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Education Research Brief

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Staff Attrition from Pennsylvania Public Schools During the COVID-19 Pandemic

Key findings for teachers, health and counseling staff, and administrators

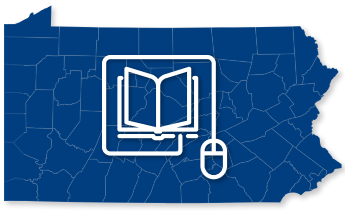
- Five percent of staff working in Pennsylvania local education agencies (LEAs) in fall 2020 left the statewide public school sector by fall 2021, an increase from 4 percent attrition in preceding years.
- Pre-pandemic attrition rates for staff of color were generally higher than for non-Hispanic White staff, and these differences grew during the pandemic except for school administrators, where they narrowed.
- Gaps in attrition rates were also exacerbated during the pandemic for teachers and health and counseling staff early in their careers and in charter schools and for LEA administrators in large LEAs.
- Remote learning was not associated with increased attrition among elementary school teachers.[a]
- The share of secondary math teachers certified in a different subject grew during the pandemic, and these teachers had higher attrition rates than teachers certified in secondary math had.[a]
- Attrition rates for school administrators changed during the pandemic in ways that generally offset pre-pandemic differences.

[a] Analyses on remote learning and certification did not cover teachers in other grades and subjects.

The COVID-19 pandemic raised concerns about the possibility of increased staff attrition from the public school sector, as it did for other occupations during the Great Resignation that followed the pandemic's onset (see Exhibit 1 for a definition of attrition). Recruiting and retaining education staff were pressing challenges even before the pandemic began. Since March 2020, education staff have needed to adapt to new job expectations and risk exposure to an unknown virus. These factors might have contributed to staff leaving public education jobs due to mental and physical health concerns and other issues.

Attrition studies in several states, including Pennsylvania, have found that teacher attrition rates were generally stable through the 2019–2020 school year, falling in some cases just as the pandemic began, before rising modestly in 2020–2021.[1] One study found similar trends for principals in North Carolina.[2] These patterns resemble job quitting trends in the broader economy.[3] They likely reflect, at least partly, the

Exhibit 1. Definition of attrition rate



Attrition rate: The percentage of LEA staff on October 1 of a given year who did not work in the Pennsylvania public school sector in any job on October 1 of the next year.

uncertainty during the early phase of the pandemic about the economy and schools' reopening plans for fall 2020.

This research brief provides a fuller picture of staff attrition during the pandemic from Pennsylvania LEAs (defined here to be traditional school districts and charter schools).[4] The brief describes annual rates of staff leaving the statewide public school sector from several jobs—including teachers, health and counseling staff, school administrators, and LEA administrators—and how changes in attrition during the pandemic varied with staff, school, and LEA characteristics (Exhibit 2). The findings can inform staff retention efforts, consistent with the Pennsylvania Department of Education's (PDE's) Pennsylvania Educator Workforce Strategy to strengthen the workforce by 2025 to help students recover from the pandemic.[5]

Exhibit 2. Methods

Approach. This brief describes annual staff attrition rates from Pennsylvania LEAs (traditional school districts and charter schools). We first examine attrition rate trends from 2016 to 2021 for staff in six job types. We then examine how changes in attrition rates during the pandemic varied by staff, school, and LEA characteristics.

- **Attrition rate.** The attrition rate is the percentage of LEA staff on October 1 of a given year who did not work in the Pennsylvania public school sector in any job on October 1 of the next year.[6] For example, a 5 percent attrition rate from fall 2020 to fall 2021 means that 5 percent of staff employed by Pennsylvania LEAs on October 1, 2020, did not work in the Pennsylvania public school sector in any job on October 1, 2021.
- **Mobility rate.** The mobility rate is a related concept that we examine in Exhibit 3. The mobility rate is the percentage of LEA staff on October 1 who worked for a different Pennsylvania LEA on October 1 of the next year.
- **Job types.** We analyze six job types that cover nearly all Pennsylvania LEA staff. These job types are (1) elementary school teachers (prekindergarten through grade 6); (2) secondary school teachers (grades 7 through 12); (3) special education teachers (any grade); (4) health and counseling staff (for example, school nurses, school counselors); (5) school administrators (principals and assistant principals), and (6) LEA administrators (chief administrative officers, superintendents, and assistant superintendents).[7] Job types not covered by this study include instructional coordinators, specialists, operational staff, and staff coaches.[8]
- **Staff, school, and LEA characteristics** and their categories include the following:
    - **Staff characteristics.** Years of experience (five categories) and race/ethnicity (of color, non-Hispanic White).[9]
    - **School characteristics.** Type (traditional public school, brick-and-mortar charter, virtual charter), urbanicity (urban, suburban, rural), and percentage of economically disadvantaged students (above or below the median).
    - **LEA characteristics.** Size (fewer than 1,000 students, 1,000 to 10,000 students, more than 10,000 students).

To focus readers on findings that are more likely to be meaningful, we highlight characteristics where the attrition rate increased from fall 2018 to fall 2021 by at least 0.75 percentage points more in one category of the characteristic than in another category. This amount is close to the overall increase in attrition during this period (0.8 percentage points).

Finally, we report findings from two additional analyses where interest stems from the pandemic. First, we examine changes in teacher attrition from fall 2018 to fall 2021 based on the predominant instructional mode their LEA used in January 2021 (fully in-person learning, hybrid learning, fully remote

learning). We focus on elementary teachers since instructional mode data were available for elementary grades.[10] Second, because staff shortages may have led to more teachers teaching outside their specialties, we examine changes in attrition during the same period for secondary math teachers based on whether they are certified in secondary math. The secondary math focus reflects PDE's interest in it.

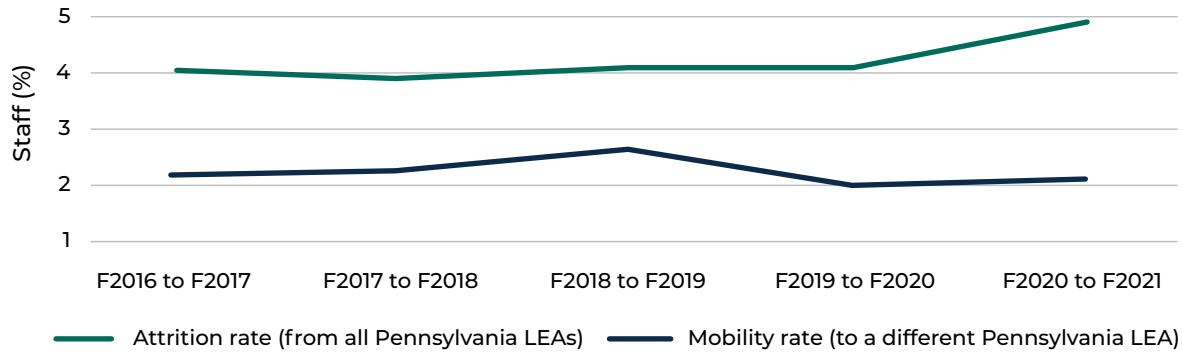
Data. Most data come from PDE's annual staffing records that cover all staff in Pennsylvania LEAs. Data on school type and urbanicity are from the U.S. Department of Education's Common Core of Data. Instructional mode data for elementary school teachers are from survey responses by more than 150 LEAs that enrolled about half of all students statewide (Lipscomb, Crigler, and Chaplin 2021). We used weights designed to represent all elementary school teachers across Pennsylvania LEAs in analyses involving the instructional mode data.

Sample. The findings cover all permanent staff in the six job types listed above in Pennsylvania LEAs. After calculating each staff person's attrition outcome for each year of the data and restricting to traditional school districts and charter schools, we excluded (1) subcontracted, temporary, and substitute employees and (2) staff working in other jobs beyond the six types we examine. After excluding these staff, our sample for 2020–2021 included about 130,000 staff (94 percent of the 138,000 total staff in Pennsylvania LEAs that year). Sample sizes for other years were similar. ◢

Findings about staff attrition trends

/ **Five percent of staff working in Pennsylvania LEAs in fall 2020 left the statewide public school sector by fall 2021, an increase from 4 percent annually since at least fall 2016.** The staff attrition rate from Pennsylvania LEAs was stable through the initial part of the pandemic before ticking upward to 5 percent from fall 2020 to fall 2021 (Exhibit 3). Attrition from Pennsylvania LEAs was consistently more common than mobility to jobs in different Pennsylvania LEAs. The staff mobility rate to different Pennsylvania LEAs was about 2 percent from fall 2020 to fall 2021, having dipped slightly at the start of the pandemic amid an uncertain job market.

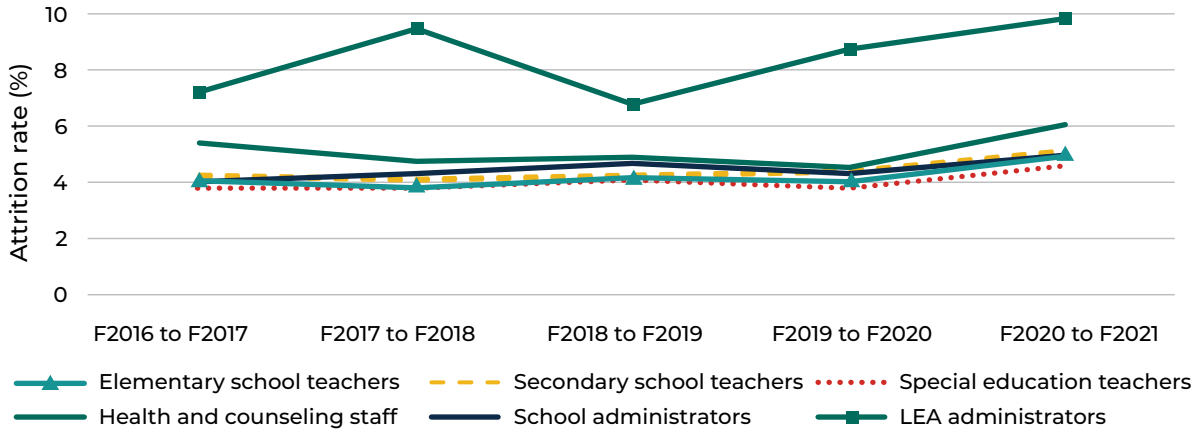
Exhibit 3. Trends in staff attrition from Pennsylvania LEAs and mobility to other Pennsylvania LEAs from fall 2016 to fall 2021



Source: Study team analyses of data from PDE.

Notes: F2016 to F2017 represents the attrition rate or the mobility rate from October 2016 to October 2017. The sample included Pennsylvania LEA staff with jobs in the six job types examined in this brief. The sample sizes ranged from about 126,000 to 130,000 staff per year.

Exhibit 4. Trends in staff attrition from Pennsylvania LEAs from fall 2016 to fall 2021, by job type



Source: Study team analyses of data from PDE.

Notes: F2016 to F2017 represents the attrition rate from October 2016 to October 2017. The sample sizes ranged from about 126,000 to 130,000 total staff each year. For 2020–2021, the sample included about 53,000 elementary teachers, 50,000 secondary teachers, 17,000 special education teachers, 8,700 health and counseling staff, 4,800 school administrators, and 850 LEA administrators. Some staff held multiple roles.

- **Staff attrition increased from fall 2020 to fall 2021 across job types.** For all six job types, the attrition rate increased from fall 2020 to fall 2021 and was at least as large as in any of the previous four years (Exhibit 4). Attrition trends for elementary teachers, secondary teachers, special education teachers, and school administrators closely resembled the trends for staff overall from Exhibit 3.[11] Attrition rates for health and counseling staff and LEA administrators were larger and more varied.

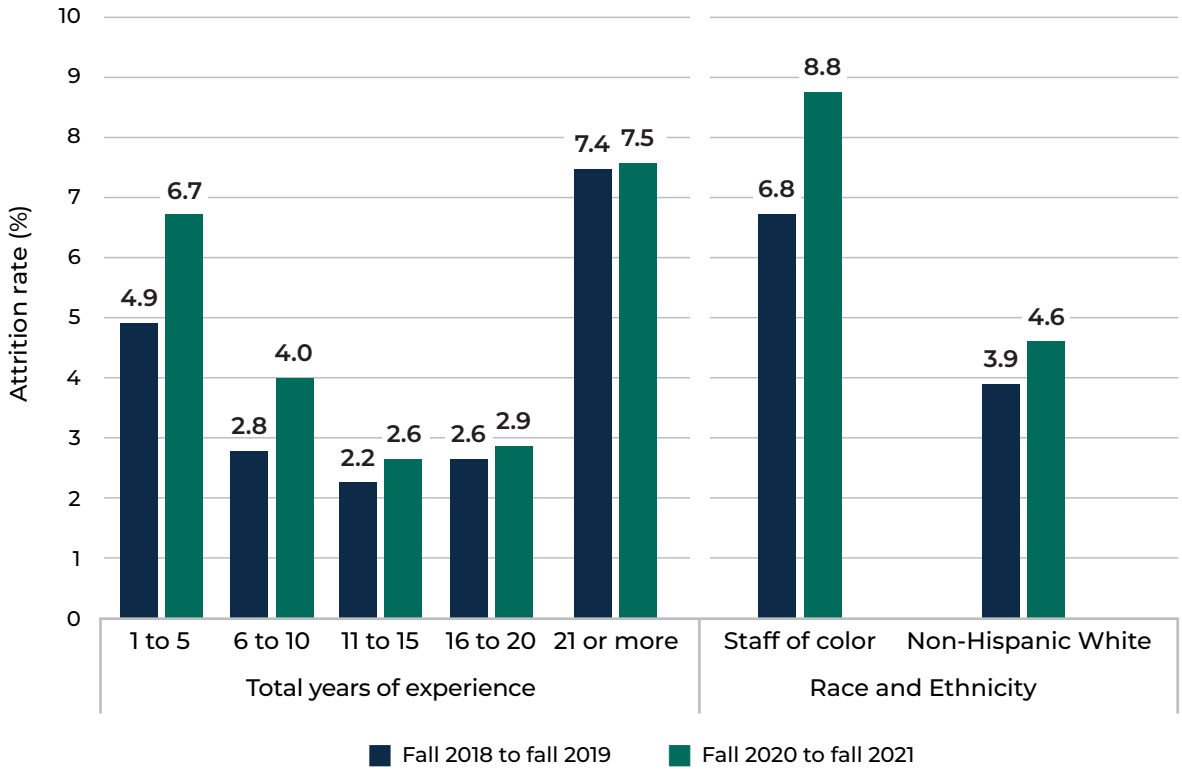
Findings about how increases in attrition during the pandemic varied by staff, school, and LEA characteristics

In this section, we examine how attrition rates from fall 2018 to fall 2019 changed after the first full year of the pandemic, from fall 2020 to fall 2021.

- **Increases in attrition for early career staff and staff of color during the pandemic exacerbated already higher attrition rates relative to most other staff.** Both before and during the pandemic, overall staff attrition rates were higher for early career staff than for all but the most veteran staff, who may be closest to retirement (Exhibit 5). During the pandemic, the attrition rate for staff with one to five years of total experience grew from 4.9 percent to 6.7 percent and, for staff with six to 10 years of experience, it grew from 2.8 percent to 4.0 percent. In contrast, attrition rates for more experienced staff grew little.

Before the pandemic, the attrition rate for staff of color was higher than for non-Hispanic White staff (6.8 percent versus 3.9 percent from fall 2018 to fall 2019). During the pandemic, the difference in attrition rates within these populations widened (attrition rates were 8.8 percent for staff of color versus 4.6 percent for non-Hispanic White staff from fall 2020 to fall 2021). This is potentially troubling because staff of color are underrepresented in Pennsylvania's education workforce; they comprise only 7 percent of the staff population compared to 37 percent of the student population.[12] Additional analyses showed similar results for both Black staff (about two-thirds of all staff of color) and non-Black staff of color relative to non-Hispanic White staff. Attrition rates in each period were generally higher for Black staff than for non-Black staff of color, but their attrition increases were similar.

Exhibit 5. Fall-to-fall attrition from Pennsylvania LEAs for staff overall, by total years of experience and race and ethnicity



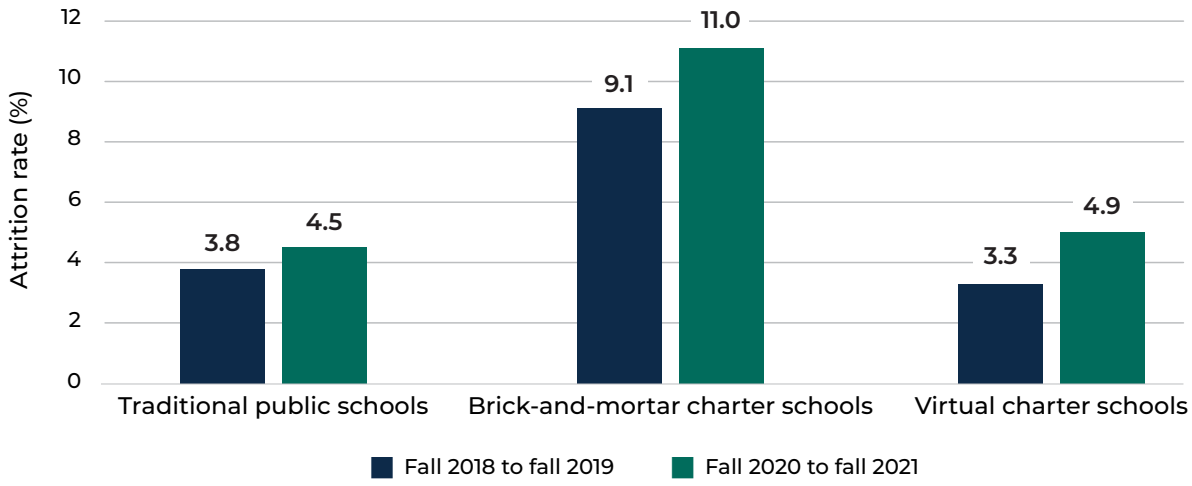
Source: Study team analyses of data from PDE.

Note: The sample included Pennsylvania LEA staff with jobs in the six job types examined in this brief. The sample sizes for the years of experience categories ranged from about 21,000 to 35,000 staff per year. The sample sizes for the race and ethnicity categories were about 9,000 for staff of color and 120,000 for non-Hispanic White staff.

/ **Charter schools generally had larger staff attrition rates than traditional public schools before the pandemic and this gap widened during the pandemic.** During the pandemic, the attrition rate at brick-and-mortar charter schools increased from 9.1 percent to 11.0 percent (Exhibit 6). In contrast, attrition in traditional public schools grew by less than 1 percentage point (from 3.8 percent to 4.5 percent).[13] Additional analyses showed that while overall attrition was generally higher in urban schools, schools with larger percentages of economically disadvantaged students, and those in LEAs with fewer than 1,000 students or more than 10,000 students, changes in attrition during the pandemic did not differ much by these characteristics.

Attrition patterns for elementary, secondary, and special education teachers were like those for staff overall. By and large, the findings for each group of teachers were like those in the two previous bullets. That is, attrition rates for early career teachers, teachers of color, and charter school teachers were higher than those for other teachers in the same job type before the pandemic and grew the most during the pandemic. We found the same general pattern of results for Black teachers and for non-Black teachers of color as we did for staff of color overall. In addition, the attrition rate for special education teachers grew more in LEAs with fewer than 1,000 students than in larger LEAs (Exhibit 7). Given the shortages of special education staff before the pandemic began,[14] small LEAs may have a particularly difficult time staffing these positions in the years ahead.

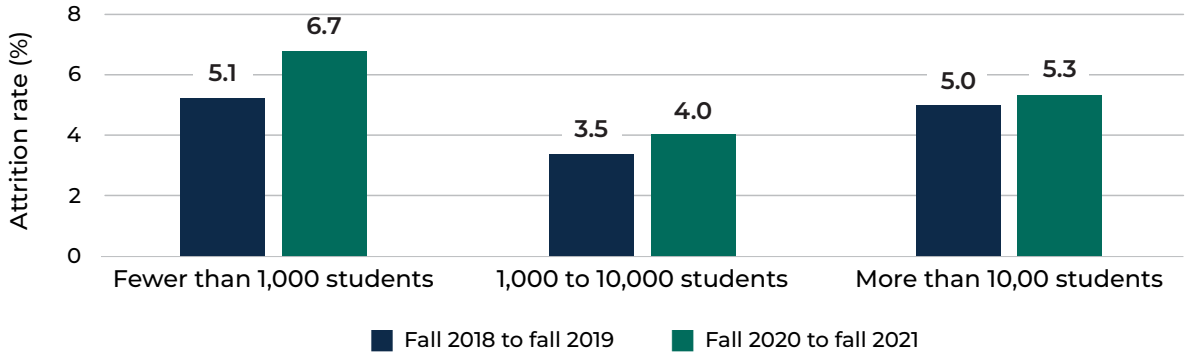
Exhibit 6. Fall-to-fall attrition from Pennsylvania LEAs for staff overall, by school type



Source: Study team analyses of data from PDE.

Note: The sample included Pennsylvania LEA staff with jobs in the six job types examined in this brief. The sample included about 117,000 traditional public school staff, 8,000 brick-and-mortar charter school staff, and 2,500 virtual charter school staff in each year.

Exhibit 7. Fall-to-fall attrition from Pennsylvania LEAs for special education teachers, by LEA size



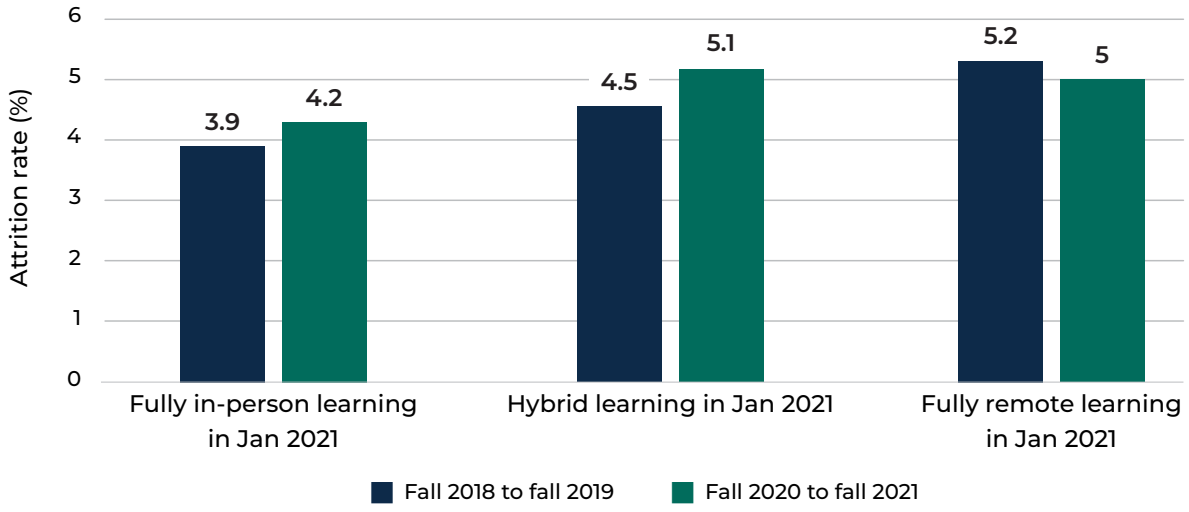
Source: Study team analyses of data from PDE.

Note: The sample included special education teachers in Pennsylvania LEAs. The sample for each year included about 1,500 teachers in LEAs with fewer than 1,000 students, 12,000 teachers in LEAs with 1,000 to 10,000 students enrolled, and 3,000 teachers in LEAs with more than 10,000 students enrolled.

- **Remote learning was not associated with increased attrition for elementary school teachers.** Fully remote learning and hybrid learning were stressful for many staff nationwide during the pandemic and might have led some staff to leave their jobs in education.[15] We examined this issue for elementary school teachers using data on each LEA's predominant instructional mode for elementary grades in January 2021. We only included elementary school teachers in this analysis because it was difficult to align instructional mode data—which differed across elementary, middle, and high school grades—to staff in other job types. During January 2021, about 45 percent of elementary school teachers were in LEAs with fully remote learning, 30 percent were in LEAs with hybrid learning, and 25 percent were in LEAs with fully in-person learning. Their attrition rates from fall 2020 to fall 2021 were higher in LEAs that used fully remote learning or hybrid learning, compared with fully in-person learning (Exhibit 8).[16] However, these same districts had higher attrition rates before the pandemic, too. The increases in attrition rates for elementary school teachers during the pandemic did not differ appreciably or in a discernable way across instructional modes.[17]

- **The share of secondary math teachers certified in a different subject grew during the pandemic, and these teachers had higher attrition rates than teachers certified in secondary math had.** Staffing shortages during the pandemic have led to concern about more teachers being asked to teach outside of their specialties, potentially resulting in increased attrition. We explored the relationship between certification and increased attrition among secondary math teachers, given PDE's interest in that subject. From school years 2018–2019 to 2020–2021, the share of secondary math teachers whose certification was in a different subject rose from 4.7 percent to 6.7 percent (Exhibit 9). We could not determine the certification status for another 8 percent of secondary math teachers during these years. This latter group likely includes uncertified teachers, including those working toward certification, teachers with emergency permits, and some whose certification may be uncoded in PDE's data due to a name change or other issues.

Exhibit 8. Fall-to-fall attrition from Pennsylvania LEAs for elementary school teachers, by instructional mode in January 2021



Source: Study team analyses of data from PDE and survey of LEAs.

Notes: The sample included elementary school teachers from Pennsylvania LEAs who responded to a survey that provided information on the LEA's predominant instructional mode for elementary grades during the first 30 days after the winter break during the 2020–2021 school year. The sample included about 6,400 teachers in LEAs that offered fully in-person learning, 7,400 teachers in LEAs that offered hybrid learning, and 11,000 teachers in LEAs that offered fully remote learning in each year. The findings are weighted to represent all elementary school teachers in the state.

Both before the pandemic and during it, attrition rates for secondary math teachers were lower for those certified to teach the subject than for those with either a different certification or unknown certification (Exhibit 10). Both groups of certified teachers experienced similar increases in attrition rates from fall 2018 to fall 2021. Attrition among secondary math teachers with unknown certification did not increase, although this group had the highest attrition rate at nearly 8 percent.

Exhibit 9. Percentages of secondary math teachers, by school year and certification status

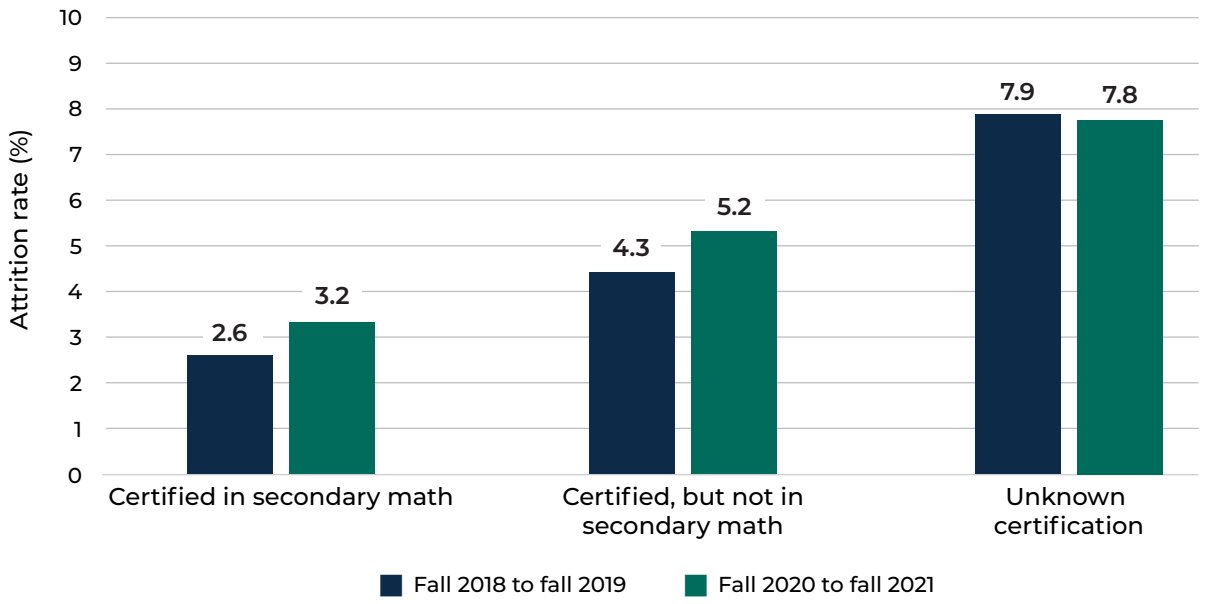
Certification	2018–2019	2019–2020	2020–2021
Certified in secondary math	87.0	86.2	85.3
Certified, but not in secondary math	4.7	5.5	6.7
Unknown certification	8.3	8.3	8.0
Total	100.0	100.0	100.0

Source: Study team analyses of data from PDE.

Note: The sample included staff who taught secondary math courses in Pennsylvania LEAs. The sample for each year included about 7,400 teachers who were certified in secondary math, 500 teachers whose certification was not in secondary math, and 700 teachers with unknown certification status.

Unknown certification indicates that teachers were not found in the certification data. This could mean that they had an emergency permit, alternative certification, or were not certified. It could also indicate a matching problem, such as a name change, or missing data.

Exhibit 10. Fall-to-fall attrition from Pennsylvania LEAs for secondary school math teachers, by certification type



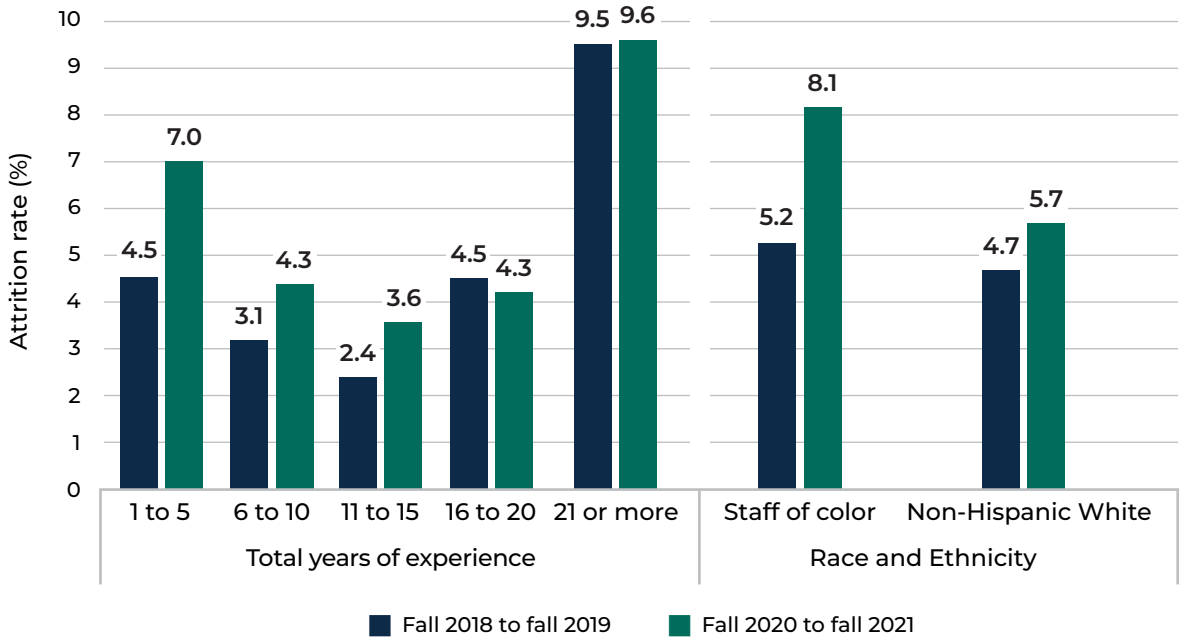
Source: Study team analyses of data from PDE.

Note: The sample included staff who taught secondary math courses in Pennsylvania LEAs. The sample for each year included about 7,400 teachers who were certified in secondary math, 500 teachers whose certification was not in secondary math, and 700 teachers with unknown certification status.

Unknown certification status means that the teacher was not found in the certification data. This could mean that they were not certified or had an emergency permit or alternative certification. It could also indicate a matching problem, such as a name change, or missing data, if some LEAs do not fill out the certification data in a timely way.

/ **Attrition changes among health and counseling staff were like those of teachers.** Attrition rates for health and counseling staff grew most during the pandemic for those with the fewest years of experience and staff of color, following the same patterns as for teachers (Exhibit 11). This increased attrition exacerbated pre-pandemic differences in attrition rates. For example, attrition rates for health and counseling staff of color grew from 5.2 percent to 8.1 percent from fall 2018 to fall 2021, while attrition rates for their non-Hispanic White counterparts grew by less, from 4.7 percent to 5.7 percent. The attrition increases for both Black and non-Black health and counseling staff of color were like those for health and counseling staff of color overall. Like other teacher attrition patterns mentioned earlier, attrition rates for health and counseling staff also grew in charter schools and small LEAs during the pandemic.

Exhibit 11. Fall-to-fall attrition from Pennsylvania LEAs for health and counseling staff, by experience and race and ethnicity



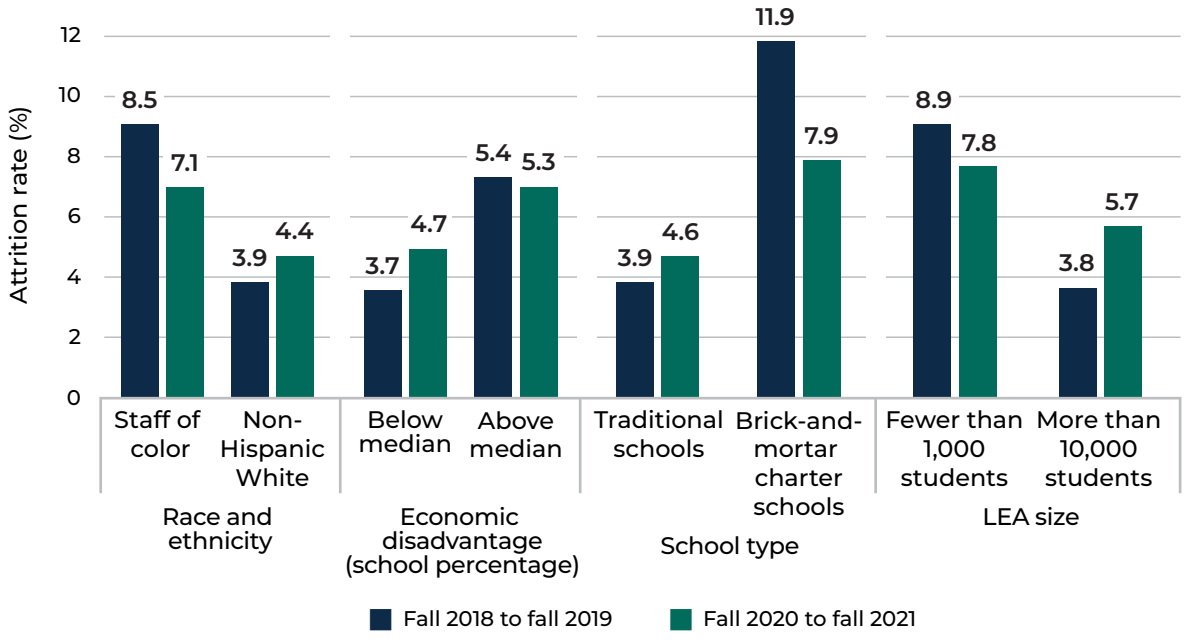
Source: Study team analyses of data from PDE.

Note: The sample included health and counseling staff in Pennsylvania LEAs. The sample sizes for the total years of experience categories ranged from about 1,500 to 2,100 staff per year and category. The sample sizes for the race and ethnicity categories were about 850 for staff of color and 7,700 for non-Hispanic White staff.

/ **Attrition rates for school administrators changed during the pandemic in ways that generally offset pre-pandemic differences.** Annual school administrator attrition rose for groups that had lower attrition rates before the pandemic and often fell for groups that had higher pre-pandemic attrition rates. Groups with lower pre-pandemic attrition rates included non-Hispanic White administrators and those in schools with lower percentages of economically disadvantaged students, traditional public schools, and larger LEAs (Exhibit 12). The results by race and ethnicity are of particular interest as PDE tries to diversify Pennsylvania's public school workforce. About 15 percent of all school administrators are people of color, compared to more than one-third of all students. Hence, the reduction in attrition rates for school administrators of color may be an indication of some success, though perhaps a small sign because the opposite pattern by race and ethnicity emerged for other types of staff. The reduction in attrition for school administrators of color was relatively steeper for those who were not Black.

Although not shown in Exhibit 12, we found similar patterns of attrition changes offsetting pre-pandemic differences by urbanicity. The attrition rate for school administrators grew by about 1 percentage point in rural schools, which had the lowest pre-pandemic attrition rates. In contrast, attrition was mostly stable in urban and suburban schools.

Exhibit 12. Fall-to-fall attrition for school administrators, by race and ethnicity, school economic disadvantage, school type, and LEA size



Source: Study team analyses of data from PDE.

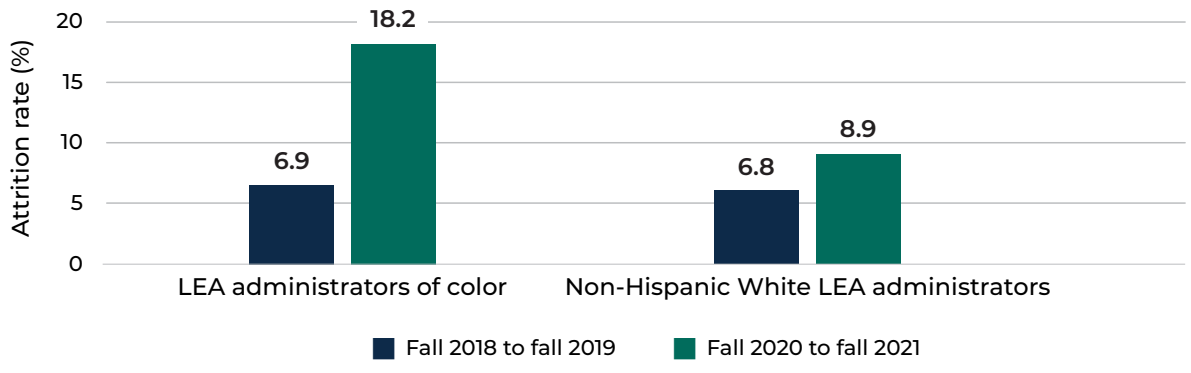
Note: The sample included school administrators in Pennsylvania LEAs. The sample sizes for each year included about 2,200 staff in schools where school-level economic disadvantage exceeded the median, and another 2,200 in schools where it did not. The sample included about 4,200 staff in traditional public schools and 400 staff in brick-and-mortar charter schools each year. The results by school type exclude about 80 staff per year in virtual charter schools where the attrition rates decreased from 4.0 to 2.5 percent. Finally, the results by size included about 500 staff per year in LEAs with fewer than 1,000 students and 1,000 staff per year in LEAs with more than 10,000 students. The results by size exclude about 3,200 staff per year in LEAs with 1,000 to 10,000 students where the attrition rates fell slightly, from 4.2 to 4.1 percent across years.

- **Attrition among LEA administrators of color was prominent during the pandemic, with a rate double that of their non-Hispanic White counterparts from fall 2020 to fall 2021.** Our analysis sample for each year included about 850 LEA administrators (chief administrative officers, superintendents, and assistant superintendents). About 10 percent of all LEA administrators are people of color, compared with more than one-third of all students. From fall 2018 to fall 2019, the 6.9 percent attrition rate for LEA administrators of color was nearly the same as for non-Hispanic White LEA administrators (Exhibit 13). By two years later, the attrition rate for LEA administrators of color rose to 18.2 percent, compared to 8.9 percent for non-Hispanic White LEA administrators. Additional analyses showed that attrition increased among both Black LEA administrators and non-Black LEA administrators of color. Thus, the pandemic appears to have exacerbated the challenge of increasing the share of LEA administrators of color in Pennsylvania.[18]
- **LEA administrator attrition increased in large LEAs, exacerbating pre-pandemic differences.** In large LEAs—those with more than 10,000 students—the attrition rate for LEA administrators nearly tripled from 7.3 percent (three out of 41 administrators) to 20.0 percent (eight out of 40 administrators) from fall 2018 to fall 2021. Pennsylvania only has 18 of these large LEAs, but they enrolled just over 20 percent of all students in the state during the 2020–2021 school year. LEA administrator attrition rates in small and medium-sized LEAs were like those in large LEAs before the pandemic and grew only 2 to 3 percentage points during it.[19]

Looking ahead

This brief begins to document staff attrition rates in Pennsylvania LEAs during the pandemic. The results suggest that staff attrition in Pennsylvania ticked upward from fall 2020 to fall 2021. It will be important for PDE and LEAs to continue monitoring staff attrition rates to know if this is the start of a new trend. In the years ahead, Pennsylvania will be focused on achieving the state's goal of strengthening and diversifying the educator workforce by 2025. Our findings about increased attrition in most job types for staff of color and early career staff suggest hurdles for achieving that goal and underscore the concerted effort needed to support and retain staff.

Exhibit 13. Fall-to-fall attrition from Pennsylvania LEAs for LEA administrators, by race and ethnicity



Source: Study team analyses of data from PDE.

Note: The sample included Pennsylvania LEA administrators. The samples across years included about 80 LEA administrators of color and 770 non-Hispanic White LEA administrators.

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Endnotes

[1] For example, see Bacher-Hicks et al. (2022) for Massachusetts, Bastian and Fuller (2022) for North Carolina, Bleiberg and Kraft (2022) for 16 states not including Pennsylvania, Camp et al. (2022) for Arkansas, Fuller (2022) for Pennsylvania, and Goldhaber and Theobald (2022) for Washington. Most of these studies also found that attrition rates rose among novice educators, but the findings were mixed on whether attrition rates rose for educators of color.

[2] Bastian and Fuller (2022).

[3] Casselman (2022) showed that monthly job resignations in the U.S. economy fell precipitously when the pandemic began before climbing in the months that followed. Growth in resignations was accompanied by even faster growth in job openings and thus occurred during a period of economic strength.

[4] The brief is part of a partnership between PDE and Mathematica to understand how the pandemic has shaped education outcomes in Pennsylvania.

[5] PDE's Pennsylvania Educator Workforce Strategy 2022-2025 aims to help schools and educator preparation programs meet anticipated educator staffing needs and build a diverse workforce (PDE 2022).

[6] Retirement was treated as attrition in these calculations.

[7] Some staff had roles in multiple job types. We included these staff once in analyses that cover all staff and in any applicable job type–level analyses.

[8] Staff with positions in the six job types examined in this brief in traditional school districts or charter schools were not treated as attrition if they accepted a new position in a job type not examined in the brief in a Pennsylvania LEA or in other education agency, including career and technical centers, intermediate units, and state juvenile correctional institutions.

[9] Staff of color include all staff who are not non-Hispanic White. This group includes staff who are American Indian/Alaska Native, Asian, Black or African American, Hispanic, Multi-racial, or Native Hawaiian or other Pacific Islander. We aggregated these race and ethnicity categories for our main results in the brief because, collectively, only 7 percent of the staff population are staff of color. We supplemented the findings for all staff of color by describing results from separate analyses for Black staff and for non-Black staff of color, since about two-thirds of all staff of color are Black.

[10] Instructional mode data were also available for middle school grades and high school grades. However, the staffing data did not always identify which secondary school teachers were teaching middle school grades versus high school grades.

[11] Fuller (2022) calculated higher attrition rates for Pennsylvania teachers. For example, the teacher attrition rate is reported to be 6 percent for the 2021–2022 school year in the Fuller study, compared with 5 percent from fall 2020 to fall 2021 in this study. Slight variation in how the two studies defined attrition may account for these differences. Importantly, both studies found that teacher attrition increased somewhat in fall 2021 and that it varied in similar ways based on staff and school characteristics.

[12] PDE (2022).

[13] Results for virtual charter schools have little impact on the overall results for charter schools because only about 8 percent of all charter schools were virtual charter schools. The attrition rate in virtual charter schools grew from 3.3 percent to 4.9 percent.

[14] Fuller (2022).

[15] Westphal et al. (2022).

[16] The findings in Exhibit 8 imply that the overall attrition rate for elementary school teachers did not increase much. Indeed, the attrition rate for elementary school teachers increased by only 0.2 percentage points from fall 2018 to fall 2021 in the approximately 150 LEAs that responded to a survey to provide instructional mode data. In comparison, in the full sample, their attrition rate increased by 0.9 percentage points during this time. The difference in results between the full sample and the survey sample may be due to random sampling error.

[17] The findings were similar based on each LEA's instructional mode during the first 30 days of school in fall 2020. Results based on each LEA's instructional mode during the last 30 days of the school year in spring 2021 suggested somewhat larger attrition increases for elementary school teachers in LEAs using fully remote learning only. LEAs using fully remote learning only in elementary grades as of spring 2021 were predominantly virtual charter schools where instruction is provided remotely.

[18] We did not examine patterns of LEA administrator attrition based on school characteristics.

[19] Staff of color are over-represented among LEA administrators in the largest LEAs, but the pattern of increasing attrition holds for staff of color regardless of LEA size. In addition, the finding that attrition is highest in the largest LEAs holds for both staff of color and non-Hispanic White staff.

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