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ABSTRACT

School closures and testing disruptions during COVID-19 prevented many teacher candidates from completing certification milestones, prompting many states to waive or alter licensure requirements to prevent losses of new teachers for the 2020-21 school year. Michigan allowed in-state candidates to teach under temporary certificates before passing licensure exams and granted flexibility in student teaching requirements. This study examines the impact of these changes on teacher supply, diversity, retention, and effectiveness. We find that Michigan succeeded in maintaining its total supply of new teachers, but that the composition of teachers differed from past cohorts. The 2020-21 entry cohort was more diverse, but this was true for all certification types including those unaffected by policy changes. Teachers with temporary certificates had similar effectiveness ratings and retention rates as those with standard certificates. Truncated or otherwise-modified student teaching experiences may have had a more prominent effect on special education teachers than those with other specializations.

INTRODUCTION

In the years leading up to the COVID-19 pandemic, school districts across the U.S. faced growing teacher shortages and a dwindling supply of new teachers. With fewer college students interested in pursuing careers as educators (Bartanen & Kwok, 2023), teacher preparation programs experienced dramatic declines in enrollment and completion after 2008 (United States Department of Education, 2023). At the onset of the pandemic, advocates feared a mass exodus of teachers nationally would exacerbate existing shortages and longstanding disparities in low-income schools' access to high-quality teachers (Fortin & Fawcett, 2022).

These concerns resonated strongly in Michigan, a state facing widespread teacher shortages concentrated in low-income areas and a growing reliance on new graduates from teacher preparation programs (TPPs) to fill vacancies (Kilbride et al., 2025) as a large share of the teacher workforce approaches retirement (Mauriello & Higgins 2022). Most teacher candidates in their final year of training complete their last requirements for licensure in the spring, becoming eligible to start teaching the following fall. However, testing center and school building closures in the spring of 2020 prevented many candidates from completing the licensure exams and student teaching placements required for certification. Without policy intervention, this could potentially lead to a large shortfall of newly certified educators to fill the positions vacated by the usual number of teachers retiring and leaving the profession each year as well as those exiting due to health concerns related to the pandemic entering the 2020-21 school year.

Nationally, states took action to avoid a potential catastrophic shortage of teachers. Nearly all states waived or changed some of their teacher licensure requirements during the COVID-19 pandemic (DeArmond et al., 2023). While evaluation of these policies is sparse, evidence from Massachusetts and New Jersey suggests that these policies substantively changed the population of new teachers in these states, and in the case of Massachusetts, enabled the state to exceed its pre-pandemic licensure rates. New Jersey lawmakers allowed candidates who had not yet completed their licensure exams but reached other key teacher preparation milestones to teach under temporary licenses during the COVID-19 pandemic. Backes & Goldhaber (2023) investigate this policy change, finding that these temporary licenses brought a more diverse population of new teachers into the profession, who had similar performance outcomes to their colleagues with standard licenses but were less likely to remain in the profession. Bacher-Hicks et al. (2023) consider the impact of a similar emergency licensure policy in Massachusetts, finding that more teachers entered the profession in these years. Those who entered through emergency licensure were more ethnoracially diverse and had similar turnover rates to their traditionally licensed peers. The emergency licensure policies in Massachusetts and New Jersey, however, were quite broad in comparison to other states, encompassing both alternative- and traditional-route teachers and in the case of Massachusetts, lasting multiple years. Therefore, these studies may not generalize to states that adopted more conservative or shorter-term policy changes. Whether these more limited waivers were sufficient to prevent losses of newly certified teachers to fill vacancies entering the fall of 2020 and whether they changed the composition of the workforce remain open questions.

Michigan is one example of a state that took a more circumscribed approach to combating the effect of COVID-19 on its already dwindling teacher workforce. In 2019-20, Michigan's overall supply of new

prospective teachers was just beginning to rebound after facing acute declines for several years (Kilbride et al., 2024). To prevent further losses of teachers due to school building and testing center closures in the spring of 2020, Michigan temporarily granted teacher preparation programs flexibility to reduce student teaching requirements under certain circumstances and allowed program completers meeting all other certification requirements to teach under temporary certificates for up to a year before passing the required licensure exams.

Michigan's approach to licensure flexibility during the pandemic was more conservative than that of other states, many of which implemented waivers over longer periods of time or for broader ranges of prospective teachers (DeArmond et al., 2023; Slay et al., 2020). For instance, although Massachusetts' emergency licenses were initially set to expire after one year like Michigan's temporary certificate, the term length was later extended to 3 years automatically and up to 5 years under certain circumstances. Emergency licenses were available to both traditional and alternative-route candidates in Massachusetts and New Jersey, whereas Michigan only granted flexibilities to candidates from traditional-route programs.¹ Moreover, while Michigan's policies only affected candidates at the end of their preparation, New Jersey's applied to any preparation program enrollee who had completed 50 preservice hours and Massachusetts merely required the applicant to hold a bachelor's degree. Consequently, we may expect the effects of Michigan's COVID-era licensure changes to be less pronounced than those in states that adopted more expansive or longer-term changes.

Student teaching is thought to be the most crucial component of teacher preparation programs (NRC, 2010). Pandemic-related closures affected student teaching across the country in the spring of 2020, with many programs either shortening student teaching duration or switching to an online format (Choate et al, 2020). It is possible that for teacher candidates whose student teaching experiences were truncated, moved, or otherwise adapted during the pandemic may feel less prepared and consequently either less likely to enter the profession or less effective once they get there. Ronfeldt & Reininger (2012) find that the *length* of student teaching has little effect on candidate outcomes. However, this study looks at student teaching assignments that lasted for varying, predetermined lengths of time. We cannot know whether these results extend to our setting in which student teaching was abruptly and unexpectedly cut short or dramatically altered. Alternately, if the latter half of their student teaching took place online, they may be more prepared to offer remote instruction during the 2020-21 school year than their peers. As student teaching is an important connection for where a candidate is ultimately hired (Goldhaber et al., 2014; Goldhaber et al., 2021), the disturbance at the

¹ Alternative-route candidates were still required to pass state licensure exams to qualify for certification. However, the department of education allowed candidates who could not complete these exams due to testing center closures to count time spent teaching under a substitute teaching permit toward the three years of experience required to advance from an interim certificate to a standard certificate. https://www.michigan.gov/-/media/Project/Websites/mde/2020/04/22/AltRoute_InterimCerts.pdf

end of student teaching in the spring of 2020 may impact the types of teaching assignments and the locations of those assignments we see newly certified teachers in in the fall of 2020.²

The intent of licensure exams is to ensure that teachers enter the profession with the necessary content knowledge to effectively teach students, though there is mixed evidence on whether these exams achieve that goal (e.g. Goldhaber & Hansen; 2010; Larsen et al., 2020). While removing this screening mechanism may allow more teachers to enter the profession, it may allow teachers who do not have the content knowledge necessary to be successful to enter the classroom, lowering the effectiveness of this entry cohort. Further, these temporary credentials are only valid for one year. If these teachers cannot go on to pass the required exams, they may be forced to leave the profession, increasing turnover and decreasing stability for students. On the other hand, licensure exams disproportionately prevent teachers of color from entering the profession (Cowan et al., 2020; Kilbride et al., 2023; Rucinski & Goodman, 2019). By delaying this requirement for some candidates, it is possible that Michigan might see a more diverse cohort of teachers enter the profession. A large and growing body of research demonstrates that students of color benefit from having teachers of the same race (e.g. Dee 2005). If these waivers serve to diversify the supply of entering teachers, they may benefit students of color.

Taken together, it is not clear which of these relationships, documented in the literature, is likely to dominate. Our study examines the effects of these temporary measures in Michigan, asking

- 1) Did Michigan maintain, increase, and/or diversify its supply of newly certified teachers during the licensure flexibility period?
- 2) Did new teacher retention and performance outcomes change during Michigan's licensure flexibility period? Did these changes vary by certification type?

We find that the flexibilities Michigan implemented in 2019-20 allowed the state to maintain recent levels of newly certified teachers working in public schools in 2020-21. While the total supply of new teachers remained about the same size, the composition of new teachers differed from past years. Teachers who earned their initial certification during the waiver period³ were more diverse than pre-pandemic entry cohorts, though we find this to be the case for all certification types, including those unaffected by COVID-era waivers. Among the cohort who became certified in 2019-20 and entered the workforce in 2020-21, teachers with temporary certificates had similar effectiveness ratings and retention rates as those with standard certificates. Special education teachers whose student teaching experiences may have been shortened or modified were less likely than prior cohorts to remain in the profession after their first year.

² For a thorough discussion on the potential impact of pandemic era changes to student teaching on the profession see Goldhaber & Ronfeldt (2020).

³ Consistent with the literature, we use the term "waiver period" to refer to a range of temporary regulatory changes and flexibilities to licensure requirements that occurred during the COVID pandemic.

MICHIGAN CONTEXT

Certification Types and Requirements

Prospective Michigan teachers must complete several milestones before they qualify for their initial teaching certification. In addition to earning a bachelor's degree and passing the appropriate Michigan Test for Teacher Certification (MTTC) content examinations, candidates must complete an approved educator preparation program, which includes coursework and training in pedagogical and content area knowledge as well as supervised clinical teaching experiences.⁴ Although all Michigan teachers must complete these same milestones, they do not all take the same pathway or receive the same type of certification. Table 1 provides an overview of the three types of initial teaching certificates that Michigan offers for first-time licensure candidates entering the profession. The right-most column of the table describes relevant policy changes and flexibilities in meeting licensure requirements that were available to candidates for each type of teaching credential on a temporary basis during the COVID-19 pandemic.

Candidates from traditional-route teacher preparation programs typically receive a *Standard Teaching Certificate* (STC), which is valid for 5 years and can be renewed an unlimited number of times. Teacher candidates who enter the profession through this pathway receive their training as part of an undergraduate or post-baccalaureate degree program at a postsecondary institution that the state has approved as an educator preparation provider. Traditional-route teacher preparation programs offer or facilitate all of the coursework and other required training that candidates receive, including a student teaching placement lasting at least 12 weeks or 300 hours. To ensure that teacher candidates completing their programs in 2019-20 could fulfil the student teaching requirement amidst the COVID-related school building closures that spring, the Michigan Department of Education granted educator preparation providers flexibility to modify and/or shorten student teaching placements for candidates who have demonstrated competence.

Alternative-route teacher candidates earn an *Interim Teaching Certificate* (ITC) as their initial credential. This pathway allows candidates who already hold bachelor's degrees and have passed the appropriate MTTC exams to work full-time as teachers of record during their teacher preparation training. ITCs are valid for up to 5 years (as long as the certificate-holder remains enrolled in an alternative-route preparation program) and cannot be renewed. To progress from an interim to a standard certificate, candidates must complete the remainder of their teacher preparation training and teach full-time for at least 3 years during this 5-year term. Michigan's alternative-route option is limited to certain teaching specializations. It has not historically been available as a licensure pathway for early childhood, career and technical education, or special education teachers. Effective July 2021, Michigan legislators amended state law to temporarily (initially until July 2024 — but was later extended to July

⁴ <https://www.michigan.gov/mde/services/ed-serv/ed-cert/cert-guidance/becoming-a-teacher>

2027) expand this pathway to include some types of special education teaching credentials.⁵ Although the amendment went into effect during the pandemic, it was the result of longer-term efforts to address persistent special education teacher shortages that pre-date COVID-19.

Michigan also offers a *Temporary Teaching Certificate* (TTC) for candidates who completed an out-of-state preparation program and are certified to teach in another state but have not yet passed the necessary MTTC exams to qualify for a standard certificate. This option allows certified educators from other states to teach in Michigan for up to 1 year while they complete Michigan-specific licensure testing requirements. Temporary certificate-holders must pass the appropriate MTTC exams and progress to a standard certificate within this 1-year term in order to remain certified; the TTC cannot be renewed.⁶ Following the onset of the pandemic, Michigan's state governor issued an emergency executive order authorizing the Michigan Department of Education to temporarily expand the TTC eligibility criteria to include candidates from in-state preparation programs and non-certified out-of-state candidates who could not complete the necessary MTTC exams to qualify for a standard certificate due to testing center closures.

DATA AND METHODS

Our analyses use administrative data from Michigan's statewide educator credentialing and K-12 school personnel data systems. These data include teacher demographic characteristics, licensure information, and employment records. We use this information to identify teachers' initial entry into a public school teaching position after certification, focusing on the 93% of newly-certified teachers whose job assignments are in a single school building. We then link our teacher-level data to information about the schools and districts where they work (e.g., urbanicity, sector) and the populations of students they serve (e.g., demographic composition).

We limit our analytic sample to first-year teachers who earned one of three types of initial teaching licenses—a Standard Teaching Certificate, Temporary Teaching Certificate, or Interim Teaching Certificate—and began a teaching position at a traditional public or charter school in Michigan within one year of certification. Our sample includes nine different "entry cohorts," which we define based on their first school year of teaching employment after certification (2015-16 through 2023-24). We further divide these cohorts into "pre-COVID," "waiver," and "post-waiver" periods, allowing us to compare trends before, during, and after Michigan's temporary licensure flexibilities were in place. The "waiver" group refers to the 2020-21 entry cohort, as these teachers completed their training in 2019-20. We retain data from the first two school years after each teacher's entry into the workforce,

⁵ The amendment allowed alternative-route candidates to pursue endorsements for teaching students with cognitive impairment, emotional impairment, learning disabilities, and physical or other health impairments. Endorsements for teaching students with deafness or hearing impairments, visual impairments, and Autism Spectrum Disorder remain unavailable through this pathway. This change was initially set to expire in July 2024 (3 years after its effective date) and was subsequently extended another 3 years to July 2027.

⁶ Some TTC-holders may progress to more advanced teaching credentials (i.e., Michigan's *Professional Teaching Certificate*, rather than an STC), depending on their out-of-state teaching experience and prior coursework.

allowing us to examine their performance in the first year and determine whether they return to teach for a second year.

To assess whether and how the supply and diversity of newly certified teachers in Michigan changed during and after the licensure flexibility period, we examine descriptive trends in both the number of first-year teachers and their demographic characteristics. Noting that the supply of special education teachers is of particular concern in Michigan (Kilbride et al., 2025) and a focal point of policy changes and recruitment incentives during the post-waiver period, we separately examine descriptive trends in the number of newly certified special education teachers. For initial certificates, we follow the same restrictions as discussed above. For additional endorsements, we count a teacher's first employment after expanding their special education endorsements, again restricting to employment within one year. In years after Michigan's temporary policy allowing alternative-route programs to offer special education endorsements went into effect, we also examine the subset of each of these teacher counts that earned their special education credential on an interim certificate.

We then examine changes in first-year teachers' employment outcomes during and after the waiver period. We consider three outcomes of interest: returning to the same school the following year, returning to teach anywhere within Michigan's public school system the following year, and receiving a "highly effective" evaluation rating at the end of their first year. We compare levels and changes in each outcome across teachers with different certificate types to examine whether groups of teachers that were affected in different ways by Michigan's COVID-era licensure flexibility experienced differential changes in retention and effectiveness. We estimate a series of linear regression models of the following form:

$$Y_{it} = \beta_0 + \beta_1 \mathbf{Entry} + \beta_2 \mathbf{CertificateType}_{it} + \beta_3 \mathbf{CertificateType} * \mathbf{Entry}_{it} + \varepsilon \quad (1)$$

where Y_{it} represents one of three binary performance outcomes for teacher i and year t : returning to teach in the same school in year $t+1$, returning to teach in any Michigan public school in year $t+1$, or receiving a "highly effective" evaluation rating in year t .⁷ \mathbf{Entry} is a vector of indicators for the time period during which a teacher entered the workforce: the waiver year, 1st post-waiver year, or 2nd post-waiver year, omitting the pre-waiver period as the reference group. $\mathbf{CertificateType}$ is a vector of binary indicators describing the type of initial teaching certificate a teacher holds (temporary or interim, with standard certificates as the reference group). $\mathbf{CertificateType} * \mathbf{Entry}$ is a vector of interaction terms between each certificate type and entry period.

We expand on the base model in Equation (1) by first adding a vector of teacher demographics (race/ethnicity and gender) and then a vector of school fixed effects. We then estimate the probabilities of each outcome variable for each certification type and time period based on the coefficient estimates

⁷ We identify "highly effective" teachers based on the evaluation ratings their districts reported to the state to fulfill requirements in Section 1249 of Michigan's Revised School Code. Under state law, districts must adopt a "rigorous, transparent, and fair performance evaluation system" and assign teachers an "effectiveness" rating that takes into account student growth and assessment data. The possible rating categories during the timeframe of our study were as follows: highly effective, effective, minimally effective, and ineffective. <http://legislature.mi.gov/doc.aspx?mcl-380-1249>

from these models. Each estimated probability is a linear combination of the model intercept and coefficients for the appropriate *Entry* and *CertificateType* indicators and the corresponding *CertificateType * Entry* interaction term. For instance, β_0 in Equation (1) represents the model-predicted probability for teachers with STCs in the pre-COVID period. We derive predicted probabilities for teachers with STCs during other entry periods by taking the sum of β_0 and the estimated coefficient from β_1 for the specific entry period of interest. For teachers with TTCs and ITCs, we also add the estimated coefficient from β_2 for the certificate type of interest, and for estimates in waiver or post-waiver years, the coefficient from β_3 for the interaction between the entry period and certificate type of interest.

We further explore differential patterns by examining heterogeneity by teaching assignment, noting that turnover rates vary across subject areas and tend to be particularly high for special education positions (Cowan et al., 2016). Moreover, working conditions during the height of the pandemic may have varied by specialization area (Bacher-Hicks et al., 2023). For instance, some school districts resumed in-person instruction for elementary students first, with secondary-level instruction continuing in a remote or hybrid format further into the year. We estimated the same series of models on separate subsamples of teachers with a particular type of teaching assignment: elementary self-contained classrooms, secondary-level core subject courses, and special education. We define these subsamples based on the area of a teacher's assignment, which may not always be the same as their certification area. For example, if a teacher certified in elementary education teaches in a special education role, we include that teacher in our special education subsample and exclude them from our elementary subsample. These categories are not mutually exclusive. If a teacher's job assignment includes both general elementary and special education roles, we include them in both subsamples.

RESULTS

Licensure Trends

We first examine year-to-year changes in the number of first-year teachers across entry cohorts and certificate types. The first column of Table 2 shows that STCs comprise the vast majority of first-year teachers every year. While there is a notable decrease in the number of teachers with STCs in the waiver period, the second column shows a comparably sized increase in teachers with TTCs that year. While this pattern could simply suggest that a group of teachers who would have received STCs in a typical year instead received TTCs, later in this section we present evidence that the loss of potential teachers with STCs and influx of new teachers with TTCs are driven by somewhat different populations of teachers. From the third column of Table 2, it is clear that the number of interim-certified teachers has grown rapidly each year since 2016-17. The number of new teachers with ITCs during the waiver period is consistent with the pre-COVID trend, as expected given that none of Michigan's temporary licensure changes applied to ITCs.

The combined total count of newly certified first-year teachers, shown in the fourth column of Table 2, increased for three consecutive years leading up to the pandemic after reaching a low point of 1,547 in 2016-17. This growth was starkest for the 2018-19 entry cohort and began to level off in 2019-20. The waiver-affected cohort entering the workforce in 2020-21 was roughly the same size as the 2019-

20 cohort, with 2,027 newly certified first-year teachers compared to 2,045 the year before. This suggests that the licensure flexibility period in Michigan allowed the state to maintain its supply of newly certified teachers for the 2020-21 school year.

Table 3 displays summary statistics for this same population of teachers by certificate type, grouping together entry cohorts within the pre-COVID, waiver, and post-waiver periods. Prior to the pandemic, newly certified first-year teachers with standard certificates tended to come from less diverse demographic backgrounds and teach in schools with more advantaged and less diverse student populations than those with temporary or interim certificates. For instance, 90% of new teachers with STCs during this period were White, compared to 86% of those with TTCs and 74% of those with ITCs. Sixty-one percent of new teachers with STCs worked in schools serving mostly students who are economically disadvantaged, compared to 67% of those with TTCs and 85% of those with ITCs. At the same time, teachers with STCs were the most likely to return to their schools or to the profession in general after their first year. Teachers with TTCs had the lowest retention rates, possibly reflecting the fact that these teachers held certifications in other states and may have therefore had more competing employment opportunities or been less committed to living in Michigan long-term. Teachers with TTCs were far more likely than those with STCs or ITCs to receive “highly effective” evaluation ratings, possibly because some may have prior teaching experience from outside of Michigan.⁸

Several of these patterns shifted during the waiver period. Notably, the waiver-affected entry cohorts were more racially diverse than earlier cohorts. As Panel A of Table 3 shows, the 2020-21 entry cohort had higher percentages of Black teachers and lower percentages of White teachers than earlier cohorts. This is true for all certificate types, both those affected by licensure flexibility policies (STCs and TTCs) and those not affected (ITCs). Thus, these patterns cannot fully be explained by the waivers. It may be that the increase in diversity was driven less by changes in the population of teachers who became certified during the waiver period and more so by changes in the population who chose to enter the profession during the height of the pandemic. The share of Michigan’s workforce comprised by first-year teachers decreased by about one percentage point in 2020-21 then increased by two percentage points in 2021-22, suggesting that some newly certified teachers waited to enter the profession until the following year (Kilbride et al., 2024). Teachers of color may have been less likely to delay their entry into the workforce, leading to the increase in diversity we see among first year teachers in 2020-21. As Figure 1 shows, these changes were temporary, reverting to pre-COVID trends after the waiver year. The composition of teachers with STCs and TTCs in the post-waiver period closely resembles that of the pre-waiver period. Post-waiver cohorts of interim-certified teachers are less diverse than the average across pre-COVID years in Panel A of Table 3, but as Figure 1 shows, compositionally similar to the last pre-COVID cohort. This pattern reflects the rapid expansion of alternative-route programs in less diverse areas of the state throughout the pre-COVID period (Rogers & Kilbride, 2024).

⁸ Michigan’s employment data only captures teaching experience within the state’s public school system; we therefore cannot determine whether or for how long a candidate taught in other states.

Prior to the pandemic, teachers with TTCs and ITCs tended to teach in schools serving more students of color and more students from economically disadvantaged backgrounds than those with STCs. As Panel B of Table 3 shows, these differences became smaller during the waiver period. With many in-state candidates unable to receive STCs and eligible for the first time for TTCs, the populations of teachers with each of these types of certificates were more alike during the waiver period than before or after. In the pre-waiver period, teachers with ITCs were disproportionately concentrated in urban areas and tended to work in schools serving more diverse student populations. This continually changed throughout the waiver and post-waiver periods alongside the expansion of alternative-route programs into rural areas of the state.

Panel C shows that, before adjusting for changes in demographics and employment locations, we can observe some descriptive changes in employment outcomes for first-year teachers during the waiver period. For instance, the likelihood of returning to the same school decreased for teachers with STCs during the waiver period, remained about the same for those with TTCs, and increased for those with ITCs. The likelihood of returning to the profession remained about the same for teachers with STCs and increased for those with TTCs and ITCs. The likelihood of receiving a “highly effective” evaluation rating increased for teachers with STCs and ITCs and decreased slightly for those with TTCs, closing the gap that existed between these groups in the pre-COVID period such that all three had roughly equal incidence of “highly effective” ratings. In the post-waiver period, school retention rates increased for all three certification types, while retention in the profession remained about the same. The pre-COVID gap in “highly effective” ratings reemerged, with TTCs once again associated with the highest effectiveness ratings.

The supply of special education teachers is of particular concern as one of the state’s most persistent and widespread shortage areas (Kilbride et al., 2025). Table 4 displays counts of first-year teachers with one or more special education endorsement on their initial teaching certificate, teachers who have added their first special education endorsement to an existing certificate, and teachers who have added *another* special education endorsement in the columns from left to right. Examining the initial certificate column, it is evident that slightly fewer first-year teachers with special education credentials entered the profession during the first year of the pandemic than in preceding years.

However, the second and third columns of Table 4 show that teachers completing their initial certification only account for about 60% of those earning new special education credentials. The remaining 40% are teachers adding special education credentials to an existing certificate. The large numbers of already-certified teachers earning or expanding on their special education credentials suggest that school districts often recruit from within their existing teaching staff to fill special education vacancies. Michigan has a special education teacher tuition reimbursement program, that funds the preparation necessary to add a special education endorsement to an existing certificate.⁹ This program launched in May of 2021 and may have helped contribute to the popularity of this option in the later years of the panel. During the waiver period, the number of teachers adding their first

⁹ For more details: <https://www.michigan.gov/mde/services/special-education/funding/idea-grant-initiatives/se-teacher-tuition-grant>

special education endorsement to an existing certificate increased while the number adding a subsequent special education endorsement stayed about the same.

Beginning in 2021-22 when the state first began allowing alternative-route programs to offer special education endorsements, we show counts of teachers earning these credentials on ITCs in parentheses alongside the total counts in each column of Table 4. Nearly all of the interim-certified teachers with special education endorsements were already certified in an area other than special education adding their first-ever special education endorsement through an alternative-route program. The first teacher to work under a special education ITC did so during the 2021-22 school year, with another 20 following suit in 2022-23, growing to 49 in 2023-24. This delayed uptake likely reflects the significant amount of time necessary for alternative-route providers to develop special education programs and recruit candidates, and for those candidates to complete the requirements for an interim certification and begin teaching jobs. This process may have taken slightly less time for teachers already holding a standard certification than those who have not taken any prior education coursework or licensure exams. We may start to see increases in special education teachers earning ITCs as an initial certification in future years when this group of candidates has had enough time to complete their certification requirements.

Employment Outcomes

With these descriptive trends in mind, we turn to our second research question and present the main results of our analysis in Tables 5 through 8. Table 5 provides the estimated coefficients from a series of three nested linear regression models for each of the three employment outcomes. To illustrate how the main effects and their interactions translate into differences across groups and time periods, Tables 6 through 8 display model-predicted probabilities of a given outcome variable (retention in school, retention in profession, and receipt of a highly effective rating in Tables 6, 7, and 8, respectively) for each certification type and entry period, both for the full sample and for subsamples with a particular type of teaching assignment (special education, elementary, or secondary core subjects).

Results from the nested models in Table 6 reveal a few notable descriptive differences that diminish after accounting for differences between schools. For instance, estimates for the “ITC” coefficients indicate that, in the pre-COVID period, interim-certified teachers were less likely to return to their school or to the profession after their first year of teaching. These differences persist after controlling for teacher demographic characteristics but lose significance when we include a school fixed effect. This suggests that the baseline differences in retention between teachers with ITCs and STCs can be explained by differences in the schools in which these teachers work. Similarly, teachers with TTCs were less likely at baseline than those with STCs to return to their schools or the profession and more likely to receive “highly effective” evaluation ratings. These differences become smaller once we account for the school in which a teacher works, though they remain statistically significant.

We find similar patterns in some of our waiver year estimates. For instance, columns (1) and (2) show significant increases in the probability of returning to the same school for teachers with ITCs during the waiver year, even though none of Michigan’s COVID-era waivers affected interim certificates. Column (3) shows that, after accounting for school-level differences, the effect becomes smaller and

only marginally significant ($p < 0.1$). Given the differences between our estimates with and without school fixed effects, as well as the descriptive differences in school types across certification types and over time that we observed in Table 3, we use the full model (with both teacher-level covariates and school fixed effects) for the remainder of our analyses.

Table 6 shows model-predicted probabilities of returning to the same school, which we calculated as linear combinations of the coefficients from Column (3) of Table 6, as well as estimates from equivalent models using subsamples of teachers working in a special education, elementary, or secondary core subject assignment (full regression tables for these subsample models are available in Appendix Table A2). The significance symbols in this table, as well as those in Tables 7-8, indicate significant differences between a waiver-year or post-waiver probability and the pre-COVID probability for teachers with the same type of certification (by definition, none of the pre-COVID probabilities are denoted as statistically significant).

Column (1) of Table 6 shows that, among the full sample of first-year teachers, the predicted probability of returning to the same school for a teacher with an STC was significantly lower in the waiver year (70%) than in the pre-COVID period (76%). This decrease persisted into the first post-waiver year, suggesting that the licensure flexibility period alone cannot explain the change. Columns (2) through (4) show similar patterns among STC-holders in the special education and elementary subsamples, but not for those teaching core subjects at the secondary level. The probability of returning to the same school decreased slightly for teachers with TTCs and increased slightly for those with ITCs, though neither of these changes persisted beyond the waiver period or appears consistently across subject-specific subsamples.

Table 7 shows comparable estimates for retention in the profession. Column (1) shows no significant change in the probability of returning to the profession for teachers with STCs in the waiver period. However, the corresponding estimate in column (2) shows a significant decrease in retention among standard-certified special education teachers that year. This could suggest that the flexibility in student teaching requirements for the waiver-affected cohort hindered special education teachers' preparedness for the profession. Temporary and Interim certified teachers, however, were both more likely to remain in the profession in the waiver affected year than pre-pandemic. Neither group is subsequently more likely to remain in the profession in post-waiver years. These teachers follow the same pattern as the broader teacher workforce in Michigan which saw below trend rates of attrition from the profession in 2020-21 (Hopkins et al., 2024). This could be due to greater stress in the workplace as well as more demanding working conditions. Thus, we are unable to separate the effect of licensure waivers from the effect of teachers' working conditions in 2020-21 on teacher retention outcomes.

In addition to retention outcomes, we also consider changes in teacher effectiveness ratings during and after the waiver period. Table 8 presents estimated probabilities of receiving a "highly effective" evaluation rating for first-year teachers with each type of initial certification in each entry period. Temporary-certified teachers were less likely to receive high effectiveness ratings during the waiver period, relative to first-year teachers with the same type of certification prior to the pandemic, while teachers with standard certificates were more likely to receive this rating. This pattern may in part reflect changes in the population of teachers receiving each type of certification. For instance, at least a subset of the in-state candidates who received TTCs during the waiver period would have qualified

for STCs in a typical year. In Table 3, we showed that teachers with TTCs were more likely than those with STCs to receive high effectiveness ratings during pre-waiver years. This may be because, historically, most teachers earning an initial STC were first-time teachers while many of those earning TTCs had prior experience teaching in another state. In the waiver year, TTC-holders included a combination of first-time teachers from in-state programs and out-of-state teachers (some with and some without prior experience). We would therefore expect the average effectiveness among this combined group to fall between the average effectiveness levels of the two individual groups.

The increase in effectiveness ratings for teachers with STCs during the waiver year likely also reflects changes in the population. The teachers from in-state traditional-route programs who earned TTCs rather than STCs may include a disproportionate share of teachers who did not pass one or more MTTC exams on their initial attempt and were planning to retake these assessments in the spring. This would mean that teachers with lower performance shifted out of the population of STCs that year and into the population of TTCs, resulting in average effectiveness ratings to increase among teachers with STCs and decrease for those with TTCs. Our heterogeneity analyses show a similar increase in effectiveness for secondary core subject teachers with STCs but no corresponding decrease for those with TTCs. We see the reverse of this for elementary teachers, with a decrease in effectiveness among those with TTCs but no corresponding increase for those with STCs. These patterns further suggest that the group of teachers moving into the TTC population is different from the group moving out of the STC population, rather than one group of people simply shifting from one category to the other.

DISCUSSION & CONCLUSION

Michigan's COVID-era licensure waivers affected fewer candidates and were shorter in duration than those in many other states but were still successful in preventing losses of teachers. This relatively conservative approach to licensure flexibility allowed policymakers to balance the need to maintain the supply of teachers with ensuring that robust standards for teacher training remained in place. Although the teacher licensure policies we examine in this study were temporary responses to unprecedented circumstances, their effects can also provide insight about how licensure requirements shape the workforce more generally.

Our results show that Michigan succeeded in maintaining a comparable supply of newly certified teachers for the 2020-21 school year as they had the year before. However, the composition of new teachers entering the workforce while the state's emergency licensure flexibilities were in place differed from the composition of both pre-COVID and post-waiver cohorts of first-year teachers. Entry rates varied across teaching specializations, and a lower-than-typical supply of newly certified special education teachers exacerbated ongoing shortages. Consistent with studies of similar policies in Massachusetts and New Jersey, as well as the broader body of literature on barriers to licensure, the 2020-21 entry was more diverse than past cohorts. However, we find this to be the case across all certification types, including those not affected by any of Michigan's COVID-era waivers. This suggests that the increase in diversity is likely related to changes in teaching conditions and employment preferences during the pandemic, rather than changes in licensure requirements.

If the teachers who entered the profession through these waivers did not have the skills necessary to educate students effectively, we would expect to see retention rates decrease during the waiver period. Although our results show that temporary-certified teachers in the waiver-affected cohort were less likely to be rated “highly effective,” we also find that these teachers were *more likely* than earlier cohorts to remain in the profession after their first year. These patterns likely reflect the fact that, outside of the waiver period, temporary certification was only available to teachers holding an out-of-state certification who had not yet completed their licensure exams, some of whom may have taught in other states before applying for a Michigan certificate. First-time teachers from in-state programs were also eligible for temporary certificates during the waiver year, likely lowering the average experience level for the cohort and explaining the decrease in effectiveness. The increase in retention may at least partly reflect prior cohorts’ connections to and job opportunities in the other states in which they hold teaching credentials. A key limitation of our study is that we cannot delineate between temporary-certified teachers from in-state and out-of-state preparation programs; if additional data become available in the future that enable us to make this distinction, we may be able to more accurately estimate impacts for in-state candidates who were only eligible for temporary certification during the waiver period.

Teachers with standard certificates were subject to shortened or modified student teaching placements during the waiver period but still completed the same licensure exams required in a typical year. On average, first-year teachers with temporary certificates and those with standard certificates had roughly equal effectiveness ratings in 2020-21. Although temporary-certified teachers had lower retention rates than standard-certified teachers in all years, the gap between their respective rates was smaller during the waiver period. These patterns suggest that the teachers who had not yet completed their licensure exams upon entry into the workforce were generally similar to those who had done so. Retention rates for most types of standard-certified teachers did not change significantly during the waiver period, consistent with prior research demonstrating that the length of student teaching has little effect on candidates’ preparedness for the profession (Ronfeldt & Reinger, 2012). However, special education teachers were significantly less likely to remain in the profession after completing their first year of teaching during the waiver period, suggesting that the reduced time or change in format of student teaching may have had a more pronounced effect on special education teachers’ preparedness for their specialized roles.

Overall, Michigan’s COVID-era licensure policies demonstrate that even relatively conservative adjustments to certification requirements can help to mitigate teacher shortages without compromising teacher quality or retention. While the temporary flexibilities succeeded in preserving the state’s total supply of new teachers, differential entry and retention rates—particularly among special education teachers—underscore the importance of maintaining robust preparation and support for teachers in specialized roles. Future research, including more granular analyses of teachers directly affected by COVID-era waivers, may provide further clarity regarding the effects of different components of these policies and their broader implications.

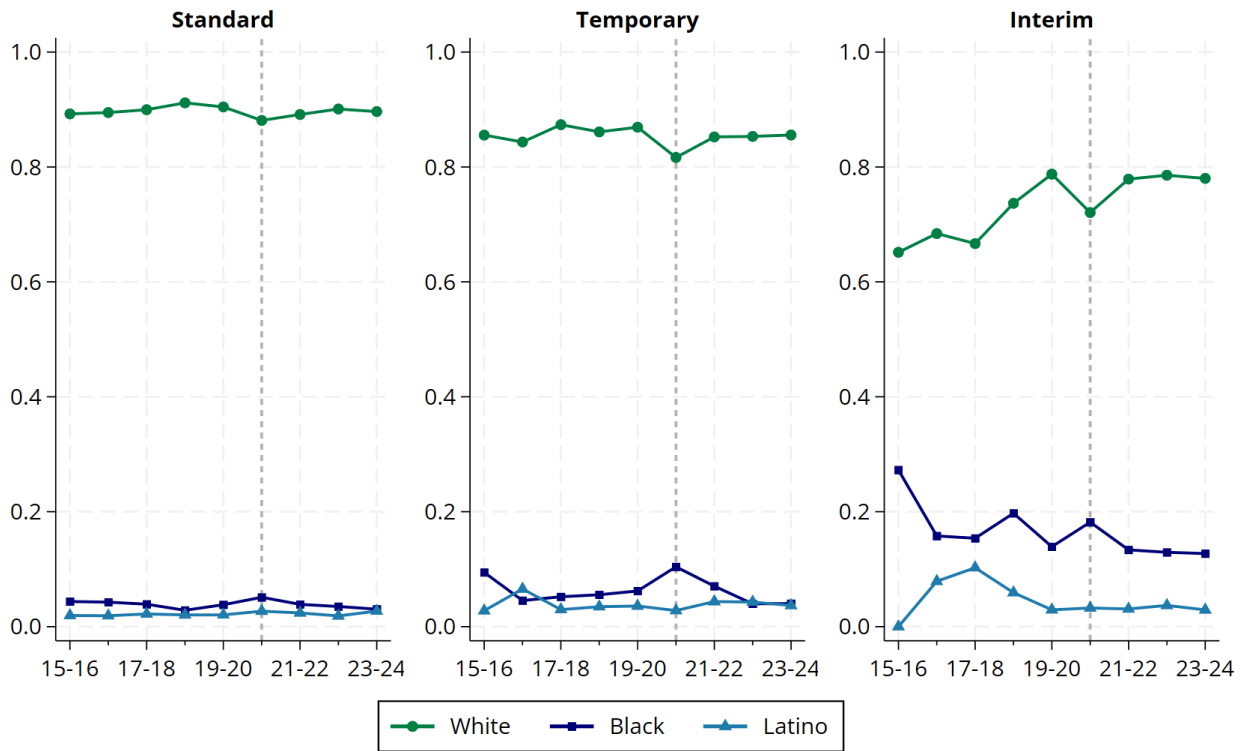
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FIGURES AND TABLES

Figure 1. Share of First-Year Teachers by Race/Ethnicity and Certification Type



Notes: The x-axis indicates the school year when a newly certified teacher began their first in-state public school teaching position (e.g., "15-16" data points represent newly certified first-year teachers in 2015-16).

Table 1. Initial Certification Options for Michigan Teachers

Certificate Type	Program Type	Term Length & Renewal	Minimum Eligibility Criteria for Initial Teaching Certificate	Relevant COVID-era Changes
Standard Teaching Certificate (STC)	Traditional-Route*	5-year, renewable	Completed a bachelor's degree, teacher preparation program, required reading coursework, and 600 clinical experience hours including a 12-week student teaching internship; passed the appropriate MTTC content exams	Option to reduce or modify the 12-week student teaching requirement for candidates who demonstrate competence (3/13/2020 – 7/29/2020)
Temporary Teaching Certificate (TTC)	Out-of-State*	1-year, non-renewable	Holds a valid teaching certificate from another state; has not yet passed required MTTC exams but meets all other criteria for an STC	Available to in-state and out-of-state candidates who have not passed required MTTC exams but meet all other criteria for an STC (4/21/2020 - 9/30/2020)
Interim Teaching Certificate (ITC)	Alternative-Route	5-year, non-renewable	Completed a bachelor's degree with 3.0 GPA; currently enrolled in an alternative-route program; passed the appropriate MTTC content exams; completed any courses and field experiences their program requires as prerequisites for an ITC	No changes in initial COVID-affected school year For a 3-year period starting 7/21/2021, ITC temporarily available as a pathway for some special education teaching endorsements; later extended through 7/21/2027

Notes: Under state law, ITCs are not available for career and technical education or early childhood teaching specializations. Special education is also excluded from this pathway, aside from a temporary exception for endorsements in Cognitive Impairment, Emotional Impairment, Learning Disabilities, and Physical or Other Health Impairment effective 7/21/2021 through 7/21/2027.

** Candidates from out-of-state programs can also receive an STC as their initial Michigan certificate if they pass the necessary MTTC exams beforehand; some of these out-of-state candidates may have completed their training through alternative-route programs.*

Table 2. Counts of First Year Teachers by Certification Type/Pathways

	Entry Year	Standard Teaching Certificate (STC)	Temporary Teaching Certificate (TTC)	Interim Teaching Certificate (ITC)	Total
Pre-COVID	2015-16	1,348	180	66	1,594
	2016-17	1,311	198	38	1,547
	2017-18	1,356	269	39	1,664
	2018-19	1,472	288	152	1,912
	2019-20	1,466	306	273	2,045
Waiver Period	2020-21	1,076	643	308	2,027
Post-Waiver	2021-22	1,547	298	389	2,234
	2022-23	1,655	327	541	2,523
	2023-24	1,806	298	582	2,686

Notes: The “entry year” column indicates the school year when a newly certified teacher began their first in-state public school teaching position. To align with our sample for regression analyses that include school level fixed effects, we restrict the sample to teachers assigned to a single school building.

Table 3. First-Year Teacher Summary Statistics by Certification Type and Entry Year

	Pre-COVID (2015-16 to 2019-20)			Waiver Period (2020-21)			Post-Waiver (2021-22 to 2023-24)		
	STC	TTC	ITC	STC	TTC	ITC	STC	TTC	ITC
	<i>Panel A: Teacher Demographics</i>								
Male Teacher	22%	23%	34%	21%	21%	29%	20%	21%	31%
Black Teacher	4%	6%	17%	5%	11%	18%	3%	5%	13%
Latino Teacher	2%	3%	4%	3%	2%	3%	2%	4%	3%
White Teacher	90%	86%	74%	88%	82%	72%	90%	85%	78%
<i>Panel B: School Characteristics</i>									
Urban School	32%	35%	59%	30%	30%	48%	25%	29%	35%
Rural School	18%	20%	10%	20%	24%	18%	20%	22%	22%
>50% Students of Color	35%	45%	67%	37%	42%	63%	32%	37%	46%
>50% Economically Disadvantaged	61%	67%	85%	60%	67%	82%	61%	67%	79%
<i>Panel C: Employment Outcomes</i>									
Returned to Same School	75%	65%	67%	71%	66%	73%	76%	70%	75%
Returned to Profession	91%	79%	84%	90%	84%	91%	91%	82%	90%
Rated "Highly Effective"	10%	17%	9%	16%	15%	14%	12%	17%	12%
<i>Total Number of Teachers</i>	6,911	1,205	566	1,069	634	307	4,977	912	1,508

Notes: Employment outcomes (Panel C) for the post-waiver period are based on just the 2021-22 and 2022-23 cohorts of first-year teachers, as we cannot yet determine whether 2023-24 teachers return for a second year. We restrict the sample to teachers assigned to a single school.

Table 4. Counts of Teachers Earning Special Education Credentials

Entry Year	Initial Teaching Certificate	Added First Special Education Endorsement	Added Subsequent Special Education Endorsement	Total
2015-16	296	146	117	559
2016-17	362	141	112	615
2017-18	350	89	106	545
2018-19	334	134	118	586
2019-20	339	95	105	539
2020-21	322	106	106	534
2021-22	392 (0)	142 (1)	104 (0)	638 (1)
2022-23	438 (0)	145 (19)	102 (1)	685 (20)
2023-24	424 (1)	199 (47)	117 (1)	740 (49)

Notes: Numbers in parentheses indicate counts of teachers who earned their special education credentials through an alternative-route program (i.e., on an interim certificate). The “entry year” column indicates the school year when a teacher first held an in-state public school teaching position after earning a special education credential.

Table 5. Regression Coefficients - Teacher Retention and Effectiveness

	Returned to Same School			Returned to Profession			Rated Highly Effective		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	0.757*** (0.006)	0.765*** (0.006)	0.758*** (0.005)	0.916*** (0.004)	0.922*** (0.004)	0.916*** (0.004)	0.104*** (0.005)	0.105*** (0.006)	0.108*** (0.004)
Waiver Year (2020-21)	-0.045** (0.017)	-0.045** (0.017)	-0.057** (0.018)	-0.021* (0.010)	-0.021* (0.010)	-0.019 (0.012)	0.052*** (0.013)	0.052*** (0.013)	0.047*** (0.012)
Post-Waiver Y1 (2021-22)	-0.015 (0.013)	-0.015 (0.013)	-0.048*** (0.014)	-0.016+ (0.008)	-0.016+ (0.008)	-0.030** (0.010)	0.017+ (0.010)	0.017+ (0.010)	0.008 (0.010)
Post-Waiver Y2 (2022-23)	0.027* (0.012)	0.027* (0.012)	-0.010 (0.014)	0.010 (0.008)	0.010 (0.008)	-0.003 (0.009)	0.012 (0.010)	0.012 (0.010)	0.009 (0.010)
TTC	-0.095*** (0.015)	-0.094*** (0.015)	-0.072*** (0.015)	-0.123*** (0.012)	-0.123*** (0.012)	-0.110*** (0.013)	0.073*** (0.013)	0.073*** (0.013)	0.066*** (0.012)
TTC x Waiver Year	0.048+ (0.029)	0.049+ (0.029)	0.050+ (0.030)	0.071** (0.022)	0.071** (0.022)	0.068** (0.024)	-0.074*** (0.022)	-0.074*** (0.022)	-0.055** (0.021)
TTC x Post-Waiver Y1	0.036 (0.033)	0.036 (0.033)	0.024 (0.035)	0.027 (0.028)	0.027 (0.028)	0.036 (0.030)	-0.021 (0.027)	-0.021 (0.027)	-0.018 (0.027)
TTC x Post-Waiver Y2	0.039 (0.031)	0.041 (0.031)	0.054 (0.033)	0.033 (0.025)	0.035 (0.025)	0.041 (0.027)	-0.018 (0.026)	-0.018 (0.026)	-0.023 (0.025)
ITC	-0.067** (0.025)	-0.061* (0.025)	0.010 (0.025)	-0.054** (0.017)	-0.051** (0.018)	-0.018 (0.019)	-0.013 (0.014)	-0.013 (0.014)	-0.011 (0.014)
ITC x Waiver Year	0.091* (0.039)	0.092* (0.038)	0.079+ (0.041)	0.068* (0.026)	0.068* (0.026)	0.063* (0.029)	-0.000 (0.028)	-0.001 (0.028)	0.008 (0.026)
ITC x Post-Waiver Y1	0.060+ (0.036)	0.059+ (0.036)	0.032 (0.037)	0.049* (0.025)	0.049* (0.025)	0.034 (0.027)	0.034 (0.024)	0.035 (0.024)	0.033 (0.024)
ITC x Post-Waiver Y2	0.051 (0.033)	0.050 (0.033)	0.015 (0.035)	0.037 (0.024)	0.037 (0.024)	0.015 (0.027)	0.008 (0.021)	0.008 (0.021)	0.011 (0.022)
Observations	14,945	14,945	14,945	14,945	14,945	14,945	14,945	14,945	14,945
Teacher controls		X	X		X	X		X	X
School FE			X			X			X

Notes: We restrict the sample to teachers assigned to a single school. The “returned to same school” and “returned to profession” outcomes reflect retention between the fall of years “t” and “t+1” (e.g., retention in the 2nd post-waiver year indicates that a teacher remained in their school or in the profession from 2022-23 to 2023-24). +p<0.1; *p<0.05; **p<0.01; ***p<0.001

Table 6. Model-Predicted Probabilities of Returning to Same School

	Full Sample (1)	Special Education (2)	Elementary (3)	Secondary Core (4)
Standard Teaching Certificate (STC)				
Pre-COVID (2015-16 to 2019-20)	0.758 (0.005)	0.765 (0.017)	0.767 (0.007)	0.749 (0.011)
Waiver Year (2020-21)	0.701** (0.016)	0.640* (0.056)	0.700* (0.022)	0.722 (0.032)
1st Post-Waiver Year (2021-22)	0.709** (0.012)	0.605** (0.052)	0.719* (0.017)	0.741 (0.024)
2nd Post-Waiver Year (2022-23)	0.748 (0.012)	0.872* (0.042)	0.739 (0.017)	0.759 (0.023)
Temporary Teaching Certificate (TTC)				
Pre-COVID (2015-16 to 2019-20)	0.686 (0.014)	0.758 (0.052)	0.707 (0.021)	0.650 (0.029)
Waiver Year (2020-21)	0.679+ (0.020)	0.823 (0.104)	0.670 (0.029)	0.689 (0.041)
1st Post-Waiver Year (2021-22)	0.662 (0.029)	0.716 (0.102)	0.641 (0.049)	0.644 (0.056)
2nd Post-Waiver Year (2022-23)	0.730 (0.026)	0.606* (0.110)	0.765 (0.039)	0.666 (0.058)
Interim Teaching Certificate (ITC)				
Pre-COVID (2015-16 to 2019-20)	0.768 (0.024)	1.004 (0.209)	0.827 (0.035)	0.723 (0.042)
Waiver Year (2020-21)	0.789* (0.029)	0.201 (0.423)	0.756 (0.047)	0.833+ (0.052)
1st Post-Waiver Year (2021-22)	0.751 (0.024)	0.394 (0.310)	0.745 (0.036)	0.734 (0.045)
2nd Post-Waiver Year (2022-23)	0.773 (0.022)	0.732 (0.121)	0.778 (0.030)	0.792 (0.045)

*Note: Estimates in this table represent model-predicted probabilities for each outcome variable by certification type and entry period, calculated based on the coefficients from the models with teacher controls and school fixed effects (shown in column (3) Table 5 and columns (1) – (3) of Table A2). The “secondary core subjects” sample includes middle and high school teachers with math, ELA, social studies, or science assignments. Most interim-certified teachers in the special education sample are assigned outside of their endorsement area, as special education endorsements were not available for ITCs until 2021. For model-predicted probabilities in the waiver and post-waiver years, we denote statistically significant differences relative to the pre-COVID probability for the same certification type. + $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$*

Table 7. Model-Predicted Probabilities of Returning to Profession

	Full Sample (1)	Special Education (2)	Elementary (3)	Secondary Core (4)
Standard Teaching Certificate (STC)				
Pre-COVID (2015-16 to 2019-20)	0.916 (0.004)	0.941 (0.012)	0.929 (0.005)	0.901 (0.008)
Waiver Year (2020-21)	0.897 (0.011)	0.849* (0.042)	0.898 (0.016)	0.892 (0.022)
1st Post-Waiver Year (2021-22)	0.886** (0.009)	0.900 (0.035)	0.895* (0.012)	0.902 (0.017)
2nd Post-Waiver Year (2022-23)	0.913 (0.008)	0.967 (0.027)	0.919 (0.011)	0.912 (0.015)
Temporary Teaching Certificate (TTC)				
Pre-COVID (2015-16 to 2019-20)	0.806 (0.012)	0.819 (0.037)	0.821 (0.019)	0.786 (0.027)
Waiver Year (2020-21)	0.855** (0.016)	0.874 (0.074)	0.856* (0.024)	0.871* (0.029)
1st Post-Waiver Year (2021-22)	0.812 (0.026)	0.990** (0.056)	0.800 (0.040)	0.790 (0.048)
2nd Post-Waiver Year (2022-23)	0.844 (0.022)	0.786 (0.087)	0.913** (0.032)	0.747 (0.051)
Interim Teaching Certificate (ITC)				
Pre-COVID (2015-16 to 2019-20)	0.898 (0.018)	0.908 (0.052)	0.921 (0.025)	0.889 (0.033)
Waiver Year (2020-21)	0.942** (0.019)	0.458 (0.376)	0.962+ (0.030)	0.929 (0.033)
1st Post-Waiver Year (2021-22)	0.902 (0.019)	0.765 (0.247)	0.880 (0.029)	0.896 (0.034)
2nd Post-Waiver Year (2022-23)	0.910 (0.016)	0.803 (0.094)	0.926 (0.023)	0.887 (0.034)

Note: Estimates in this table represent model-predicted probabilities for each outcome variable by certification type and entry period, calculated based on the coefficients from the models with teacher controls and school fixed effects (shown in column (6) of Table 5 and columns (4) – (6) of Table A2). The “secondary core subjects” sample includes middle and high school teachers with math, ELA, social studies, or science assignments. Most interim-certified teachers in the special education sample are assigned outside of their endorsement area, as special education endorsements were not available for ITCs until 2021. For model-predicted probabilities in the waiver and post-waiver years, we denote statistically significant differences relative to the pre-COVID probability for the same certification type. + $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 8. Model-Predicted Probabilities of Receiving a “Highly Effective” Rating

	Full Sample (1)	Special Education (2)	Elementary (3)	Secondary Core (4)
Standard Teaching Certificate (STC)				
Pre-COVID (2015-16 to 2019-20)	0.108 (0.004)	0.128 (0.011)	0.105 (0.006)	0.101 (0.007)
Waiver Year (2020-21)	0.154*** (0.011)	0.165 (0.042)	0.125 (0.014)	0.185*** (0.022)
1st Post-Waiver Year (2021-22)	0.116 (0.008)	0.202+ (0.039)	0.127 (0.012)	0.094 (0.016)
2nd Post-Waiver Year (2022-23)	0.117 (0.008)	0.155 (0.037)	0.115 (0.012)	0.123 (0.015)
Temporary Teaching Certificate (TTC)				
Pre-COVID (2015-16 to 2019-20)	0.174 (0.011)	0.180 (0.039)	0.183 (0.018)	0.172 (0.020)
Waiver Year (2020-21)	0.165** (0.014)	0.199 (0.051)	0.135** (0.020)	0.179+ (0.027)
1st Post-Waiver Year (2021-22)	0.164 (0.022)	0.155 (0.039)	0.145 (0.040)	0.187 (0.039)
2nd Post-Waiver Year (2022-23)	0.160 (0.020)	0.144 (0.054)	0.205 (0.035)	0.123+ (0.031)
Interim Teaching Certificate (ITC)				
Pre-COVID (2015-16 to 2019-20)	0.096 (0.014)	0.160 (0.026)	0.129 (0.025)	0.061 (0.026)
Waiver Year (2020-21)	0.151 (0.020)	-0.112 (0.216)	0.137 (0.030)	0.138 (0.037)
1st Post-Waiver Year (2021-22)	0.137 (0.018)	0.238 (0.104)	0.181 (0.027)	0.074 (0.028)
2nd Post-Waiver Year (2022-23)	0.117 (0.014)	0.205 (0.074)	0.120 (0.023)	0.095 (0.025)

*Note: Estimates in this table represent model-predicted probabilities for each outcome variable by certification type and entry period, calculated based on the coefficients from the models with teacher controls and school fixed effects (shown in column (9) of Table 5 and columns (7) – (9) of Table A2). The “secondary core subjects” sample includes middle and high school teachers with math, ELA, social studies, or science assignments. Most interim-certified teachers in the special education sample are assigned outside of their endorsement area, as special education endorsements were not available for ITCs until 2021. For model-predicted probabilities in the waiver and post-waiver years, we denote statistically significant differences relative to the pre-COVID probability for the same certification type. + $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$*

APPENDIX

Table A1. First-Year Teacher Summary Statistics by Certification Type and Entry Year (Regression Sample)

	Pre-COVID (2015-16 to 2019-20)			Waiver Period (2020-21)			Post-Waiver (2021-22 to 2023-24)		
	STC	TTC	ITC	STC	TTC	ITC	STC	TTC	ITC
<i>Panel A: Teacher Demographics</i>									
Male Teacher	22%	23%	33%	20%	21%	30%	21%	19%	31%
Black Teacher	4%	6%	18%	5%	11%	19%	4%	5%	13%
Latino Teacher	2%	4%	4%	3%	3%	3%	2%	5%	3%
White Teacher	90%	86%	74%	88%	81%	72%	90%	85%	78%
<i>Panel B: School Characteristics</i>									
Urban School	32%	35%	59%	34%	30%	48%	26%	29%	35%
Rural School	18%	19%	10%	20%	24%	18%	20%	22%	21%
>50% Students of Color	35%	45%	67%	37%	62%	62%	32%	36%	45%
>50% Economically Disadvantaged	61%	66%	84%	60%	67%	83%	60%	64%	78%
<i>Panel C: Employment Outcomes</i>									
Returned to Same School	76%	66%	69%	71%	67%	74%	76%	71%	75%
Returned to Profession	92%	79%	86%	90%	84%	91%	91%	82%	90%
Rated "Highly Effective"	10%	18%	9%	16%	15%	14%	12%	17%	12%
<i>Total Number of Teachers</i>	6,684	1,155	542	1,048	609	296	3,104	600	907

Notes: Employment outcomes (Panel C) for the post-waiver period are based on just the 2021-22 and 2022-23 cohorts of first-year teachers, as we cannot yet determine whether 2023-24 teachers return for a second year.

Table A2. Heterogeneity by Subject Area/Educational Setting

		Returned to Same School			Returned to Profession			Rated Highly Effective		
		<i>Special Educ</i>	<i>Elementary</i>	<i>Secondary Core</i>	<i>Special Educ</i>	<i>Elementary</i>	<i>Secondary Core</i>	<i>Special Educ</i>	<i>Elementary</i>	<i>Secondary Core</i>
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant		0.765*** (0.017)	0.767*** (0.007)	0.743*** (0.011)	0.941*** (0.012)	0.929*** (0.005)	0.901*** (0.008)	0.128*** (0.011)	0.105*** (0.006)	0.104*** (0.007)
Waiver Year <i>(2020-21)</i>		-0.125* (0.061)	-0.066** (0.025)	-0.019 (0.034)	-0.092* (0.046)	-0.030+ (0.017)	-0.004 (0.023)	0.037 (0.045)	0.020 (0.016)	0.080*** (0.024)
Post-Waiver Y1 <i>(2021-22)</i>		-0.160** (0.057)	-0.047* (0.019)	-0.013 (0.026)	-0.042 (0.038)	-0.034* (0.014)	-0.006 (0.019)	0.074+ (0.043)	0.022 (0.014)	-0.008 (0.017)
Post-Waiver Y2 <i>(2022-23)</i>		0.107* (0.049)	-0.027 (0.020)	0.010 (0.026)	0.025 (0.030)	-0.010 (0.013)	0.008 (0.016)	0.027 (0.042)	0.010 (0.015)	0.019 (0.016)
TTC		-0.007 (0.057)	-0.060* (0.024)	-0.091** (0.030)	-0.122** (0.041)	-0.108*** (0.021)	-0.110*** (0.028)	0.052 (0.042)	0.078*** (0.019)	0.064** (0.021)
TTC x Waiver Year		0.190 (0.131)	0.061+ (0.037)	-0.029 (0.044)	0.147 (0.099)	-0.008 (0.026)	-0.011 (0.034)	-0.019 (0.078)	0.024 (0.026)	-0.045+ (0.027)
TTC x Post-Waiver Y1		0.117 (0.130)	0.029 (0.043)	0.060 (0.060)	0.213** (0.077)	0.065+ (0.035)	0.091* (0.045)	-0.099 (0.072)	-0.068* (0.030)	-0.062 (0.041)
TTC x Post-Waiver Y2		-0.259* (0.129)	-0.018 (0.056)	0.003 (0.064)	-0.059 (0.100)	0.013 (0.046)	0.006 (0.055)	-0.064 (0.077)	-0.060 (0.047)	0.033 (0.045)
ITC		0.239 (0.208)	0.086+ (0.049)	0.029 (0.063)	-0.034 (0.051)	0.102* (0.041)	-0.035 (0.054)	0.032 (0.025)	0.012 (0.042)	-0.062+ (0.038)
ITC x Waiver Year		-0.678 (0.477)	-0.005 (0.060)	0.141+ (0.073)	-0.357 (0.383)	0.072+ (0.042)	0.051 (0.052)	-0.309 (0.222)	-0.012 (0.042)	-0.004 (0.052)
ITC x Post-Waiver Y1		-0.451 (0.385)	-0.035 (0.052)	0.022 (0.067)	-0.101 (0.263)	-0.007 (0.039)	0.004 (0.050)	0.003 (0.114)	0.029 (0.039)	0.016 (0.041)
ITC x Post-Waiver Y2		-0.379 (0.241)	-0.022 (0.048)	0.056 (0.066)	-0.130 (0.092)	0.015 (0.038)	-0.026 (0.051)	0.017 (0.071)	-0.019 (0.037)	0.001 (0.041)
Observations		1,947	6,881	4,642	1,947	6,881	4,642	1,947	6,881	4,642

Notes: All models include teacher demographic controls and school fixed effects. The “secondary core subjects” sample includes middle and high school teachers with math, ELA, social studies, or science assignments. Most interim-certified teachers in the special education sample are assigned outside of their endorsement area, as special education endorsements were not available for ITCs until 2021. + $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$