is associated with higher absenteeism rates. Male students' somewhat

greater absenteeism raises the possibility of behavioral or social issues. These patterns demonstrate the necessity of focused interventions during non-traditional learning and in high school. To better inform policy and school-level strategies, future research should investigate the underlying causes and long-term effects.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors in this research declare no conflicts of interest related to this research.

Statement of informed consent

The data used in this study were obtained from open-access datasets available on the internet. Participants were not required to provide informed consent because these datasets did not contain identifiable personal information.

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