



A New Method to Get Timely Information on Teacher Hiring Needs

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In the wake of COVID-19, policymakers face decisions about how to address teacher shortages (Bazzaz, 2021; McDole & Francis, 2022; PESB, 2021), adjust compensation to recruit and retain high quality teachers (García & Weiss, 2020, Kelly, 2022; OSPI, 2022), and adapt to declining enrollment in traditional public schools (Bateman, 2022; Cohen, 2023; Lee, et al., 2020). These policymakers, however, often lack timely information to help them tackle staffing challenges, as state staffing reports and administrative data are usually available too late to inform policy debates or decision making. Additionally, while teacher attrition in the wake of the pandemic has been reported to be problematic and at “crisis levels” in the media (Maxouris & Zdanowicz, 2022), the nuances of the teacher shortages—where they occur, in which subject areas, and for which students—are often ignored. In sum, we lack detailed and timely data about the state of the teacher labor market to provide nuanced information to inform policy decisions (Bleiberg & Kraft, 2023; Nguyen et al., 2022; Putman, 2023).

We investigate what can be inferred about the teacher labor market using a novel means of collecting statewide data: web scraping teacher job postings from public school district websites in Washington. Our recent work (Goldhaber et al., 2023) has shown that job postings are a good indicator of school and district “hiring needs” in that they closely line up with eventual teacher hires. In particular, we validated that the jobs that were posted by districts and schools generally did lead to eventual teacher hires.¹

In two prior papers using these data (Goldhaber et al., 2022, 2023), we have also shown that schools serving more students of color have greater hiring needs throughout the hiring cycle; also, hiring needs for special education and STEM positions are consistently higher than hiring needs for elementary positions. We therefore argue that web scraping provides timely information about teacher hiring needs at relatively low cost and is a promising area for new research on hiring challenges in schools.

Data Collection and Analysis

The primary data in this analysis are job postings collected via automated web scraping of 242 of the 295 school district websites in Washington. In districts that had web-based job postings, we conducted an initial pilot of web scraping postings in the fall of 2021. Following the pilot, we scraped district sites twice-weekly, usually on Mondays and Fridays, from early December 2021 through the end of December 2022. This gave us a relatively consistent picture of district hiring challenges for the entire 2022 calendar year.

We group teacher job postings into categories according to keywords found in job titles and focus only on classroom teaching positions in this analysis: special education; science, technology, and math (STEM); elementary; English-language learner; and other. The first four of these are the most common areas of subject endorsement in Washington and thus allow us to compare posting volume to staffing volume across subjects. We then aggregate posting data to the school-subject-month level to observe how the volume and duration of new postings varies within districts, across subjects, and over the course of the calendar year. We supplement job

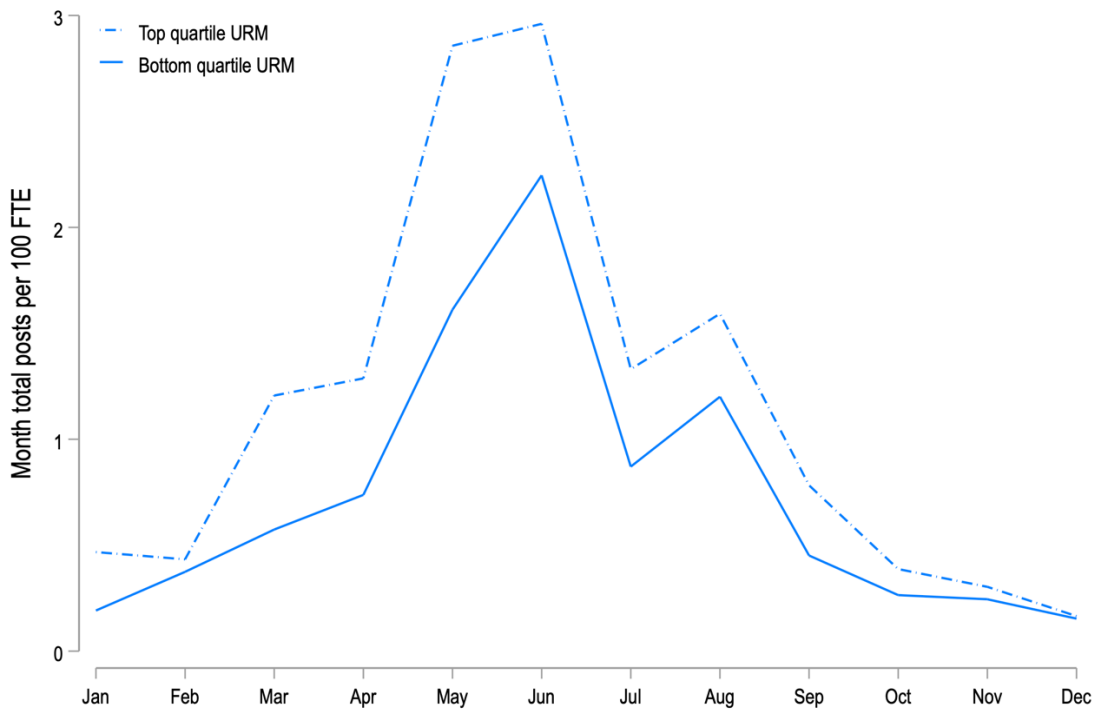
¹ More detail on the relationship between the web scraped job postings data and actual district and schooling hiring is available here: <https://caldercenter.org/publications/what-do-teacher-job-postings-tell-us-about-school-hiring-needs-and-equity>

posting data with details on districts, schools, and teachers obtained through a data sharing agreement with the Washington State Office of Superintendent of Public Instruction (OSPI).

Findings

To illustrate the variation in hiring challenges across student populations and over time, **Figure 1** groups schools into quartiles by percent URM students and describes average differences in total new posts, scaled by total teaching staff. This figure illustrates meaningful spikes in the late spring and summer months and begins to capture the inequities in hiring challenges across different school types over time; in every month, schools in the top quartile of the percent of URM students had more postings per FTE than schools in the bottom quartile. These posting gaps were the greatest in the spring months when postings signal anticipated staffing needs for the next school year.

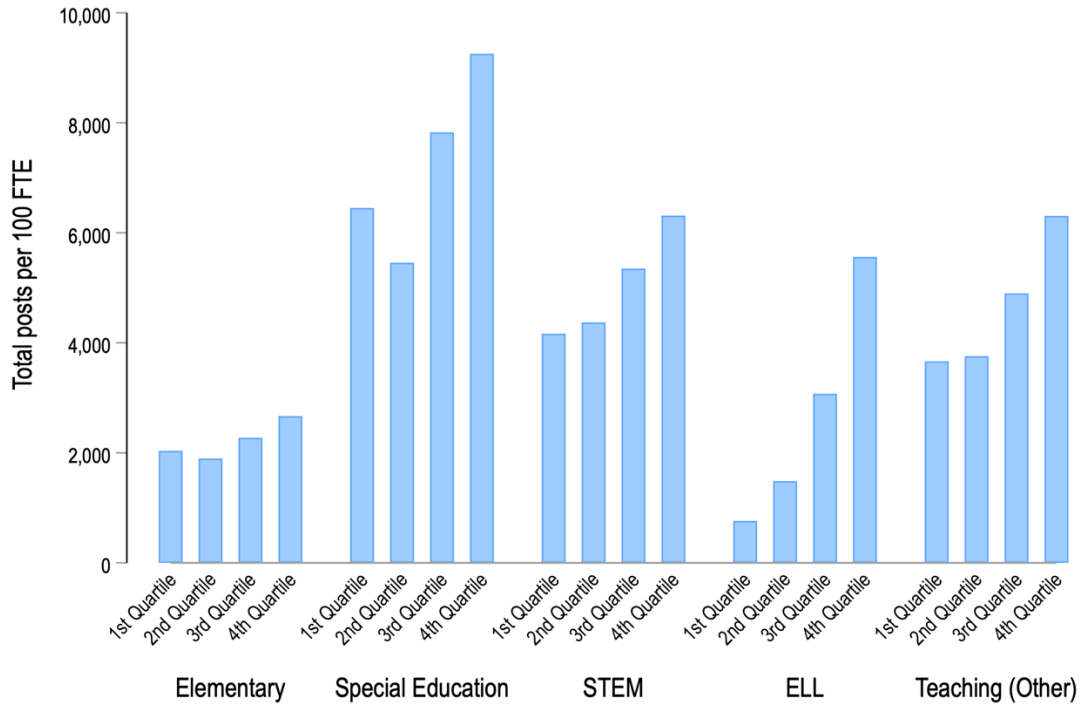
Figure 1. Month average new posts per 100 FTE by URM quartile



We further disaggregate these gaps by subject area and quartile of percent URM students in **Figure 2**. First and foremost, there are clear differences in overall posting volume (scaled here by subject staff FTE in October 2021), indicating that school hiring needs in special education and STEM subjects are far greater than hiring needs in elementary grades. We also observe striking differences in the inequity of postings within each subject area. Elementary teaching positions, for example, exhibit the smallest gaps between the highest and lowest quartile URM schools—an average of 632 posts per 100 FTE in 2022. The smaller gaps here likely reflect the fact that elementary education credentialed job candidates are relatively plentiful, making elementary positions relatively easy to fill. In contrast, the staffing challenge gaps in special education and ELL are far larger, especially in the spring months when schools in the top quartile of the percent of URM students are seeking to hire over twice as many special education

and ELL teachers per FTE than schools in the bottom quartile of the percent of URM students. Over the 2022 calendar year, the average in ELL posts between the top and bottom URM quartiles is 4799 positions per 100 FTE, or over seven times the gap for elementary positions.

Figure 2. Subject-Specific New Posts in 2022 Per 100 Subject FTE, By URM quartile



Not only do we observe differences in the number of postings, but we also observe differences in the duration that job postings stay open. **Figure 3** and **Figure 4** show the number of posts still open after 2, 4, 6, and 8 weeks, disaggregated by academic subject and school URM quartile, respectively. We see elementary posts fill more quickly than other subject areas, with about 60% of posts removed from district job boards within two weeks of their appearance. By comparison, only 30% of special education postings have been removed within a two-week span. By the eighth week of a post being online, only 11% of elementary positions are still posted compared to 25% in special education. Gaps across school URM quartiles are much smaller, although schools in the top quartile appear to have slower rates of filling over most periods. By the eighth week of posts being online, 80% of posts in the top quartile URM are filled relative to 82% in the bottom quartile URM.

Figure 3. Duration of Posts by Subject Area

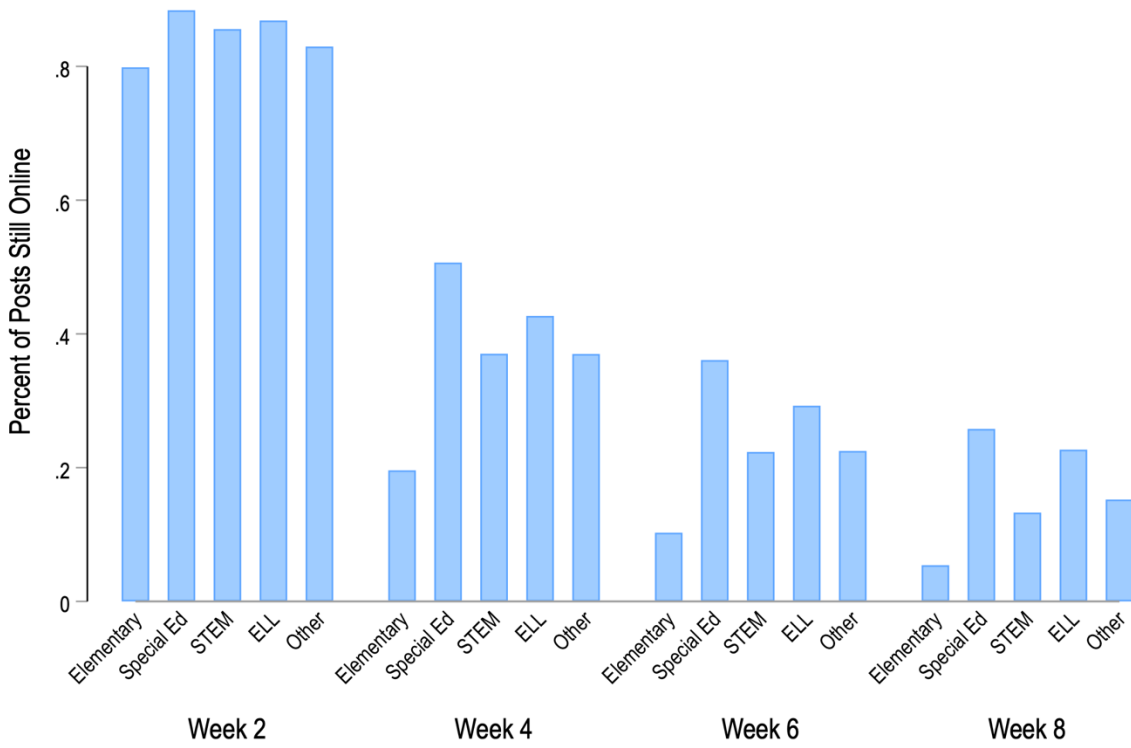
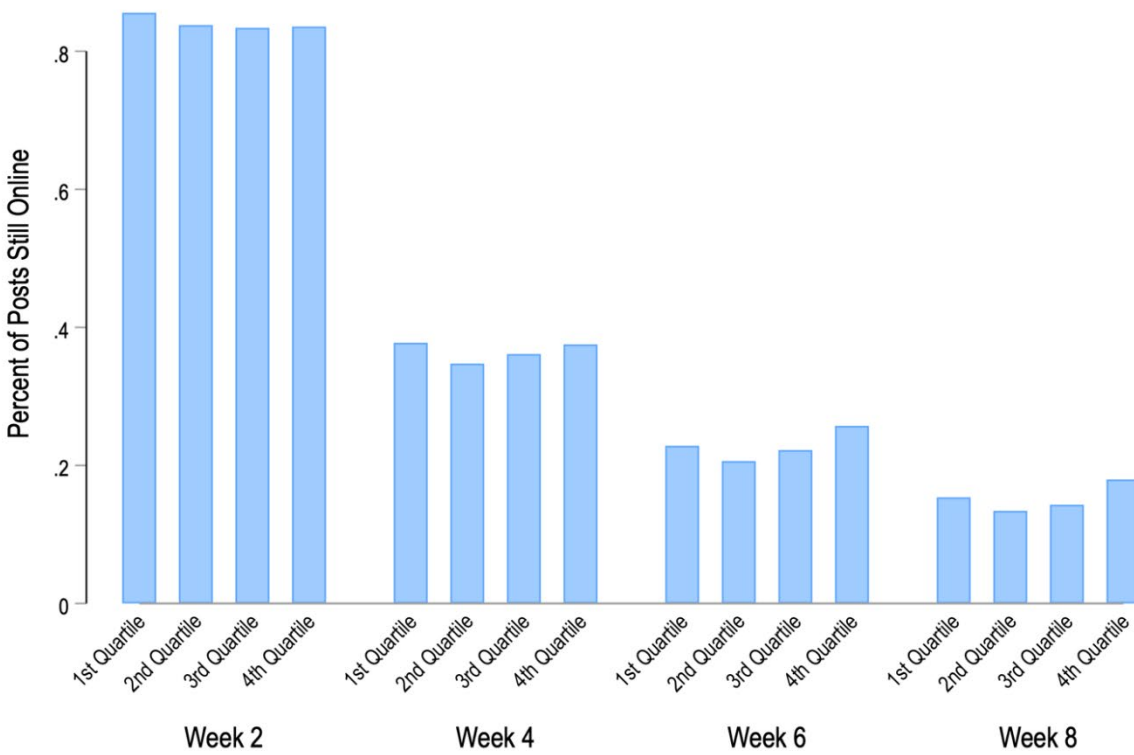


Figure 4. Duration of Posts by School URM Quartile



Conclusions

Recent accounts of staffing shortages across subjects and schools during the COVID-19 pandemic highlight the lack of detailed, up-to-date information on staffing challenges to help inform policy decisions (Bleiberg & Kraft, 2023). Administrative data often capture teacher shortages at one moment in time and are only available to policy makers months after that point in time. Other methods of collecting teacher shortage data, such as surveys of districts, have similar constraints. In contrast, the web scraping we describe in this paper happens twice each week. Because job postings are available at this frequency, they provide a clear, nuanced, and timely signal of school staffing needs.

The importance of timeliness cannot be overstated. As has been pointed out (Bleiberg & Kraft, 2023; Bruno, 2023; Putman, 2023), there are major deficiencies in the data needed to understand the scope of challenges in the teacher labor market and their equity implications. As an example, in Washington state—where we gathered our data—the legislative session runs from early January to mid-March or late April, depending on the year. In a given legislative session, policymakers in Washington state can rely on teacher staffing data collected months before on staffing shortage reports (e.g., PESB, 2021) published by state agencies every few years.² Given recent recommendations to the Washington legislature for changing teacher compensation (Kelly, 2022) and developing state-wide teacher residency programs to address staffing shortages (Gillon & Barnes, 2022), we argue that timely data on teacher staffing issues could help policymakers make more informed decisions.

This analysis also illustrates the need for nuanced approaches to teacher staffing challenges, which differ across different contexts. Decades of research show that teacher attrition is higher for schools and districts serving higher shares of underserved students (e.g., students of color and those receiving free- or reduced-price lunch). There is less evidence, however, about how these disparities translate into hiring needs. Our findings show, for the first time at the school level, that teacher postings per FTE are higher in schools serving more students of color and that job postings at these schools also tend to remain open for longer. In short, job postings data highlight inequities in teacher hiring needs that go beyond what are captured in administrative data. Given that job postings appear to be a valid signal of district and school hiring needs, this method of regular web scraping can provide states with data that are more timely than annual reports and less expensive than surveying districts. Replicating these methods in other states could provide vital information to policymakers who hope to address systemic inequities in public schools.

² These data and reports do include information that we cannot capture from job postings, such as teacher demographics, years of experience, and certification status. However, as we argue above, they leave out the nuances of staffing challenges throughout the year.

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