Annenberg Institute
BROWN UNIVERSITY

EdWorkingPaper No. 24-998

Funding the Digital Divide? How School District Financing for Educational Technology Changed During the COVID-19 Pandemic

David S. Knight
University of Washington

Pooya Almasi
University of Washington

Bre Urness-Straight
Washington Office of Superintendent of Public Instruction

Hilary Loeb
Puget Sound Educational Service District

School finance inequities are a key driver of disparities in educational outcomes. Higher per-pupil funding levels allow schools to provide more qualified educators, smaller class sizes, and high-quality physical resources such as modern instructional technology. We study how Washington state school districts generate and allocate funding for instructional technology, and how that changed during the COVID-19 pandemic. We find districts use state funding but rely most heavily on local levies, creating economic and racial disparities in access to educational technology. Federal stimulus funds allowed districts to increase expenditures on technology, and states may need to take steps to ensure those investments are supported as stimulus funding expires.

VERSION: December 2024

Suggested citation: Knight, David S., Pooya Almasi, Bre Urness-Straight, and Hilary Loeb. (2024). Funding the Digital Divide? How School District Financing for Educational Technology Changed During the COVID-19 Pandemic. (EdWorkingPaper: 24 -998). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/2xc6-gm93

Funding the Digital Divide? How School District Financing for Educational Technology Changed During the COVID-19 Pandemic

David S. Knight[‡]
dsknight@uw.edu
University of Washington

Pooya Almasi
pooyaa@uw.edu
University of Washington

Bre Urness-Straight
bre.urness-straight@k12.wa.us
Washington Office of Superintendent of Public Instruction

Hilary Loeb
hloeb@psesd.org
Puget Sound Educational Service District

Abstract

School finance inequities are a key driver of disparities in educational outcomes. Higher per-pupil funding levels allow schools to provide more qualified educators, smaller class sizes, and high-quality physical resources such as modern instructional technology. We study how Washington state school districts generate and allocate funding for instructional technology, and how that changed during the COVID-19 pandemic. We find districts use state funding but rely most heavily on local levies, creating economic and racial disparities in access to educational technology. Federal stimulus funds allowed districts to increase expenditures on technology, and states may need to take steps to ensure those investments are supported as stimulus funding expires.

[‡] Please direct correspondence to Knight (dsknight@uw.edu), University of Washington, Miller Hall, Box 353600, Seattle, WA 98195-3600.

Funding the Digital Divide? How School District Financing for Educational Technology Changed During the COVID-19 Pandemic

A growing area of research highlights the importance of school funding in determining long-term student outcomes, particularly among low-income youth (e.g., Jackson, 2020). As schools transitioned to virtual learning and grappled with the COVID-19 pandemic, targeted stimulus funding was a key policy lever for federal and state governments. A key challenge for school districts pertained to instructional technology to facilitate course management software, synchronous virtual learning, and asynchronous communication (Baker & DiCarlo, 2020). More broadly, districts have often struggled to update and maintain investments in new technology (Hashim & Vongkulluksn 2018), and federal and state funding specially tied to technology is limited (Bowman et al., 2020; Vongkulluksn et al., 2018). Technology investments are thus often left up to local districts, which may lead to funding inequities given well-documented disparities in local tax revenues (Knight, 2017).

We examine how school districts generate funding for educational technology, including through local taxation and through inter-governmental loans at the state and federal level. We then explore how those funds are spent. We pose the following research questions:

(1) How are state general funds for educational technology allocated across school districts?

(2) How does general fund spending on educational technology compare among districts enrolling higher and lower proportions of low-income students and students who identify as Black and/or Indigenous, or as a Person of Color (BIPOC)?

(3) Which districts pass technology levies, how much revenues do school districts generate from technology levies, and how have patterns changed during the COVID-19 pandemic?

(4) To what extent do technology levy revenues contribute to resource disparities along student income and race/ethnicity?

We proceed in four main sections. We first describe our theoretical framework and synthesize extant literature that address our research questions. Second, we provide background on the policy context in the U.S. nationally, and specifically in Washington state. We then describe our analytic approach and the data used in our analyses. Finally, we present findings and close with a summary and conclusion.

Background Literature and Theoretical Framework

Our work builds on extant literature on educational technology and school finance. Research on educational technology highlights two relevant points. First, teachers and school leaders report inadequate resources and training to support technology in the classroom (e.g., Vongkulluksn et al., 2018). In many cases, initial investments led to the acquisition of new equipment, but lack of human capital to update and maintain that equipment limits usability. In other cases, instructional technology is well maintained, but educators lack necessary training to fully integrate technology in their classroom (Bowman et al., 2020). Second, schools are limited in their ability to provide students with internet connectivity at home and, especially in rural contexts, within classroom buildings (e.g, Hashim & Vongkulluksn, 2018). Because funding for technology comes from federal, state, and local sources, there is not a single policy framework for targeting support for education technology development and maintenance (Ritzhaupt et al., 2008).

From the school finance literature, we use the concept of finance equity (Hinojosa, 2018; Knight & Mendoza, 2018), which defines an equitable state finance system as one that allocates a greater share of funding to school districts serving higher percentages of low-income students that otherwise face similar cost factors. In other words, overall per-student funding and student poverty rate should be positively correlated among school districts of similar size and geographic

context. Racial/ethnic finance equity refers to state systems that allocate at least an equal share of funding to districts serving higher percentages of historically underserved students of color, including those who identify as Black, Latinx, Indigenous, Southeast Asian / Pacific Islander, more than one race, or another underrepresented person of color, compared to otherwise similar school districts that serve predominantly White students. Research shows only about one-third of state education funding systems demonstrate finance equity (EdTrust, 2022). While states have made substantial progress over the past 50 years, targeting state aid to higher-need school districts, additional state aid is often not substantial enough to address economic and racial gaps in local tax revenues across school districts (Knight & Mendoza, 2019). Local tax revenue disparities stem largely from racial differences in property wealth, which are in turn the result of an extended history of land appropriation, residential redlining, and racist housing and land use policies implemented in the U.S. over the nation's history (Daza & Tuck, 2014; Tyack & Lowe, 1986).

Policy Background

State School Finance

School districts on average nationally receive about 10% of funds from the federal government and an approximately equal share of state and local funding (about 45% each, Odden & Picus, 2019). Federal funds include specific programs to support technology, including the E-Rate program, distance learning, and broadband initiatives. Districts in Washington receive a greater proportion of total funds from state sources (63%), as opposed to local (31%) or federal (6%), but like other states, Washington's public education system is funded through a mix of federal, state, and local tax revenues. The state's school finance system is unique in that state revenues pay for all basic educational services that are required under the state constitution. In

most other states, school districts are expected to pay for a portion of basic educational services through local tax revenues. In Washington, local tax revenues are used only for "enrichments," and new school construction, remodeling, and upgrades ("capital" expenses). Enrichments include extra services or staff members, that districts can choose to provide, that go beyond the constitutionally mandated basic educational services (OSPI, 2021). Washington's system is also unique because the state uses a resource-based funding model, rather than a dollar-based model. Under a resource-based model, the amount of funding each district receives is based on a set of staffing ratios, where a district receives, for example, one teacher for every 20 students, one principal for every 500 students, and so on. Washington refers to their set of staffing ratios as the Prototypical School model (OSPI, 2022a). Funding levels for each district are based on the total number of staff generated through the Prototypical School model, multiplied by state-determined salary levels, and then multiplied by a cost-of-living regionalization factor. Some resources, such as the state's Materials, Supplies, and Operating Costs (MSOC) allocation, are distributed on a dollar-per-student basis, and then multiplied by the same regionalization factor.

In 2012, judges in the *McCleary v. Washington* State Supreme Court case ruled the state was not providing enough funding to meet the obligations spelled out in the state constitution. Over the next seven years, state legislators passed several bills that substantially increased funding, and in 2019, the court determined the legislature had adequately addressed judicial mandates. Research on the impact of these legislative reforms shows that most districts experienced large increases in funding, and that the majority of funds were used to support salaries (Knight et al., 2022; Sun et al., 2022). However, increases in funding disproportionately benefited school districts serving wealthier student populations, in part due to the regionalization factor that targets additional funds to higher cost-of-living areas (Baker et al., 2021; Knight &

Plecki, 2022). Moreover, the state provides limited matching funds for enrichment levies, and almost no matching funds for capital expenses or bonds, meaning that districts must generate their own local tax revenues to support these investments. Reliance on local property taxation creates racial and economic funding disparities across school districts because of differences in average local property values across districts. Disparities in local property values stem in part from legacies of racial redlining and restrictive covenants in place in Washington during the 1920s through 1960s (Lukes & Cleveland, 2021). In sum, Washington's K-12 finance system provides all districts with a base allotment of resources, and state legislators recently expanded the base allocation, but recent research shows these post-McCleary funding increases were not equitably distributed across school districts in terms of student race/ethnicity and socioeconomic status.

Overview of Educational Technology Finance

Educational technology refers broadly to the resources used to deliver instruction and facilitate learning (Hashim & Vongkulluksn, 2018). School districts invest in educational technology by purchasing new electronic devices, equipment, and infrastructure, upgrading connectivity systems, and providing professional development for individuals learning to use technology. Districts in Washington have three primary mechanisms to invest in educational technology, using federal, state, or local revenues, and these mechanisms differ by the extent to which the funds are (a) equitably distributed across districts; and (b) regulated by state and federal policies.

Federal funding for educational technology. School districts receive federal funding for educational technology through several programs, the largest of which, E-Rate, provides funding for internet access (OSPI 2022b; Hashim, 2022). The COVID-19 pandemic spurred

additional federal supports for educational technology. The Emergency Connectivity Fund (ECF) was established as part of the American Rescue Plan of 2021. ECF allocated $7.1 billion nationally to K-12 schools and libraries out of the total $1.9 trillion stimulus package. ECF provides funding to connect students and staff who would otherwise have lacked access to fully participate in distance education. Funding was made available for laptops, tablets, hotspots, and the necessary Internet access to ensure full, off-campus connectivity.

While any student or staff member lacking sufficient connectivity qualified for the program, laptop and tablet purchases were capped at $400 per device. Applications for funding were accepted in three rounds, providing school districts with three different opportunities to request funding. A map showing which districts receive ECF funds in each round is available in an online appendix associated with this article (Appendix Figure A1).[1] The maps show that most districts received less than $500 per pupil through ECF, and many did not receive any funds. In total, 213 Washington school districts submitted applications for funding, and as of October 27, 2022, over $112 million in funding commitments have been issued, with another $62.5 million awaiting final announcement of award. Because federal funding for educational technology is not the primary focus of this report, we limit analysis of the ECF and other federal funding programs.

In addition to ECF funds, districts can also direct their general-purpose federal COVID stimulus to educational technology. Districts can also invest in educational technology through regular federal funding, though districts receive only about 10 percent of their overall funding from federal sources in a typical year. A final federal source for educational technology is the Affordable Connectivity Program, although this program supports families directly, not school

[1] To view the online appendix tables and figures, visit: https://edworkingpapers.com/users/david-s-knight

districts. Formerly called the Emergency Broadband Benefit (EBB) program, the program provides low-cost access to high-speed internet directly to families that meet household income eligibility requirements.

State funding for educational technology. Most states provide funding for educational technology, either implicitly as part of the base allotment of funding, or explicitly through a categorical funding stream (Verstegen & Jordan, 2009). The most common mechanism for Washington districts to invest in educational technology is through the former, using "Basic Education" funding from the state, which is deposited into a school district's General Fund. All districts in Washington receive a base allotment of funds, and districts are expected to use these funds to pay for salaries and benefits of teachers and other staff, materials, and equipment, including educational technology. After the *McCleary* decision, legislators increased Basic Education funding, including increasing funding for educational technology through the state's Materials, Supplies, and Operating Costs (MSOC). The total MSOC funding allotment amounts to approximately $1,300 per student, with additional funds for high school students and those in Career and Technical Education and skill center programs (OSPI, 2020). About 11% of these funds, or $140 per student, is specifically intended to support technology, although districts have flexibility in how they spend their MSOC allocation (OSPI, 2022a). Districts also receive funding for classified staff salaries to serve as technology specialists as part of the Prototypical School model (0.628 FTE for every 1,000 students).

One of the primary purposes of state funding for K-12 state systems, broadly speaking, is to fill in funding gaps for lower property wealth districts that do not generate as much revenue from local property taxes (Odden & Picus, 2019). In Washington, state funding for educational technology is mostly equalized such that all districts receive approximately the same amount per

student through the Prototypical School model. In contrast to state and federal funding, most local funding is generated through local property taxation, so local funding often disproportionately benefits school districts located in wealthier communities (Knight & Plecki, 2022).

Local funding for educational technology. The third mechanism through which school districts can invest in educational technology is through private donations, levies, and bonds, which are categorized as local revenues. Levies and bonds increase local property taxes usually through voter approval (Picus & Odden, 2019; Odden et al., 2015), while private donations typically come from parent-teacher associations. School districts in Washington use these same local funding mechanisms. Districts are permitted to run elections for (a) long-term bonds to pay for major school construction, maintenance, and capital projects; (b) enrichment levies to pay for additional staff members, salary increases, or materials; or (c) capital project levies to pay for major school construction and maintenance, physical equipment, and infrastructure. Revenues generated from any of these levies or bonds can be devoted to educational technology. A capital project levy can be designated as a technology levy if the district commits to allocating all of the generated funds to purchasing technology. Districts can also run elections for transportation levies to pay for school buses, but those funds are not eligible for spending on educational technology and district have passed only nine transportation levies since 2014-15. New regulations stemming from the *McCleary v. Washington* case require districts to develop spending plans for enrichment levies and gain approval from the state education agency. Districts have relative flexibility in spending on enrichment levies, so long as they adhere to their pre-approved spending plan. The amount of revenue generated from any of these levies depends on local property values, which contributes to funding disparities across districts.

The state uses two mechanisms that aim to equalize local tax revenues across districts: local tax limitations or "levy lids" and Local Effort Assistance. Levy lids were increased in 2010 such that local revenues could represent up to 28 percent of a district's total funding (up from 24 percent). House Bill 2242 (2017) reduced levy lids to the lesser of $1.50 per $1,000 of assessed value or $1,500 per student, but levy lids were then increased (under SB 5313, 2019) to the lesser of $2.50 per $1,000 of assessed value or $2,550 per student (OSPI 2020b). Local Effort Assistance is a state matching program that ensures all districts including those with lower local property values generate at least $1,500 per student at tax rate of 0.15%. These two programs apply only to enrichment levies and not to other levies or bonds. Thus, districts with lower average local property values receive some state matching funds when raising revenues to support educational technology through the general fund (via enrichment levies), but no state matching funds are available for districts to purchase technological equipment through capital project levies.

Analytic Approach and Data

Analytic Approach

We use descriptive statistics for most of our analyses, drawing comparisons between urban, suburban, and rural districts and between districts serving different proportions of students who are low-income students or identify as BIPOC. We present statewide mean per-pupil values, so that readers can multiply any per-pupil figure by statewide enrollment each year to determine total statewide revenue or expenditure levels. For example, state MSOC funding for technology provided $165 per pupil, or about $179 million total statewide, given statewide enrollment of 1,084,168 that year. To measure the resource levels for the typical low-income student or for the

typical student who identifies in a particular racial/ethnic category, we use a "weighted-average approach," introduced in a recent Urban Institute policy brief (Chingos & Blagg, 2019).

The first step is to calculate the overall statewide mean per-pupil expenditures across all districts, which is the simple average per-pupil expenditures across all districts, weighting by the number of students in each district (so that larger districts contribute more to the overall mean). This number can also be calculated by summing total expenditures across all districts and dividing by statewide enrollment. This figure provides the per-pupil spending for school districts that the typical student attends. Next, we calculate the per-pupil expenditures for school districts that the typical low-income student attends. This number is calculated by taking the average per-pupil expenditures across all districts, weighting by the number of low-income students in each district. We can similarly calculate the average per-pupil expenditures for school districts that the typical non-low-income student attends by weighting the statewide mean by the number of non-low-income students in each district. Finally, similar calculations can be made for students who identify in different racial/ethnic categories. We focus on the student racial/ethnic categories with the largest number of students in Washington, Asian, Black, Latinx, and White. Results for students who identify as American Indian, Indigenous, or Alaskan Native, Pacific Islander or Hawaiian Native, or two or more races are available upon request. This method for measuring school resource disparities along student demographics is used in several other studies (e.g., Knight & Mendoza, 2019; Shores et al., 2022). The approach can be extended to other resource measures, including funding and spending on educational technology and technology levy revenues.

The approach described above provides estimates of differences in per-pupil funding levels across different student income and racial/ethnic groups. One concern with these simple

comparisons of resources across school districts is that differences in funding or spending levels may exist due to real differences in cost. For example, school districts that are smaller and located in more sparsely populated areas are generally more costly to operate. Conversely, districts that enroll a greater percent of students who require special education services or who participate in bilingual education generally face greater costs. In other words, some school districts face higher costs for reasons that are not directly in their control. These reasons include size, population sparsity, the local cost of labor, and student special education and bilingual education needs. If low-income students are more likely to attend higher- or lower-cost districts, than simple funding comparison will under or overstate resource differences between low-income students and non-low-income students.

We therefore use regression-based adjustments to make "apples-to-apples" comparisons among school districts. For example, to compare lower-poverty school districts to *otherwise similar* high-poverty school districts, we use the following regression framework:

$$PPR_d = \beta_0 + \beta_1 Poverty\_rate_d + X'\lambda + \varepsilon_d \quad (1),$$

where PPR_d is per-pupil instructional technology funding allocated to district *d*, and X is a vector of district covariates associated with cost, including size, local cost of labor, urbanicity, and the precent of students receiving bilingual or special education services. We calculate the extent to which funds are allocated progressively by comparing funding between high and low-poverty districts, defined as those at the 10th and 90th percentile of district poverty rate. These values are estimated using Stata's post-estimation margins command (see Knight & Mendoza, 2019 for more details on this methodology).

For all comparisons between urban, suburban, and rural districts, we report raw averages. For comparison of resources by student income and race/ethnicity, we adjust funding levels

through regression-based methods (see Knight & Mendoza, 2019). In general, our regression-adjusted estimates are similar to non-adjusted estimates, and we note when results diverge. For all reported values, we adjust figures for inflation to the 2020-21 school year.

Data

We use publicly available data from the OSPI F-196 database, the school apportionment files, and the unofficial elections data, all of which are published on the OSPI website. The F-196 database includes datasets that disaggregate annual General Fund expenditures by program, activity, and object. OSPI tracks a total of 10 objects, including for example certificated and classified salary and benefits, purchased services, travel, and capital outlays. The state categorizes spending into 54 different programs, the largest of which include Basic Education, Special Education, and several federal programs. Expenditures are also tracked along 43 different activities, one of which is called "instructional technology" (activity code 32). These datasets allow us to examine spending on technology (categorized as an activity), disaggregated by program and object. The F-196 database also includes annual item-district level datasets that include information about expenditures across all funds in addition to the General Fund. These files provide information on spending from the Capital Projects Fund. School Apportionment files include information about revenues, including specific funding programs such as MSOC and districtwide classified technology staff support. Although OSPI accounting systems use the term instructional technology, some funds that are often categorized as educational technology support non-instructional support stuff (i.e., the districtwide classified technology staff funding), so we use the term educational technology to include all spending related to technology. Appendix Table A1, available in an online appendix (see footnote 1), shows summary statistics of key input and output variables.

Findings

We describe findings in two main sections, starting with funding and spending on educational technology from the General Fund. Then, section two describes similar results for the Capital Projects Fund, including detailed analysis of capital project and technology levy elections, revenues, and expenditures.

General Fund Revenues and Expenditures on Educational Technology

Table 1 shows average per-pupil state funding for educational technology across all districts. The first row shows total state revenues per-pupil, which increase from $8,469 to $12,643 from 2014-15 to 2020-21 in inflation-adjusted terms. This increase is the result of *McCleary v. Washington* related reforms noted earlier and corresponds with a slight decline in overall statewide local revenues per pupil. The second row shows state funding for educational technology, which includes both MSOC and districtwide classified technology specialist support staff funding. MSOC funding for technology provides $105 per pupil in 2014-15, was increased to $142 in 2015-16, and has stayed close to that figure since. Funding for classified technology staff increased by $10 per pupil in 2018-19 and has stayed constant around $30 per-pupil in recent years. Overall, these two state funding streams for educational technology provide approximately $160 per student per year, with no major change associated with the COVID-19 pandemic years. This amount reflects approximately 1.3% of state per-pupil funding and 1.0% of total state and local per-pupil funding.

Table 2 shows average per-pupil General Fund spending for educational technology, disaggregated by program and object. General Fund educational technology expenditures are supported through state MSOC funding and state funding for technology specialist support staff,

as well as federal funding and local enrichment levy funds.[2] The first row shows overall expenditures per-pupil, which, like overall state revenues, increases substantially from 2014-15 to 2020-21 ($11,625 to $15,515 in inflation-adjusted terms). The second row shows General Fund spending for educational technology, which hovers around $80 per student during the pre-pandemic years, but quickly increases to $152 in 2020-21, when a majority of students attended school virtually. Panels B and C show how educational technology expenditures were allocated across programs and objects, respectively. The largest program is Basic Education, but districts expended funds on educational technology across seven other programs during the school years observed. A portion of the COVID-19 related increase in educational technology spending that occurred in 2019-20 and 2020-21 results from an increase in educational technology expenditures within Basic Education. This trend suggests that in response to the pandemic, some districts drew down their Basic Education funding to pay for educational technology. However, the vast majority of the increase in educational technology expenditures during the pandemic results from an increase in spending from federal stimulus (row 2 of Panel B), as districts began spending down ESSER I and II funds.

The first two panels of Figure 1 summarize the results from Tables 1 and 2 graphically, this time disaggregated by district locale or "urbanicity." Panel A shows that districts generally receive $160 per-pupil regardless of urbanicity. Panel B shows districts spend around $80 per pupil on educational technology in most years up until 2019-20 and 2020-21, when districts

[2] In other words, the expenditure data include all General Fund spending on educational technology, regardless of whether those funds were acquired through federal sources, state sources, or through local enrichment levies. Because Washington does not have revenue-to-expenditure accounting, we are not able to determine exactly what proportion of educational technology spending comes from state MSOC funding or state funding for districtwide classified technology staff versus local enrichment levies. Districts operate several federal programs, such as School Improvement grants, Reading First, and Migrant Education, and most expenditures generated through federal funding can be separated from state and local expenditures, but in many cases, the revenue source of expenditures is unknown.

increased spending to about $150 per student on average. One notable takeaway from Panels A and B is that prior to the pandemic, districts generally spent less on educational technology *from the General Fund* than they received funding for (below we discuss spending from the Capital Projects Fund). Districts increased spending on educational technology during the pandemic years, but this increase is associated with federal stimulus, not a change in state funding. One other notable finding is that beginning in 2018-19, urban district began spending less on educational technology from their General Fund compared to other districts.

The first two panels of Figure 2 show similar results, this time disaggregated by student income and race/ethnicity. Panel A shows that prior to the pandemic, in the 2014-15 school year, the typical student classified as low income attended a school district that spent about $85 per student on educational technology, whereas the typical non-low-income student attended a district that spent about $75 per student, implying roughly a 5% spending advantage for low-income students. As General Fund spending on educational technology increased during the pandemic years, the spending advantage for low-income students increased slightly to 7% and then 9% during the 2019-20 and 2020-21, likely due to the progressive allocation of federal stimulus funds, which fueled much (but not all) of the pandemic-related increase in educational technology General Fund spending. In other words, General Fund spending on educational technology became more "progressive" with respect to student income likely because federal stimulus dollars were allocated according to the number of low-income students in each district. Panel B of Figure 2 highlights differences in educational technology spending rates for students in different racial/ethnic categories. White and Latinx students, on average, attend school districts with slightly higher spending per pupil on educational technology, while students who

identify as Black or Asian attend districts with lower per-pupil spending, although all students experienced increases during the pandemic years, on average.

Differences across school districts in per-pupil General Fund educational technology expenditures could result from different choices district leaders make about how to spend state funds. But differences in spending patterns may also result from varying levels of local enrichment levies or federal funding streams because revenues from enrichment levies as well as some federal funds are deposited into a school district's General Fund. That total state funding for educational technology (about $165 per student in 2021-22) is roughly similar to district General Fund spending on educational technology (about $152 per student) suggests that either (a) districts spend their state allocation for educational technology on its intended purpose, but do not invest substantial amounts of federal and local *General Fund* dollars into the educational technology, or (b) districts are investing local and federal funds toward educational technology, and allocating much of their state funds for educational technology on other programs. In either case, the data suggest districts are spending a per-pupil amount on educational technology that is approximate to the per-pupil state funding amount. Because the state does not have "revenue-to-expenditure," we are not able to disaggregate all expenditures by funding source.

Capital Projects Fund Revenues and Expenditures on Educational Technology

We next turn to revenues and expenditures from the Capital Projects Fund, which includes funds generated through technology levies. Table 3 provides summary statistics for technology levies and other related local school finance elections available to Washington districts. The table shows a larger number of technology levies proposed and passed on even-years 2015-16, 2017-18, 2019-20, and 2021-22 with a total of 10, 19, 17, and 45 technology levies passed in those years, respectively. Most technology levies, as well as other levies, are

approved for four years, so a patterned election cycle makes sense if many districts initially proposed a levy or bond in a given year.[3] Levies can last up to six years, so revenues secured in election year 2014-15 may potentially provide funding for technology in every year from 2015-16 to 2020-21. The third row of Table 3 shows the total revenues per-pupil generated from technology levies, an average of about $100 per pupil per year, with larger amounts corresponding to election years with a larger number of levies passed. School year 2021-22 had the largest number of technology levies passed during this window, and these levies will generate additional revenues for school districts moving forward.[4]

The next three rows of Table 3 show the same information for capital projects levies. Districts propose and pass a far greater number of capital projects levies than technology levies, and generate substantially higher revenues per pupil, an average of $630 and up to almost $1,600 per pupil in 2018-19. Importantly, revenues from both technology levies and capital projects levies are deposited into the Capital Projects Fund and do not have separate accounting. Districts have the option to spend those funds on educational technology equipment but are not authorized to spend these funds on salaries or training, since those revenues must come from the General Fund. The next three rows of Table 3 show the number of enrichment levies, which make deposits into the General Fund (and are subject to state matching funds to Local Effort Assistance). Districts propose and pass a far greater number of enrichment levies, approximately 100 per year with about 97 percent passing in each year prior to 2018-19. In the three most recent years of data, districts passed about 90 percent of enrichment levies and this decline may

[3] Though not shown, districts can propose levies in February, April, August, or November, but can only propose a levy of the same type twice in one year. February is the most common month for levy elections. A benefit of proposing a levy during the February election window is that if the vote fails, districts can re-propose the levy or bond again the same year in either April, August, or November.

[4] Appendix Table A5, available in an online appendix (see footnote 1) shows the total dollar amounts of each technology levy, for each district, each year. Table 3 does not show per-pupil revenues secured for 2021-22 because enrollment data were not yet prepared at the time of analysis.

be due in part of shifting public perceptions of local and state funding after the recent McCleary reforms and state tax property increases. Table 3 also shows information about transportation levies, which are less common, especially in recent years. Finally, the last three rows of Table 3 shows information for bonds. Districts propose a larger number of bonds compared to levies, about 40 statewide in a typical year, with a declining number in more recent years.

Last, we provide more detailed data on the revenues generated from technology levies as well as educational technology expenditures drawn from the Capital Projects Fund. The bottom half of Figure 1 shows revenues and expenditures related to technology levies. Panel C shows total funding secured through voter-approved technology levies each election year, disaggregated by urbanicity. During the pre-pandemic years, the average district secured between $60 and $120 per pupil in technology levy revenues, while urban districts secured significantly more than other districts, about $150 per pupil per year.[5] Technology levy per-pupil revenues appear to trend down in the two most recent years of revenue data, 2019-20 and 2020-21, and no urban district proposed a technology levy in 2020-21; however, more recent levy data show a large increase in the number of technology levies passed in 2021-22.[6]

Panel D of Figure 1 shows spending on technology from the Capital Project Fund. The data does not differentiate between Capital Project Fund expenditures from technology levies and Capital Project Fund expenditures from capital projects levies, so we report total expenditures on educational technology from the Capital Project Fund, acknowledging that some of those funds could have been generated from a capital projects levy rather than a technology levy and not necessarily all technology levy revenues will be spent on educational technology

[5] Panel C of Figure 1 shows a three-year running average. We report single-year figures in Appendix Figure A2, which is available in an online appendix (see footnote 1).
[6] See Table 3 and Appendix Tables A4 and A5.

(thus capital projects expenditures on educational technology do not necessarily represent dollars generated solely from technology levies, nor do they necessarily account for all technology levy revenues). The figure shows generally increasing expenditures per-pupil from the Capital Project Fund on educational technology, hovering around $160 per pupil (also shown in row 2 of Table 1). Interestingly, urban districts consistently outpace other districts on expenditures per-pupil from the Capital Project Fund on educational technology, and the gap increases in 2019-20 and 2020-21. This increase gap likely results from substantially higher tech levy revenues in the years leading up to 2019-20 and 2020-21. Rural districts consistently spend less on educational technology out of the Capital Project Fund.

The bottom half of Figure 2 provides similar information, disaggregated by student income and race/ethnicity. Students classified as low income and those who identify as Latinx attend school districts with substantially lower per-pupil educational technology expenditures out of the Capital Project Fund.

Discussion and Implications for Policy and Future Research

In this study, we describe the funding structures and spending patterns for educational technology in Washington public school districts. We focused on the school years leading up to and during the COVID-19 pandemic, from 2014-15 to 2020-21. Our analysis yielded four key findings. First, through the Prototypical School funding formula, the Washington school finance system allocates about $160 per pupil to each district's General Fund to support educational technology including staff salaries, training, materials, and supplies, and this funding amount has not changed since the start of the COVID-19 pandemic. Per-pupil state funding for educational technology is similar across districts serving different student populations, across urban, suburban, and rural districts, and across districts of varying size. In other words, small rural

districts in Washington receive the same per-pupil support for educational technology as large urban and suburban districts. Both are free to supplement these funds through technology levies, but urban and suburban districts are more likely to have a larger property tax base from which to generate technology levy revenues. Districts have flexibility with how to spend these General Fund revenues, and prior to the pandemic, the typical district spent less than $160 per pupil from the General Fund on educational technology.

Additionally, we found that educational technology spending increased in 2019-20 and 2020-21, but those increases were supported by federal stimulus, not changes in state funding. Urban districts did not increase their General Fund educational technology expenditures during the pandemic as much as other districts, which may be a result of greater success with technology levies during the pre-pandemic years.

Our second key finding is that from 2014-15 to 2020-21, districts in Washington passed technology levies that generated revenues of approximately $100 per pupil each year. Prior to the pandemic, urban districts secured a far greater amount of revenues through technology levies compared to other districts. This may have allowed urban districts to spend more on educational technology from the Capital Projects Fund during the pandemic years (about $200 per student, compared to $100 for typical districts), but may also explain lower General Fund expenditures on educational technology during the same period ($125 per student, compared to $150 for a typical district, see Figure 1).

Third, we found that General Fund per-pupil expenditures on educational technology are slightly higher in districts attended by the typical low-income student, compared to districts that the average non-low-income student attends, and we observe a similar resource advantage for students who identify as Latinx. In contrast, Capital Projects Fund expenditures on educational

technology are greater for students not classified as low-income and for students who identify as Asian, Black, or White. Low-income students and students who identify as Latinx attend districts with less Capital Projects Fund spending on educational technology.

Finally, given that much of the recent increases in educational technology spending is funded through temporary federal stimulus including ESSER I, II, and II, and the Emergency Connectivity Fund, and that state funding for educational technology has not changed substantially during the pandemic, many districts will face a fiscal cliff in the coming years as federal stimulus funds run out. Districts may face pressure to pass technology levies, which generally produce revenues inequitably in terms of student income and race/ethnicity.

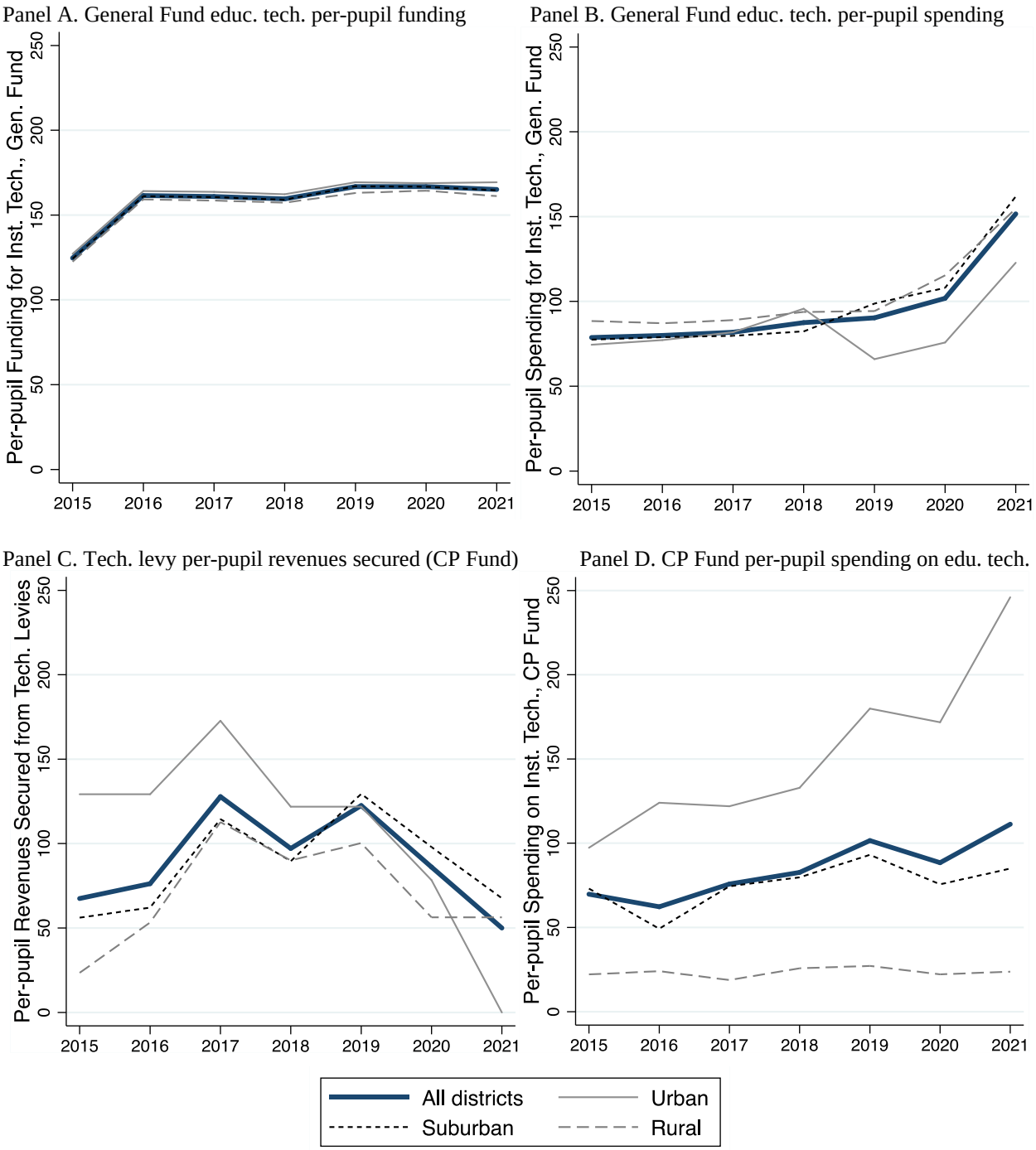
These findings have several implications for policy. First, states can better support tax base equalization for both general fund expenditures and for capital improvements. Much of the advances in school finance equity achieved over the past 40 years have focused on operations spending, rather than capital spending. While students have more equitable access to higher-quality instructional resources than in the past, access to quality school facilities with improved technology has not seen the same progress. Second, states may consider providing bridge funding to school districts to replace technology purchased with federal stimulus funds, as most devices and desktop computers have replacement cycles and districts may need assistance more smoothly transitioning out of less technology-dependent instructional delivery systems. Last, states may need to be more proactive in providing technology supports during periods of crisis, such as during a natural disaster or other significant event. As documented in this study, the federal government's effort to support school district technology needs during the COVID-19 pandemic allowed districts to make significant investments in educational technology, helping students access instruction and online learning systems. States might consider developing

funding streams perhaps through a rainy day fund that can provide districts with financial support for technology in times of emergency.

The results still leave several questions unanswered especially related to federal stimulus investments during the 2022-23 and 2023-24 school years, as well as voting behavior and election marketing following the *McCleary vs. Washington* legislative reforms and COVID-19 pandemic. With that said, the available data highlight several deficiencies in the way Washington funds educational technology and our results provide important insights into potential policy reforms. As part of our ongoing work, we hope to partner with district and state leaders to identify a set of policy recommendations based on our findings. Many of these challenges can be addressed through legislative reform but will likely require additional considerations and buy-in among local communities. Further research on educational technology finance will help inform this effort. Ultimately, improvements to the allocation of educational technology will make schools more effective and enhance learning opportunities for students.

FIGURE 1

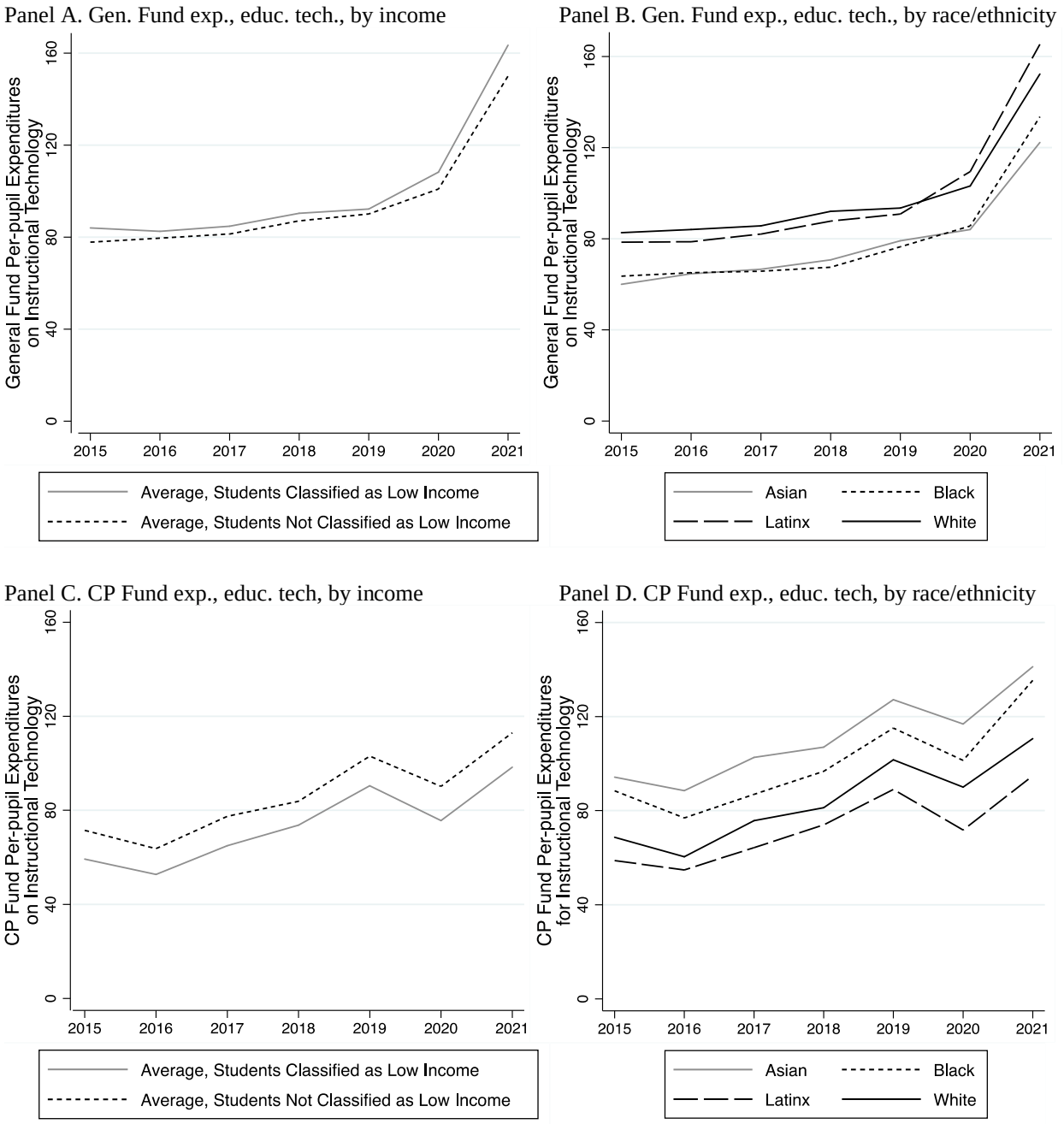
Average funding and spending per pupil for educational technology from the General Fund and Capital Projects Fund, by district locale, 2014-15 to 2020-21 (2020-21 dollars)



Note. CP Fund = Capital Projects Fund. General Fund per-pupil funding for educational technology (Panel A) includes funding through the MSOC program and through districtwide classified salary support. Panel C shows voter-approved technology levy revenues per pupil using a three-year running average, which are deposited into the CP Fund. Revenues secured from technology levies in one year are not spent that same year, but rather over the next three to six years. Panel D shows all spending on educational technology from the CP Fund, including spending from capital projects levies not devoted specifically to technology.

FIGURE 2

Average adjusted spending per pupil for educational technology from the General Fund and Capital Projects Fund, by student household income and race/ethnicity, 2014-15 to 2019-21



Note. Gen. Fund exp., edu. tech. = General Fund expenditures per pupil on educational technology. CP Fund = Capital Projects Fund. Funding amounts are adjusted for influation and districts cost factors. Results for students who identify as Pacific Islander/Native Hawaiian, Indigenous/Native American/ Alaskan Native, or as two or more races are available in an online appendix (see text).

TABLE 1

Average per-pupil state funding for educational technology through the Materials, Supplies, and Operating Costs program (Panel A) and districtwide classified technology specialist staff per-pupil funding (Panel B), for Washington school districts, 2014-15 to 2020-21 (2020-21 dollars)

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	7-yr. avg.
Panel A: State per-pupil revenues and state revenues for educational technology								
State pp. rev.	$8,469	$9,226	$9,510	$10,218	$12,228	$12,623	$12,643	$10,718
State pp. rev., on inst. tech.	$125	$161	$161	$159	$167	$167	$165	$158
Panel B: Materials, Supplies, and Operating Costs (MSOC) technology funding								
Regular	$84	$120	$120	$119	$118	$118	$116	$114
Lab science	$11	$11	$11	$10	$10	$10	$11	$10
CTE, gr, 7 - 8	$1	$1	$1	$1	$1	$1	$2	$1
CTE, gr. 9 - 12	$8	$8	$8	$8	$7	$7	$8	$8
Skills center	$1	$1	$1	$1	$1	$1	$1	$1
MSOC tech. total	$105	$142	$141	$140	$138	$138	$137	$135
Panel C: Districtwide classified technology specialist support staff funding								
Salary maint.	$19	$19	$19	$19	$19	$28	$27	$22
Salary incr.	$0	$1	$1	$0	$10	$1	$1	$2
Salary Total	$19	$20	$20	$20	$29	$29	$28	$24

Note. CTE = career and technical education. Figures adjusted for inflation to 2020-21 year dollars. The data include two types of CTE for grades 9-12, labeled "expl." and "prep." We report the former as the latter is equal to zero in all years. Other technology spending categories for MSOC, including for the Learning Assistant Program, Traditional Bilingual program, and Highly Capable, are all equal to zero in all years. Averages are weighted by student enrollment, meaning reported numbers represent the average for the district that a typical Washington student attends. Sample includes 295 school districts each year. Unweighted per-pupil averages are within 1 percent of weighted means (and Appendix Table A3 shows unweighted districtwide totals). While not shown, local per-pupil revenues include over $4,000 per pupil each year. Coinciding with the "levy swap" in 2018-19, local per-pupil revenues decline the same year (for the seven years shown, local per-pupil revenues are $4,194, $4,338, $4,412, $4,540, $4,259, $4,089, and $4,396, respectively, a 7-year average of $4,318). To convert per-pupil values reported in this table (and elsewhere) to statewide totals, multiply by statewide enrollment for the appropriate year. Statewide enrollment over the period shown is as follows: 1,079,678 (2014-15); 1,092,762 (2015-16); 1,109,985 (2016-17); 1,122,178 (2017-18); 1,128,990 (2018-19); 1,137,082 (2019-20); and 1,084,168 (2020-21). respectively.

TABLE 2

Average per-pupil state spending for educational technology through the General Fund, by program (Panel A) and by object (Panel B), for Washington school districts, 2014-15 to 2020-21

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	7-yr. avg.
Panel A: General Fund (GF) expenditures per-pupil overall and on educational technology								
GF exp. pp.	$11,625	$12,432	$12,744	$13,449	$14,576	$14,821	$15,515	$13,606
GF exp. pp., on technology	$71	$72	$75	$82	$87	$99	$152	$91
Panel B: General Fund Educational Technology Expenditures by Program								
Basic Educ.	$53	$56	$62	$60	$61	$72	$78	$63
Fed. Stimulus	$1	$1	$0	$0	$0	$0	$41	$6
Special Educ.	$1	$1	$1	$1	$1	$1	$2	$1
Voc. Educ	$9	$8	$7	$13	$14	$14	$15	$12
Skills Centers	$0	$0	$0	$0	$0	$1	$0	$0
Compen. Ed.	$6	$6	$4	$7	$9	$9	$11	$7
Other instruct.	$1	$1	$1	$2	$2	$2	$4	$2
Comm. serv.	$0	$0	$0	$0	$0	$0	$1	$0
Panel C. Educational Technology Expenditures by Object								
Supplies, Inst. Resources, and Noncap. Items	$47	$44	$41	$47	$50	$59	$97	$55
Class. Salary	$9	$10	$10	$11	$11	$13	$15	$11
Class. Benefits	$3	$4	$4	$5	$5	$5	$6	$5
Purch. Serv.	$5	$6	$7	$8	$11	$11	$21	$10
Cap. Outlay	$6	$8	$12	$12	$9	$11	$12	$10
Debt Transfers	$0	$0	$0	$0	$1	$1	$1	$0
Travel	$0	$0	$0	$0	$0	$0	$0	$0

Note. Figures adjusted for inflation to 2020-21 year dollars.

TABLE 3

Average number of levies and per-pupil revenues for Washington school districts, 2014-15 to 2021-22 (2020-21 dollars)

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Tech. levy, failed	0	1	0	0	2	2	0	7
Tech. levy, passed	2	10	7	19	3	17	9	45
Tech. levy per-pupil revenue secured	$2	$200	$26	$157	$108	$103	$47	--
CP levy failed	2	2	2	2	1	3	2	2
CP levy passed	14	19	7	46	24	26	7	9
CP levy per-pupil revenue secured	$33	$1,017	$38	$1,112	$1,581	$380	$239	--
Enrich. levy failed	1	3	1	5	4	18	8	17
Enrich. levy passed	47	136	45	161	47	149	55	119
Enrich. per-pupil revenue secured	$831	$3,406	$691	$4,057	$1,351	$2,361	$1,299	--
Trans. levy failed	1	0	0	1	0	0	0	0
Trans. levy passed	1	3	0	5	0	0	0	0
Trans. levy per-pupil revenue secured	$1	$5	$0	$11	$0	$0	$0	--
Bonds failed	24	21	17	28	8	16	0	9
Bonds passed	21	26	22	18	12	8	0	2
Bond per-pupil revenue secured	$1,680	$3,667	$2,051	$2,328	$1,273	$1,588	$0	--

Note. CP levy = capital projects levy. Per-pupil revenue secured refers to the total amount of revenues that voters approved that year, divided by the number of students enrolled that year. Dollars secured in one year are spent in the subsequent years. Levies are collected over one to six years, but most last four years. Bonds last up to 30 years, but most are approved for 20 or 21 years. All figures adjusted for inflation to 2020-21 year dollars.

References

Baker, B. D., Di Carlo, M., & Weber, M. (2019). The adequacy and fairness of state school finance systems. Albert Shanker Institute. https://www.schoolfinancedata.org/wp-content/uploads/2021/01/ExecSummary_FinanceAnnualReport_2021.pdf

Brown, C. H., & Knight, D. S. (2024). Student-to-school counselor ratios: Understanding the history and ethics behind professional staffing recommendations and realities in the United States. *Ethics & Behavior*, 1–19. https://doi.org/10.1080/10508422.2024.2342520

Brown, C. H., & Knight, D. S. (2023). Staffing schools to support the classroom: Examining the relationship between student-school counselor ratios and academic student outcomes in Texas. *Professional School Counseling, 27*(1). https://doi.org/2156759X231165497

Green III, P. C., Baker, B. D., & Oluwole, J. O. (2020). School finance, race, and reparations. *Washington & Lee Journal of Civil Rights and Social Justice, 27*, 483.

Beadie, N. (2022). Paramount duty of the state: A brief history of educational equity and inequality in Washington State. https://www.education.uw.edu/ejr/files/2022/03/Beadie--A%20Brief%20History%20of%20Educational%20Equity%20and%20Inequality%20in%20WA%20State--Final%20Report_R.pdf

Candelaria, C. A., & Shores, K. (2019). Court-ordered finance reforms in the adequacy era: Heterogeneous causal effects and sensitivity. *Education Finance and Policy, 14*(1), 31–60. https://doi.org/10.1162/edfp_a_00236

Cleveland, C., & Lukes, D. (2022). The lingering legacy of redlining on school funding, diversity, and performance. https://scholar.harvard.edu/sites/scholar.harvard.edu/files/chcleveland/files/cleveland_lukes_2022_the_lingering_legacy_of_redlining_2022-10.pdf

Daza, S. L., & Tuck, E. (2014). De/colonizing, (post)(anti)colonial, and indigenous education, studies, and theories. *Educational Studies, 50*(4), 307–312.

Fujioka, K., & Knight, D. S. (2024). McCleary at twelve: Examining policy designs following court-mandated school finance reform in Washington State. West Education Law Reporter.

Hashim, A. K. (2022). Connecting to the test: Investigating gaps in E-Rate subsidies for internal connectivity during California's transition to the Common Core State Standards. *Journal of Education Finance, 47*(4), 364–400.

Hashim, A. K., & Vongkulluksn, V. (2018). E-reader apps and reading engagement: A descriptive case study. *Computers and Education, 125*, 358–375.

Hinojosa, D. (2018). Essential building blocks for state school finance systems and promising state practices. Learning Policy Institute.

Jackson, C. K. (2020). Does school spending matter? The new literature on an old question. American Psychological Association.

Jackson, C. K., Johnson, R. C., & Persico, C. (2016). The effects of school spending on educational and economic outcomes: Evidence from school finance reforms. *Quarterly Journal of Economics, 131*(1), 157–218.

Jackson, M., Osworth, D., Knight, D. S., & Saavedra Smith, C. (2024). Catalyst for equity: Conceptualizing district COVID-19 response as a portal for increasing equitable access. *Leadership and Policy in Schools*. https://doi.org/10.1080/15700763.2024.2347914

King, J. B. (2020). Letter to Lamar Alexander and Patty Murray, Chairman and Ranking Member of the Senate Help Committee. The Education Trust.

Knight, D. S. (2020). Accounting for teacher labor markets and student segregation in analyses of teacher quality gaps. *Educational Researcher, 49*(6), 454–458. https://doi.org/10.3102/0013189X20925805

Knight, D. S. (2017). Are high-poverty school districts disproportionately impacted by state funding cuts? School finance equity following the Great Recession. *Journal of Education Finance, 43*(2), 169–194.

Knight, D. S., Hassairi, N., Candelaria, C. A., Sun, M., & Plecki, M. (2022). Prioritizing school finance equity during an economic downturn: Recommendations for state policymakers. *Education Finance and Policy, 17*(1), 188–199. https://doi.org/10.1162/edfp_a_00356

Knight, D. S., Karcher, H., & Hoang, T. (2022). School finance equity through accountability? Exploring the role of federal oversight of school districts under the Every Student Succeeds Act. *Peabody Journal of Education, 97*(4), 458–478.

Knight, D. S., & Plecki, M. (2022). Establishing priorities for education finance under fiscal uncertainty: Recommendations for Washington state policymakers. University of Washington. https://www.education.uw.edu/ejr/files/2022/04/Knight-Plecki_WEA_School-Finance-Equity-in-Washington_Feb2022-1_R.pdf

Knight, D. S., & Mendoza, J. (2019). Does the measurement matter? Assessing alternate approaches to measuring state school finance equity for California's Local Control Funding Formula. *AERA Open, 5*(3), 1–31. https://doi.org/10.1177/2332858419877424

Lafortune, J., Rothstein, J., & Schanzenbach, D. W. (2018). School finance reform and the distribution of student achievement. *American Economic Journal: Applied Economics, 10*(2), 1–26.

Lukes, D., & Cleveland, C. (2021). The lingering legacy of redlining on school funding, diversity, and performance. EdWorkingPaper No. 21-363. https://files.eric.ed.gov/fulltext/ED616673.pdf

Martínez, D. G. (2021). Interrogating social justice paradigms in school finance research and litigation. *Interchange, 52*(2), 297–317.

Martínez, D. G., & Heilig, J. V. (2022). An opportunity to learn: Engaging in the praxis of school finance policy and civil rights. *Minnesota Journal of Law and Inequality, 40*(2), 311.

McCleary v. State of Washington, 173 Wash. 2d 477, 269 P.3d 227 (2012).

McMorris, C., & Knight, D. S. (2022). How states prioritize educational needs: Assessing the distribution of the Governor's Emergency Education Relief Fund. *Journal of Education Finance*, *48*(1), 5–33.

Odden, A., & Picus, L. O. (2019). *School finance: A policy perspective* (6th ed.). McGraw Hill.

Odden, A., Picus, L. O., Griffith, M., Hoyer, K., Knight, D. S., & Odden, R. (2016). Using the evidence-based method to identify adequate spending levels for Vermont schools. Picus, Odden and Associates.

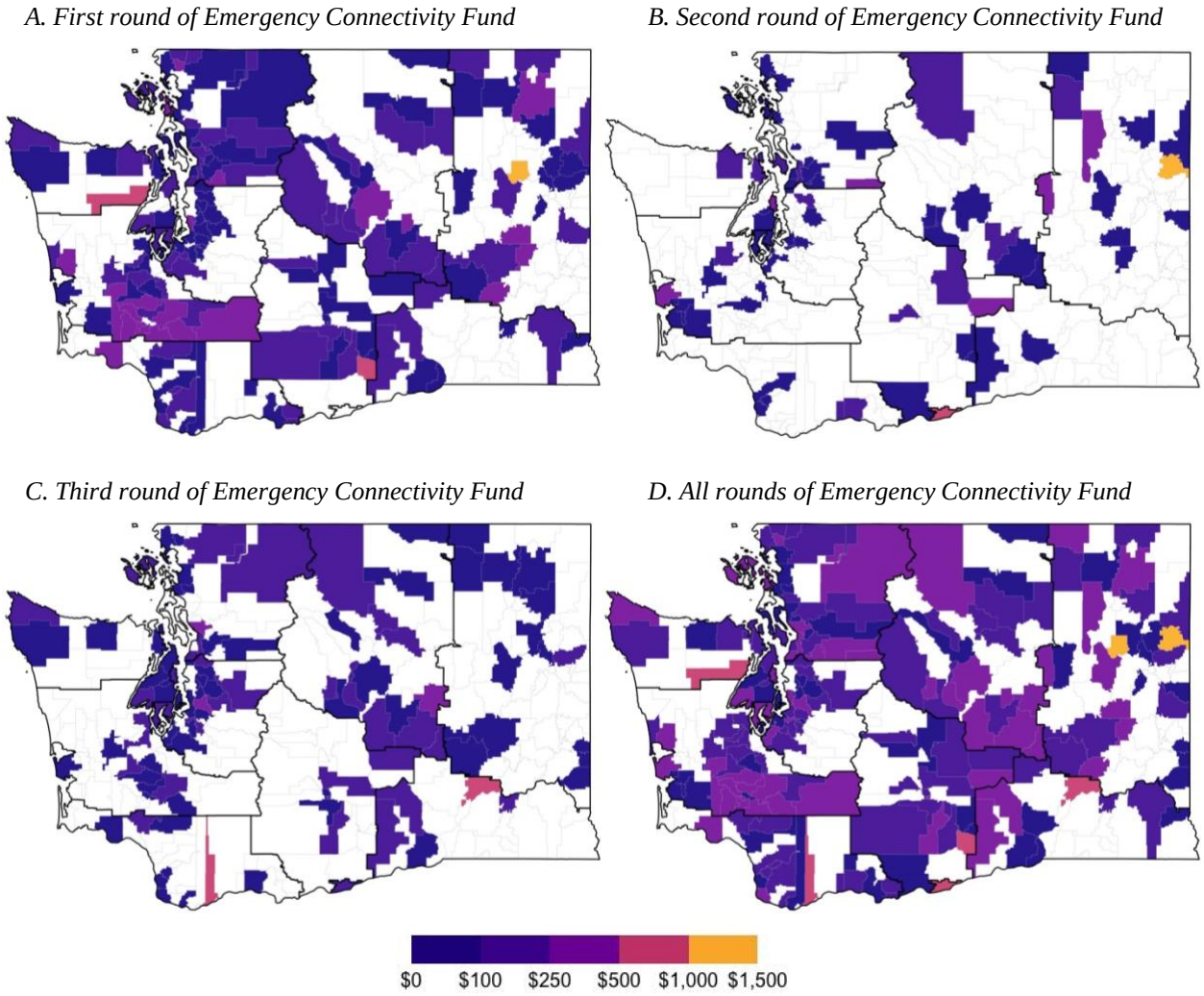
Office of Superintendent for Public Instruction. (2022a). Citizen's guide to Washington State K-12 finance. https://leg.wa.gov/Senate/Committees/WM/Documents/Citizen%27s%20guides/K12%20Booklet_2022.pdf

Office of Superintendent for Public Instruction. (2022b). Educational technology federal programs. https://www.k12.wa.us/policy-funding/school-technology/educational-technology-federal-programs

Appendix Tables and Figures

APPENDIX FIGURE A1

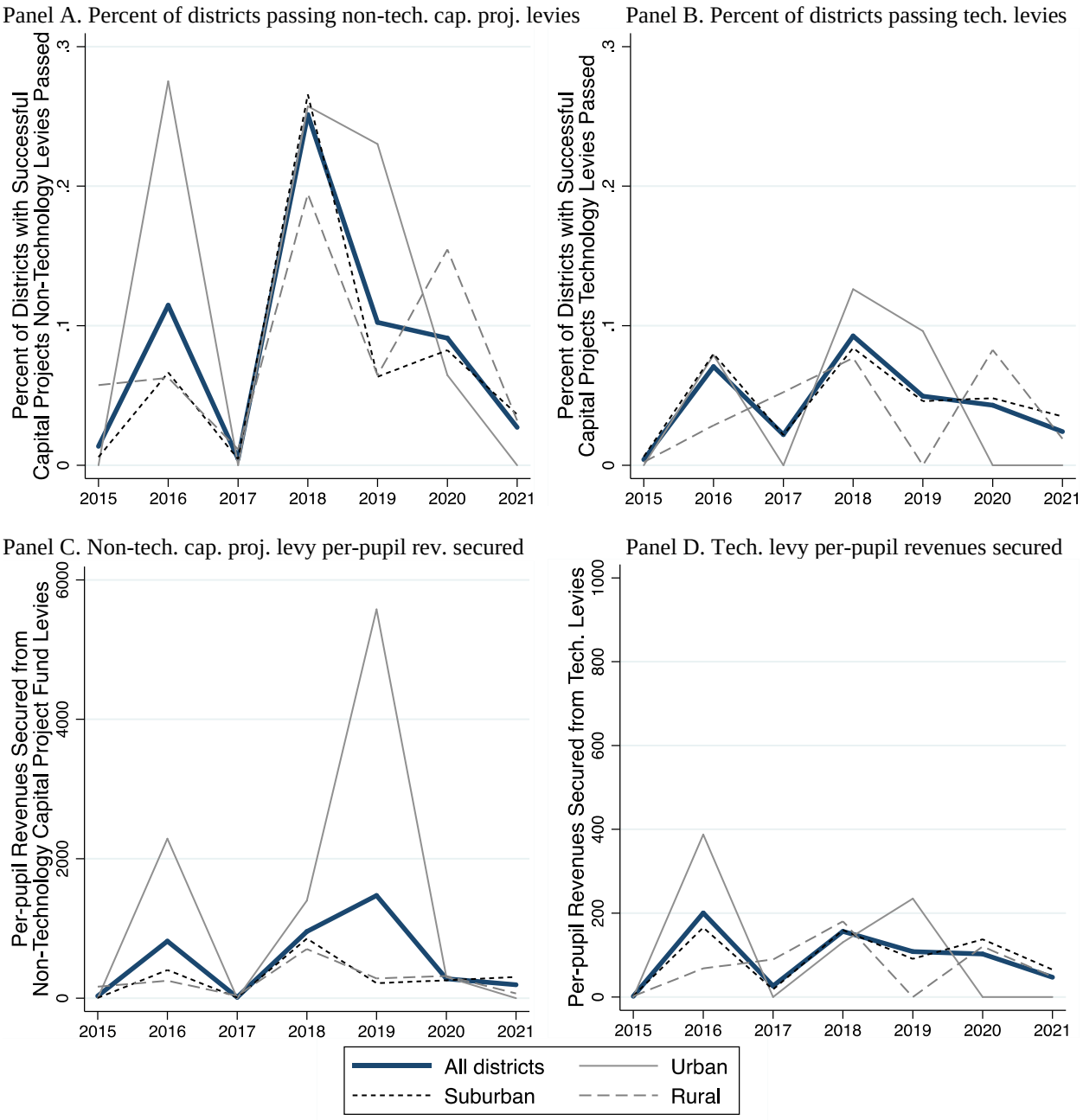
Per-pupil funding for the Emergency Connectivity Fund revenue for Washington school districts, 2020-21



Note. Emergency Connectivity Funds were allocated in three rounds, with the third application filing window closing May 13, 2022. Panel D shows the sum of per-pupil revenues for Emergency Connectivity Funds.

APPENDIX FIGURE A2

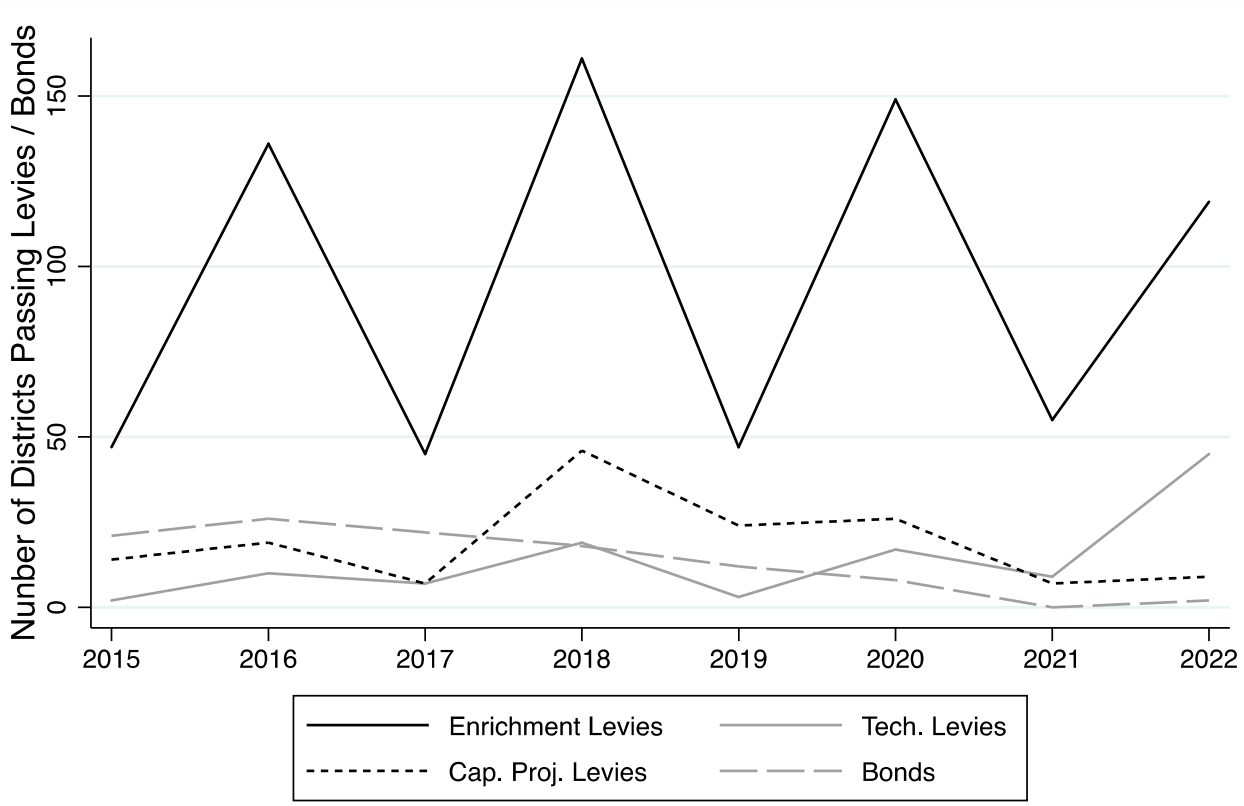
Percent of districts passing capital projects and technology levies and annual per-pupil revenues for Washington school districts, 2014-15 to 2020-21



Note. Panels A and B show the percent of districts out of 295 successfully passing capital project levies and technology levies, respectively. Panels C and D show the statewide mean per-pupil revenues generated from those levies.

APPENDIX FIGURE A3

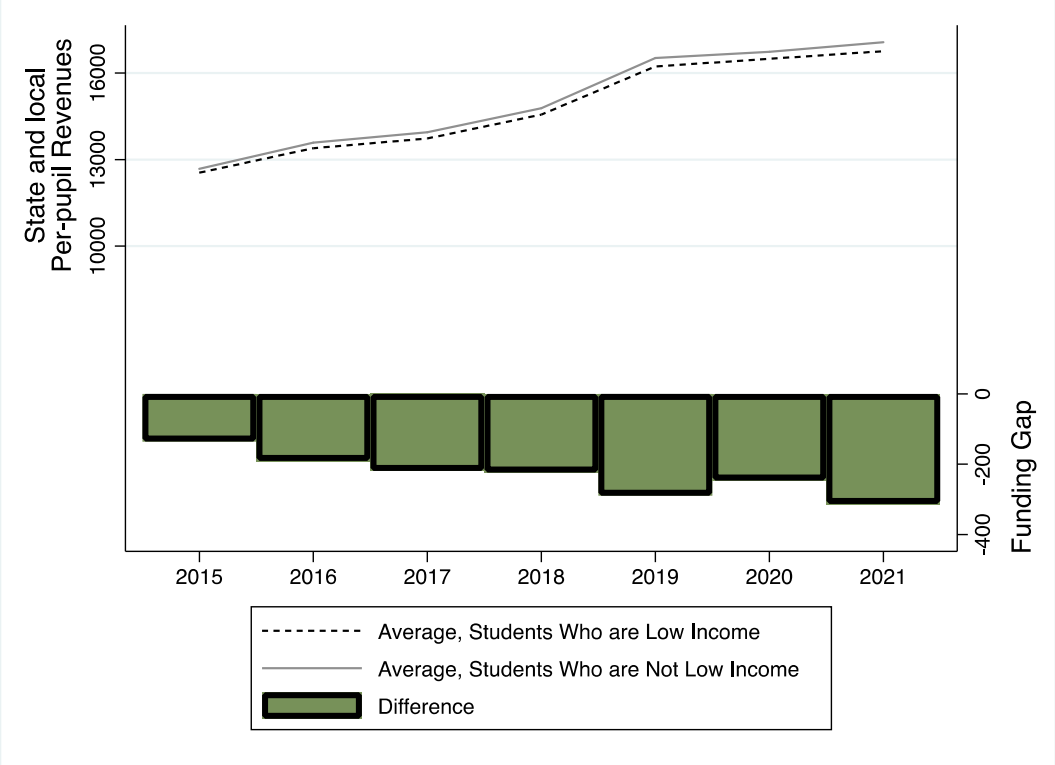
Number of districts passing enrichment, capital projects, and technology levies and bonds for Washington school districts, 2014-15 to 2021-22



Note. Figure shows number of districts passing different types of levies and bonds over a eight year period. See Table 3 for numeric values. Transportation levies are not shown (only nine were passed during this period).

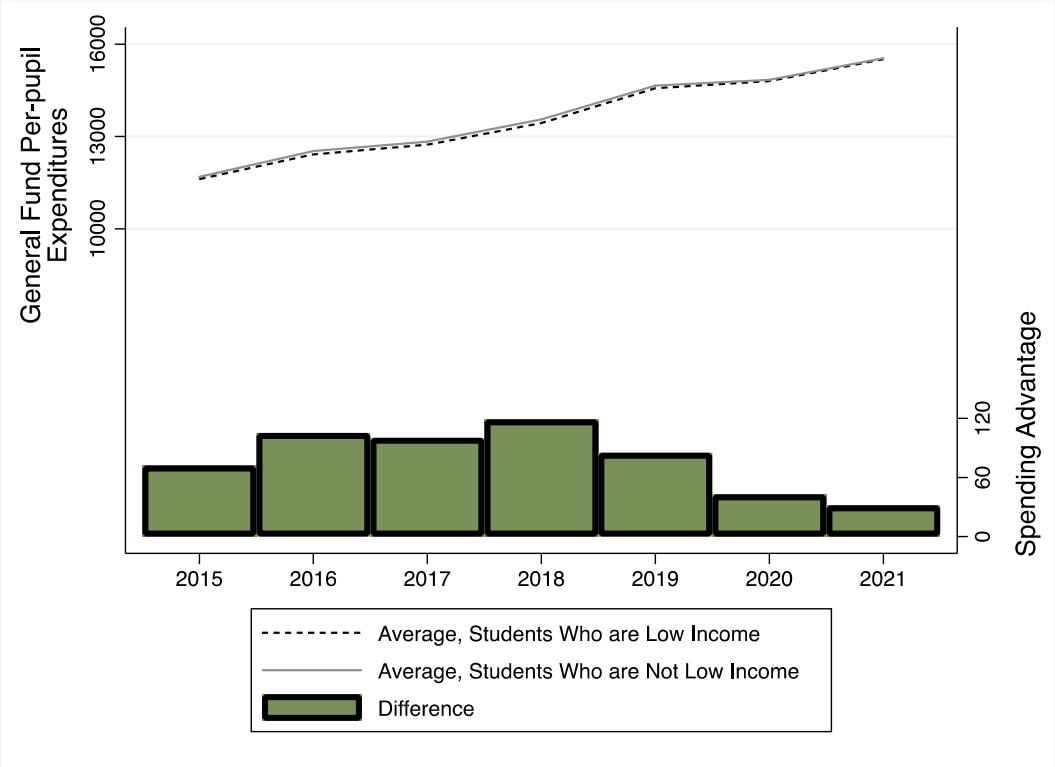
APPENDIX FIGURE A4

State and local funding per pupil by student income, 2014-15 to 2020-21



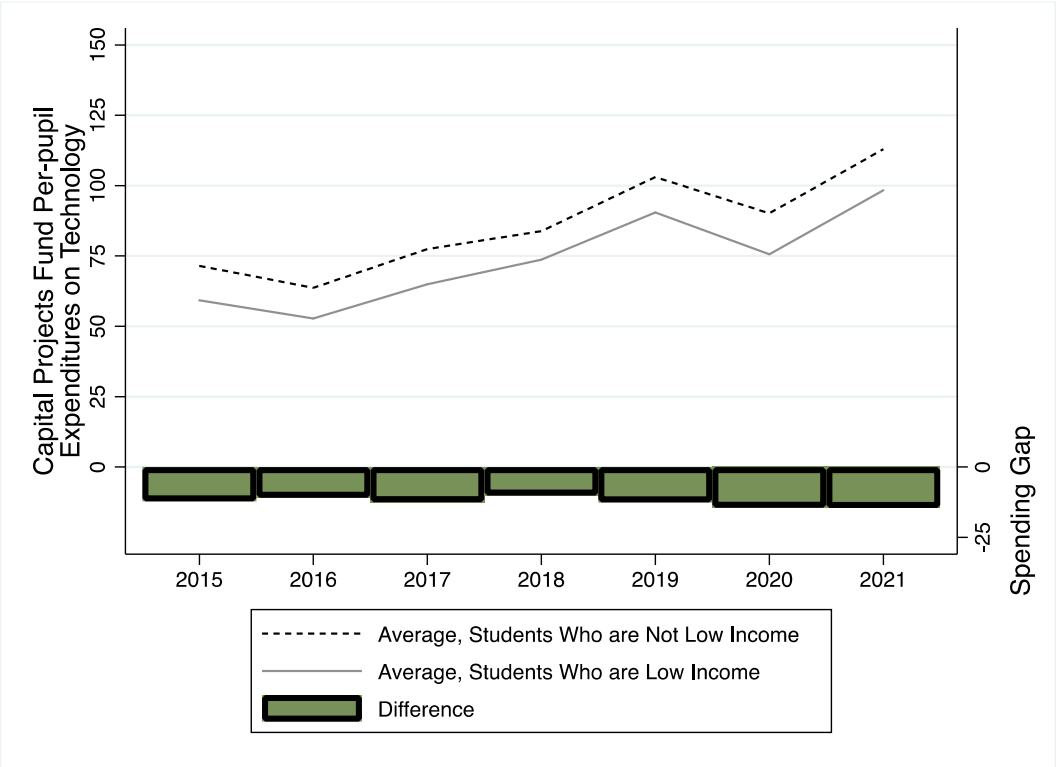
APPENDIX FIGURE A5

State and local spending per pupil, by student income, 2014-15 to 2020-21



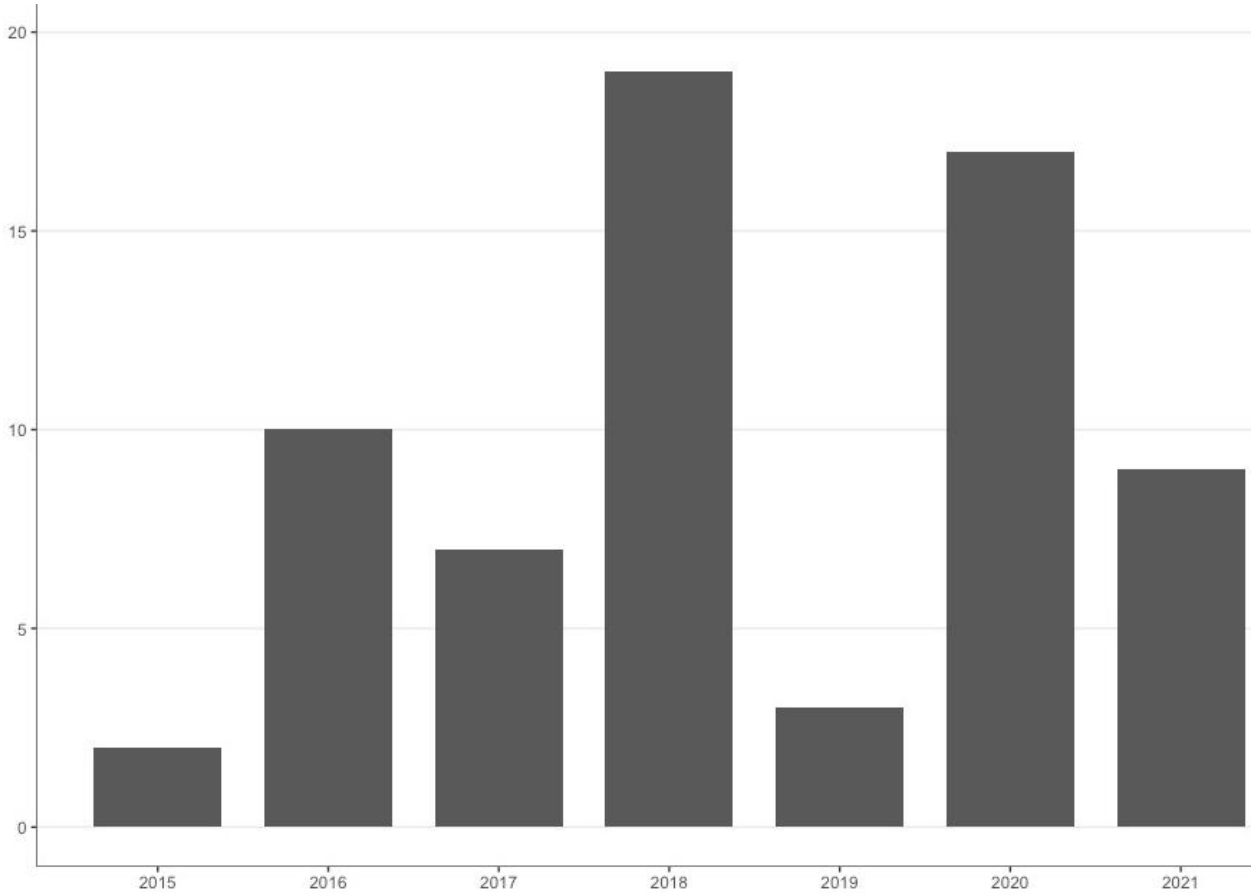
APPENDIX FIGURE A6

Capital Projects Fund spending per pupil on educational technology, by student income, 2014-15 to 2020-21



APENDIX FIGURE A7

Number of school districts that successfully pass a technology levy, 2014-15 to 2020-21



Note. Figure shows the number of districts out of 295 that pass a technology levy each year. Similar information paired with other levy election is displayed in Appendix Figure A3.

APPENDIX TABLE A1

Summary statistics for key input and outcome variables, 2014-15 to 2020-21

	Mean	Stand. Dev.	Min	Percentiles				Max
				10th	25th	75th	90th	
Revenues								
Federal	$1,031	$663	$0	$509	$642	$1,232	$1,718	$23,677
State	$10,718	$2,154	$4,038	$8,175	$9,101	$12,243	$12,963	$89,577
Local	$4,318	$1,940	$89	$2,080	$3,044	$5,629	$6,804	$68,945
Total	$16,066	$2,715	$5,628	$13,023	$14,164	$17,627	$19,317	$107,083
Total MSOC	$1,118	$161	$93	$827	$1,124	$1,204	$1,237	$3,531
MSOC - technology	$135	$17	$11	$108	$135	$143	$146	$407
Districtwide classified tech.	$24	$5	$2	$19	$20	$28	$32	$82
Expenditures								
1. General Fund	$13,602	$1,928	$8,603	$11,407	$12,320	$14,750	$15,901	$97,010
Inst. tech. exp. from GF	$96	$96	$0	$3	$19	$139	$213	$2,053
2. Capital Projects Fund	$2,622	$2,994	-$12	$106	$458	$3,633	$6,267	$66,783
Inst. tech. exp. from CPF	$85	$139	-$29	$0	$0	$142	$281	$1,017
3. Debt Service Fund	$1,317	$955	$0	$131	$696	$1,810	$2,456	$17,813
4. ASB Fund	$100	$59	$0	$29	$60	$127	$174	$1,351
5. Transp. Vehicle Fund	$65	$88	-$39	$0	$16	$92	$138	$18,187
District summary statistics								
Enrollment	15,570	12,738	4	2,165	5,158	21,872	30,323	56,200
Am. Ind./ AK Native	1%	0.04	0%	0%	0%	1%	2%	98%
Asian	8%	0.09	0%	1%	2%	13%	20%	43%
Black	4%	0.05	0%	1%	1%	7%	14%	22%
Latinx	23%	0.19	0%	9%	12%	27%	46%	100%
Pac. Is. / HI Native	1%	0.01	0%	0%	0%	2%	3%	7%
Two or more	8%	0.04	0%	3%	5%	11%	13%	35%
White	54%	0.20	0%	25%	42%	69%	79%	100%
Residential poverty rate	12%	0.06	0%	5%	8%	16%	20%	56%
Free/reduced price lunch	47%	0.20	0%	18%	34%	60%	73%	100%
Special Education	14%	0.02	0%	12%	13%	16%	17%	45%
Multi-language learner	11%	0.09	0%	2%	4%	14%	23%	93%

Note. Sample based on 2,064 district year observations, or 295 districts per year. Averages are weighted by student enrollment. All dollar valuers are adjusted for inflation to 2020-21 dollars.

APPENDIX TABLE A2

Average per-pupil spending across funds (Panel A) and within the Capital Projects Fund (Panel B) for Washington school districts, 2014-15 to 2020-21 (2020-21 dollars)

	2014-15	2016-17	2018-19	2020-21	7-yr avg.	% of total
Panel A: Expenditures across the five funds						
General Fund	$11,625	$12,744	$14,576	$15,515	$13,602	77%
Debt Service (bonds) Fund	$1,258	$1,185	$1,316	$1,531	$1,317	7%
Transportation Vehicle Fund	$58	$70	$68	$59	$65	0%
ASB Fund	$124	$119	$115	$29	$100	1%
Capital Projects Fund	$1,604	$2,244	$3,276	$3,086	$2,622	15%
Panel B: Expenditures within the Capital Projects Fund						
Site improvements and land	$142	$182	$182	$169	$167	6%
New buildings or remodeling	$1,231	$1,834	$2,816	$2,602	$2,205	84%
Initial equipment (e.g., desks)	$113	$127	$138	$171	$134	5%
Educational technology	**$70**	**$76**	**$102**	**$111**	**$85**	**3%**
Energy expenses	$40	$9	$24	$21	$19	1%
Sales and lease	$0	$2	$1	$1	$1	0%
Payments to debt, principal	$1	$2	$3	$3	$3	0%
Payments to debt, interest	$0	$0	$0	$0	$0	0%
Payments for arbitrage rebate	$0	$0	$0	$0	$0	0%
Bond/levy iss. & election exp.	$7	$11	$10	$7	$9	0%
Total	$1,604	$2,244	$3,276	$3,086	$2,622	100%
% of Cap. Proj. Fund on tech.	4.3%	3.4%	3.1%	3.6%	3.2%	--

Note. Figures adjusted for inflation to 2020-21 year dollars. This table shows per-pupil spending across the five funds Washington school districts use (Panel A) and then disaggregated spending for one of those funds, the Capital Projects Fund (Panel B). All capital projects levies, including technology levies, are deposited into the Capital Projects Fund. However, available Capital Projects Fund expenditure data do not identify whether the funds are generated from a technology levy or from a regular capital projects levy. Thus, we report all spending from the capital projects fund, noting that much of these funds are generated from capital projects levies. Spending on educational technology from the Capital Projects Fund is likely from technology levies; however, some revenues from a regular capital projects levy could be spent on educational technology, and some revenues from a technology levy could be spent on other related items, such as initial equipment or levy issuance and election expenses.

APPENDIX TABLE A3

Average total state funding for educational technology through the Materials, Supplies, and Operating Costs program (Panel A) and districtwide classified technology specialist staff funding (Panel B), for Washington school districts, 2014-15 to 2020-21

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	7-yr. avg.
Panel A: Materials, Supplies, and Operating Costs (MSOC) technology funding								
Regular	$308,110	$445,986	$452,034	$452,442	$453,498	$456,333	$427,718	$428,017
Lab science	$40,086	$40,140	$39,834	$39,488	$38,732	$38,951	$38,595	$39,404
CTE, gr, 7 - 8	$4,118	$4,710	$5,027	$5,406	$5,235	$5,628	$5,640	$5,109
CTE, gr. 9 - 12	$30,875	$31,121	$30,883	$30,840	$28,000	$28,205	$28,566	$29,784
Skills center	$2,925	$2,907	$2,900	$3,180	$2,843	$2,985	$2,675	$2,916
MSOC tech. total	$386,113	$524,864	$530,678	$531,356	$528,307	$532,102	$503,195	$505,231
Panel B: Districtwide Classified Staff Support technology funding								
Salary maint.	$70,206	$71,220	$71,400	$73,683	$72,477	$108,587	$99,960	$81,076
Salary incr.	$0	$2,137	$3,466	$1,694	$37,570	$2,172	$3,629	$7,238
Salary Total	$70,206	$73,356	$74,866	$75,377	$110,047	$110,759	$103,589	$88,314

Note. Averages are weighted by student enrollment, so that values can be multiplied by statewide enrollment to calculate total statewide revenues for each category, each year. CTE = career and technical education. Figures adjusted for inflation to 2020-21 dollars. The data include two types of CTE for grades 9-12, labeled "expl." and "prep." We report the former as the latter is equal to zero in all years. Other technology spending categories for MSOC, including for the Learning Assistant Program, Traditional Bilingual program, and Highly Capable, are all equal to zero in all years.

APPENDIX TABLE A3

Number of years each over which the revenues from a new technology levy will be collected

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Anacortes				4				4
Asotin-Anatone						5		
Bainbridge Island			4					
Bellevue								4
Bethel								4
Burlington-Edison								4
Camas			4				3	
Cascade			4				4	
Centerville				2				
Cheney							3	
Clarkston						2		
Cle Elum-Roslyn								3
Columbia (WW)								4
Conway				2				4
Coupeville				4				4
Dayton						4		
Dieringer								4
Edmonds		4						
Ellensburg		6						6
Everett		6						6
Evergreen School					6			
Federal Way		6						6
Fife		6						6
Franklin Pierce								4
Freeman							3	
Garfield								3
Gr. Coulee Dam				4				4
Granite Falls				4				4
Griffin			3					2
Highland								6
Highline						2		
Hockinson					3			
Kennewick				4				4
Kittitas				4				4
LaCrosse						3		
Lake Chelan		4						
Lake Stevens				4				4
Lake Washington								4
Lakewood		4				2		
Liberty	3						3	
Longview				4				
Lopez		4				4		
Lyle		6						
Lynden						4		
Marysville				4				4
Mercer Island								6
Meridian						4		
Methow Valley		4						

Mount Baker				6				
Mount Vernon			2		2		3	
Mukilteo				4				6
North Kitsap								4
Northshore								4
Ocean Beach			3					
Odessa							1	1
Olympia								4
Orcas Island							6	
Palouse								3
Port Angeles						5		
Pullman						4		
Puyallup								6
Quilcene						2		
Renton								4
Richland				4				4
Ritzville						2		
Riverside				4				2
Rosalia								2
San Juan Island		4						
Seattle								6
Shoreline								4
Snohomish				4				4
Snoqualmie Valley								4
Soap Lake						2		
St. John						2		
Stanwood-Camano				4				4
Sultan				4				4
Tacoma								4
Tahoma						3		
Tekoa						2		2
Tenino								4
Thorp				4				4
Tumwater								4
University Place								4
Vancouver					6			
Warden								2
Washougal			3					
Waterville								2
West Valley	3						3	
White River								4
Wilbur						3		
Winlock								3
Yakima						4		

Note. Districts in bold are collecting technology levy revenue during the 2021-22 school year (n=52). Numbers indicate the amount of years over which the revenues from a new technology levy will be collected, starting with the next year. Green highlighted boxes indicate years in which technology levy revenues are collected. We do not observe whether districts passed levies prior to 2014-15.

APENDIX FIGURE A4

List of school districts that successfully pass a technology levy, 2014-15 to 2021-22

	Voter-Approved Technology Levy Revenues ($1,000)								Year total
	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	
Districts that passed tech levies in 2014-15 (n=2)									***$2,085***
Liberty	$417						$525		
W. Valley	$1,668						$13,383		
Districts that passed tech levies in 2015-16 (n=10)									***$218,984***
Lopez		$663				$1,125			
Lk. Chelan		$1,104							
Methow V.		$2,457							
Lakewood		$3,148				$870			
Ellensburg		$4,492						$7,600	
San Juan Is.		$5,705							
Fife		$8,117						$14,000	
Fed. Way		$29,156						$28,000	
Edmonds		$65,160							
Everett		$98,981						$325,499	
Districts that passed tech levies in 2016-17 (n=7)									***$29,218***
Cascade			$1,518				$2,300		
Oc. Beach			$1,651						
Griffin			$2,115					$1,500	
Washougal			$2,597						
Mt. Vernon			$4,093		$9,950		$15,519		
Camas			$7,700				$11,470		
Bainbr. Is.			$9,543						
Districts that passed tech levies in 2017-18 (n=19)									***$175,797***
Centerville				$53					
Conway				$170				$320	
Thorp				$212				$300	
Kittitas				$1,453				$1,600	
Coupeville				$1,485				$1,950	
Coulee Dm.				$2,135					
Granite Fls.				$2,724					
Riverside				$3,545				$2,016	
Sultan				$4,333					
Lk. Stevens				$8,484				$10,000	
Stanwood-Camano				$8,877					
Anacortes				$8,899				$11,641	
Mt. Baker				$10,627					
Longview				$13,230					
Kennewick				$16,969				$18,500	
Richland				$17,181				$24,596	
Mukilteo				$23,332				$90,000	
Marysville				$25,453					
Snohomish				$26,635				$37,976	
Districts that passed tech levies in 2018-19 (n=3)									***$122,280***
Mt. Vernon			$4,093		$9,950		$15,519		
Vancouver					$50,717				
Evergreen					$61,613				

Districts that passed tech levies in 2019-20 (n=17)							***$116,686***
Ritzville					$102		
Tekoa					$291	$284	
St. John					$512		
Wilbur					$648		
Dayton					$716		
Pullman					$818		
Lakewood	$3,148				$870		
LaCrosse					$1,125		
Lopez	$663				$1,125		
Clarkston					$1,350		
As-Anatone					$1,504		
Quilcene					$1,666		
Meridian					$2,884		
Lynden					$3,171		
Tahoma					$12,788		
Highline					$33,247		
Pt. Angeles					$53,868		
Districts that passed tech levies in 2020-21 (n=9)							***$51,260***
Odessa					$100	$100	
Liberty	$416,947				$525		
Cheney					$1,590		
Cascade		$1,518			$2,300		
Orcas Is.					$3,000		
Freeman					$3,373		
Camas		$7,700			$11,470		
W. Valley	$1,667,786				$13,383		
Mt. Vernon		$4,093		$9,950	$15,519		
Districts that passed tech levies in 2021-22 (n=45)							***$2,375,240***
Odessa					$100	$100	
Rosalia						$150	
Tekoa					$291	$284	
Warden						$293	
Thorp			$212			$300	
Garfield						$300	
Conway			$170			$320	
Waterville						$478	
Winlock						$565	
Palouse						$900	
Griffin		$2,115				$1,500	
Kittitas			$1,453			$1,600	
Columbia						$1,700	
Coupeville			$1,485			$1,950	
Riverside			$3,545			$2,016	
Cle Elum-R						$4,500	
Tenino						$6,899	
Dieringer						$6,900	
Highland						$7,385	
Ellensburg	$4,492					$7,600	
Lk. Stevens			$8,484			$10,000	
Anacortes			$8,899			$11,641	
Univ. Place						$11,848	

Wt. River			$12,100	
Fife	$8,117		$14,000	
Shoreline			$14,000	
Fkin Pierce			$14,350	
Burl-Edi.			$14,427	
Kennewick		$16,969	$18,500	
Tumwater			$24,100	
Richland		$17,181	$24,596	
Fed. Way	$29,156		$28,000	
N. Kitsap			$35,688	
Snoqu. Vy			$35,693	
Snohomish		$26,635	$37,976	
Mercer Is.			$48,555	
Olympia			$52,427	
Northshore			$80,000	
Mukilteo		$23,332	$90,000	
Tacoma			$118,000	
Renton			$120,000	
Lk. WA			$177,100	
Bellevue			$228,000	
Everett	$98,981		$325,499	
Seattle			$783,000	
Total				$3,091,549

Note. This table includes a separate panel for each school year and each panel lists all districts that passed a technology levy that school year, the amount approved that year, and the amount approved for tech levies in any other year. Values are reported in nominal dollars in $1,000s. Each panel is sorted by the amount of dollars voters approved for the technology levy, so the last two rows of the table show the largest two technology levies approved in 2021-22 (Everett passed a technology levy in 2015-16 for $99 million, and another in 2021-22 for $326 million, while Seattle School District passed its first technology levy in at least eight years in 2021-22 in the amount of $783 million). Yearly totals, shown in last column include just the year totals for that year (and no prior or future years). The total revenues raised from 2014-15 to 2021-22 is $3.1 billion, including $2.4 billion in 2021-22 alone. District voluntarily indicate that a capital projects levy is designated as a technology levy, and this list does not include technology levies not reported to the state (we are not aware of any examples of districts designating a capital projects levy as a technology levy without reporting that designation to the state).