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America's School Infrastructure Needs a Major Investment of Federal Funds to Advance an Equitable Recovery

By Victoria Jackson and Nicholas Johnson

The federal government plays a small but significant role in funding public school operations and programs designed to even out disparities in student opportunity based on income, race, and ethnicity, and those facing students with disabilities. But no comparable federal program addresses the disparities in financing school construction and maintenance, leaving these significant costs to states and localities and tying schools' condition directly to the wealth of the surrounding community. Estimates suggest that American schools have hundreds of billions of dollars of unmet capital construction needs that local districts cannot make up. In recovery legislation Congress will soon consider, it should include a significant infusion of federal funds — at a minimum, the \$50 billion in grants proposed in President Biden's American Jobs Plan — to build and repair K-12 schools.

As a nation, we have not kept up with school maintenance. The COVID-19 pandemic has highlighted the need to prevent the spread of virus by, for example, improving school ventilation systems and creating ways for students to be socially distanced, but these are only some of many significant repairs facing schools. Due in part to longstanding federal inaction, the estimated cost of bringing all schools to good condition had reached nearly \$200 billion by 2013, according to the U.S. Department of Education,¹ and is likely even higher today as a result of disinvestment since the Great Recession. One estimate puts the cost of needed ventilation system improvements alone at \$72 billion.² The need for improvements is particularly acute in schools with high populations of students from low-income families and of Black, Indigenous, Latino, and other children of color.

Fixing school buildings can improve both health and student learning, research shows, while also creating jobs. Better lighting, acoustics, and accessibility all help students learn. And modern heating, ventilation, and cooling systems can slow the spread of airborne diseases such as COVID-19. While the federal government has provided significant support for schools' increased *operating* costs during

¹ Debbie Alexander and Laurie Lewis, "Condition of America's Public School Facilities: 2012-13," U.S. Department of Education National Center for Education Statistics, March 2014.

² Michael Griffith and Michael Pearce, "The Air We Breathe: Why Good HVAC Systems Are an Essential Resource for Our Students and School Staff," Learning Policy Institute, December 2020, <https://learningpolicyinstitute.org/blog/covid-hvac-systems-essential-resource>.

the pandemic — and to help children recover unfinished learning — support for school construction and other infrastructure needs is long overdue.

The American Jobs Plan represents a major step toward addressing these problems; it would provide \$50 billion in direct grants to states to upgrade and build new public schools. (It would subsidize another \$50 billion in bonds.) Democrats in Congress have gone further toward fully addressing the nation’s unmet infrastructure needs, proposing \$100 billion in grants (plus bond subsidies), to be administered by states with a small local match and targeted to districts serving the greatest shares of students from low-income families and those with significant infrastructure needs. Such investment could be a significant step toward modernizing the nation’s schools and giving all students the opportunity to succeed in a healthy, productive environment.

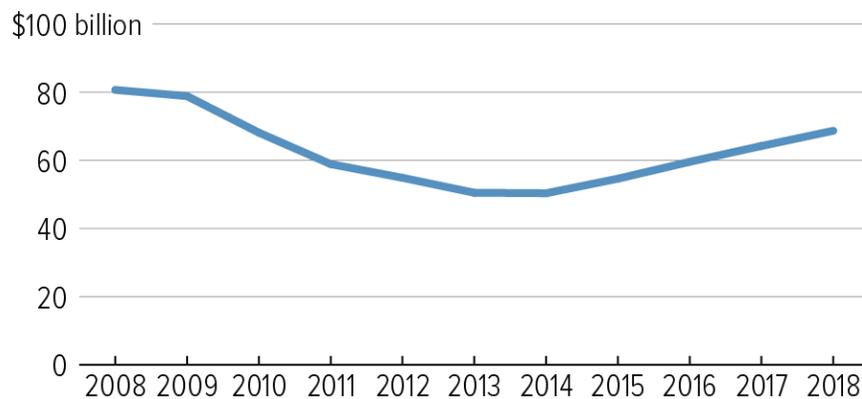
Funding for School Buildings: Inadequate and Inequitable

Over the past decade, school capital spending — for example to build new schools, renovate and expand facilities, and equip schools with more modern technologies — has fallen sharply in most states. In the years before the pandemic, most states had been restoring K-12 education funding, but progress was slow and uneven and serious needs remained; elementary and secondary schools spent \$12 billion (15 percent) less on capital projects in 2018 (the latest year for which data are available) than they did a decade earlier, after adjusting for inflation, even as school enrollment grew by 1.4 million students. (See Figure 1.)

FIGURE 1

School Infrastructure Spending Down Billions Over a Decade

For public K-12 schools, adjusted for inflation



Source: CBPP analysis of U.S. Census 2018 public elementary–secondary education finance data

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And state and local spending on infrastructure in general is at a historic low as a share of the economy.³ In 2018 total capital spending was \$68.7 billion, down from its 2008 peak of almost \$80.7

³ Elizabeth McNichol, “It’s Time for States to Invest in Infrastructure,” Center on Budget and Policy Priorities, March 19, 2019, <https://www.cbpp.org/research/state-budget-and-tax/its-time-for-states-to-invest-in-infrastructure>.

billion in 2018 dollars.⁴ According to a 2014 study by the U.S. Department of Education — which is the most recent comprehensive assessment of the nation’s school infrastructure needs — it would cost \$197 billion to bring all K-12 school buildings into good overall condition.⁵ (The absence of regularly updated federal data on school infrastructure needs is itself an indicator of longstanding federal neglect.)

Schools Educating Students From Low-Income Families Have Greatest Repair Needs

Most of the money spent on K-12 education pays for teachers and other school personnel, but investments in physical school buildings can also help children learn. A summary of the academic literature found that addressing poor lighting, bad air quality, and noise can increase student achievement.⁶

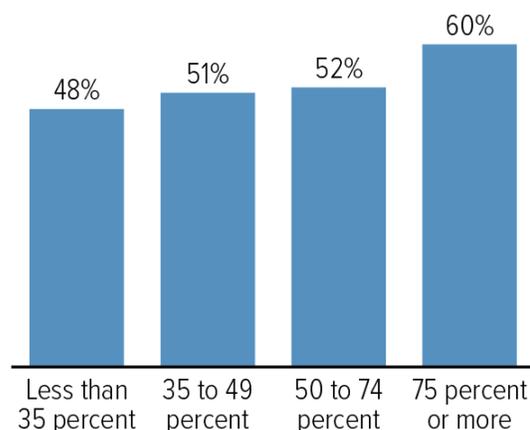
Schools in high-poverty areas, which disproportionately educate children of color, are most in need of the repairs that correlate with improved achievement.⁷ Schools with high concentrations of children in families in poverty are more likely to be in fair or poor condition, according to the Education Department survey. (See Figure 2.) High-poverty districts were more likely to rely on state funding for capital construction expenditures and spent an average \$300 (30 percent) less per student on such expenditures than did low-poverty districts, a 2020 Government Accountability Office (GAO) survey found.⁸

The specific needs of school buildings vary greatly and directly impact student learning and well-being. An estimated 54 percent of public school districts need to update or replace multiple building systems or features in their schools, the GAO report found. Some 41 percent of districts need to replace the heating, ventilation, and air conditioning (HVAC) systems in at least half of their schools, representing 36,000 schools nationwide. The report also noted needed updates or

FIGURE 2

Lowest-Income Schools Have the Highest Repair Needs

Percentage of schools in fair or poor condition, by share of students eligible for free or reduced-price lunch



Note: Students eligible for free or reduced-price lunch = students from families with incomes at or below 130 percent of the federal poverty line or at or below 185 percent.

Source: National Center for Education Statistics, Condition of America’s Public School Facilities: 2012-13

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⁴ U.S. Census Bureau, “2018 Public Elementary-Secondary Education Finance Data,” <https://www.census.gov/data/tables/2018/econ/school-finances/secondary-education-finance.html>

⁵ Alexander and Lewis.

⁶ Sapna Cheryan *et al.*, “Designing Classrooms to Maximize Student Achievement,” *Policy Insights from the Behavioral and Brain Sciences*, Vol. 1, Issue 1, October 1, 2014, pp. 4–12, <https://doi.org/10.1177/2372732214548677>.

⁷ National Equity Atlas, “School Poverty: All youth should attend economically diverse, well-resourced schools,” accessed April 14, 2021, https://nationalequityatlas.org/indicators/School_poverty#/.

⁸ U.S. Government Accountability Office, “K-12 Education: School Districts Frequently Identified Multiple Building Systems Needing Updates or Replacement,” June 2020, <https://www.gao.gov/products/gao-20-494>.

replacements in the following building systems or features: interior light fixtures (29 percent), roofing (28 percent), safety and security (27 percent), structural integrity (13 percent), and environmental conditions (9 percent).⁹

The HVAC-related problems include system leaks that damaged ceiling tiles or flooring and in some cases led to indoor air quality problems and mold.¹⁰ One study found that extreme heat inhibits learning and that school air-conditioning can mitigate that effect.¹¹

Addressing lead in school drinking water is another critical part of improving school facilities. In 2018, for example, the Detroit Public Schools Community District shut off water to its more than 100 schools for a year because tests found elevated levels of lead and copper in 16 of 24 tested schools.¹² To mitigate the problem, the district installed over 500 water-filtering hydration stations in every school, which cost over \$3 million.¹³

An estimated 43 percent of all school districts, serving 35 million students, tested for lead in drinking water in 2016 or 2017. Of the schools that tested, an estimated 37 percent had elevated lead levels that required taking steps to reduce or eliminate lead exposure, GAO found. These steps included replacing water fountains, installing filters or new fixtures, or providing bottled water.¹⁴ A study by Harvard's T.H. Chan School of Public Health found similar rates of elevated lead levels in schools' drinking water.¹⁵

There is no safe level of lead exposure for children, and exposure in early childhood is most harmful. According to the Centers for Disease Control and Prevention, elevated blood lead levels have been linked to hearing and speech problems, brain and nervous system damage, learning disabilities, and decreased growth.¹⁶ In addition to these health and developmental problems, early

⁹ *Ibid.*

¹⁰ *Ibid.*

¹¹ Joshua Goodman *et al.*, "Heat and Learning," National Bureau of Economic Research, May 28, 2018, <https://doi.org/10.3386/w24639>.

¹² Allyson Chiu, "Detroit public schools shut off drinking water because of 'elevated levels' of lead, copper," *Washington Post*, August 30, 2018, <https://www.washingtonpost.com/news/morning-mix/wp/2018/08/30/detroit-public-schools-shut-off-drinking-water-because-of-elevated-levels-of-lead-copper/>.

¹³ Lori Higgins, "After a year, drinking water is flowing in Detroit district schools," *Chalkbeat Detroit*, August 28, 2019, <https://detroit.chalkbeat.org/2019/8/28/21108789/after-a-year-drinking-water-is-flowing-again-in-detroit-district-schools>.

¹⁴ U.S. Government Accountability Office, "Lead Testing of School Drinking Water Would Benefit from Improved Federal Guidance," July 2018, <https://www.gao.gov/assets/700/692979.pdf>.

¹⁵ Angie Cradock, "Early Adopters: State Approaches to Testing School Drinking Water for Lead in the United States," Harvard T.H. Chan School of Public Health, January 9, 2019, <https://www.hsph.harvard.edu/prc/projects/early-adopters/>.

¹⁶ Centers for Disease Control and Prevention, "Health Effects of Lead Exposure," <https://www.cdc.gov/nceh/lead/prevention/health-effects.htm>.

childhood lead exposure is associated with lower math and reading standardized test scores in third grade.¹⁷

Even inadequate lighting and poor acoustics can hamper learning by making it harder for students to concentrate and for teachers to communicate. At the same time, studies have shown that increases in spending on schools generally have a disproportionately positive impact on students from low-income families and students of color. It is likely, then, that infrastructure investments in schools and districts that serve those students would be a particularly effective use of funds.

Legacy of Underinvestment in Schools Serving Native Students and Those in Puerto Rico

Legacies of underinvestment in schools funded through the Interior Department's Bureau of Indian Education (BIE) and in schools in Puerto Rico further underscore the need for equitable federal funding of school infrastructure.

While more than 90 percent of American Indian and Alaska Native students attend public schools, which would benefit from increases in K-12 funding more generally, BIE-operated schools educate about 45,000 American Indian and Alaska Native students on or near reservations and are vital assets for the communities that depend on them. BIE operates primary and secondary schools and dormitories in 23 states. They tend to be geographically isolated and face various challenges. Many are deteriorating, and construction funding remains insufficient to address maintenance backlogs — whose costs are estimated at \$639 million for schools and \$86 million for dormitories as of fiscal year 2019.¹⁸ Replacing and rebuilding some of the worst-off schools and structures in the BIE system will cost over \$4 billion, according to the Interior Department's Inspector General.¹⁹

Puerto Rico, meanwhile, as of 2019 needed \$11 billion and three to seven years to bring its public schools up to the new building codes after hurricanes Irma and Maria devastated the island in 2017, the territory's Secretary of Education Eligio Hernández noted.²⁰ That was before January 2020's earthquakes forced all of its schools to close.²¹ Hernández has also noted that 95 percent of Puerto Rico's public schools were not up to current earthquake building codes.²²

¹⁷ Anne Evens *et al.*, "The Impact of low-level lead toxicity on school performance among children in the Chicago Public schools: a population-based retrospective cohort study," *Environmental Health*, Vol. 14, No. 21, April 7, 2015, <https://doi.org/10.1186/s12940-015-0008-9>.

¹⁸ "Statement of Jason Freihage, Deputy Assistant Secretary for Management, Office of the Assistant Secretary for Indian Affairs, Department of the Interior, Before the Subcommittee on Interior, Environment, and Related Agencies, House Committee on Appropriations on Education Facilities and Construction," July 24, 2019, <https://www.congress.gov/116/meeting/house/109835/witnesses/HHRG-116-AP06-Wstate-FreihageJ-20190724.pdf>.

¹⁹ U.S. Department of the Interior Office of Inspector General, "Condition of Indian School Facilities," September 2016, https://www.doioig.gov/sites/doioig.gov/files/FinalEval_BIESchoolFacilitiesB_093016.pdf.

²⁰ Andrew Ujifusa, "What's the Price Tag for Fixing Up Puerto Rico's Schools? Try \$11 Billion," *Education Week*, January 13, 2019, <https://www.edweek.org/education/whats-the-price-tag-for-fixing-up-puerto-ricos-schools-try-11-billion/2019/01>.

²¹ Laura Jimenez, "Puerto Rico's Earthquakes Have Put Thousands of Schoolchildren at Risk," Center for American Progress, February 10, 2020, <https://www.americanprogress.org/issues/education-k-12/news/2020/02/10/480206/puerto-ricos-earthquakes-put-thousands-schoolchildren-risk/>.

²² Patricia Mazzei, Edmy Ayala, and Frances Robles, "After Homes Collapse in Earthquake, Puerto Ricans Ask: Are We Safe?" *New York Times*, January 8, 2020, <https://www.nytimes.com/2020/01/08/us/puerto-rico-earthquake.html>.

Puerto Rico received \$2 billion in Federal Emergency Management Agency grants to repair schools and educational facilities in 2020.²³ But it will need more. In addition to its deteriorated school infrastructure, the territory is grappling with a dwindling student population and widespread school closures. From 2007 to 2019, Puerto Rico shuttered 673 (or 44 percent) of its public schools. Many of these closings resulted from austerity-driven policies — the territory is dealing with an unprecedented, ongoing bankruptcy — that could hinder access to education, notes a 2020 report from the University of California, Berkeley.²⁴

Federal Aid Is Necessary to Meet School Repair Needs

Federal programs under Title I (for high-poverty schools) and the Individuals with Disabilities Education Act (IDEA) provide important funding to address some disparities; in 2016 they represented 8 percent of the funding for school operating costs. Funding for these programs has declined substantially in inflation-adjusted terms over the last decade,²⁵ but the Biden Administration has proposed undoing those declines with major increases in its budget request for fiscal year 2022. However, IDEA and Title I are only for operating costs. There is no comparable federal program that addresses disparities in the financing of school construction. Those costs are significant and fall almost entirely on states and local school districts.

Construction and purchases of school buildings, land, and equipment cost over \$80 billion in 2018, according to the most recent Census data.²⁶ And according to an analysis of school spending between 1994 and 2013, local school districts paid 82 percent of school capital costs while states contributed 18 percent; the federal share was tiny (just 0.2 percent).²⁷ Relying primarily on local funding means that the condition of schools is directly tied to the wealth of the surrounding community. Property taxes are the main source of this local funding, limiting the funds available to schools in lower-value areas, especially those that have faced discriminatory housing policies and lack of public investment. Federal aid is needed to address this inequity.

While the American Rescue Plan and previous COVID-19 relief packages provided important emergency funding for K-12 schools, they do not address most long-standing infrastructure needs. The Learning Policy Institute estimates it would cost roughly \$72 billion to update school ventilation systems to ensure healthy air quality, which is critical to controlling the spread of coronavirus and future pathogens, among other health implications.²⁸ Investing now in ventilation systems could make it easier to keep schools open during future disease outbreaks.

²³ Federal Emergency Management Agency, “Awards for Permanent Work Increase in 2020,” December 28, 2020, <https://www.fema.gov/press-release/20201228/awards-permanent-work-increase-2020>.

²⁴ Othring & Belonging Institute at UC Berkeley, “Puerto Rico’s Public School Closures Eroding Communities,” September 2, 2020, <https://belonging.berkeley.edu/puerto-ricos-public-school-closures/executive-summary>.

²⁵ Kyrie E. Dragoo, “The Individuals with Disabilities Education Act (IDEA) Funding: A Primer,” Congressional Research Service, August 29, 2019.

²⁶ CBPP analysis of U.S. Census 2018 Public Elementary-Secondary Education Finance Data.

²⁷ 21st Century Fund, National Council of School Facilities, Center for Green Schools, “State of Our Schools: America’s K-12 Facilities, 2016,” <https://eric.ed.gov/?id=ED581630>.

²⁸ Griffith and Pearce.

Upgrading HVAC systems to improve air quality is an approved use of the Rescue Plan’s \$123 billion provided for K-12 schools for pandemic-related costs.²⁹ However, school repair needs go far beyond ventilation systems and the costs are much greater than what the Rescue Plan provides for, and the Plan’s aid is also needed for other COVID-19-related costs.

Federal aid for school capital spending can take the form of low-cost loans or direct grants, but to make a significant dent in the backlog of school infrastructure needs, federal aid should focus on grant funding.

School districts and states already issue bonds, which are repaid over a long period of time, to fund the construction of schools (and other government buildings). Often that makes sense since school facilities are used for decades but entail large upfront costs; borrowing allows localities to spread out these costs. As a result, taxpayers who use the infrastructure in the future will help pay for it, which promotes intergenerational equity and makes the projects more affordable by reducing pressure on budgets in any given year. The federal government subsidizes such loans indirectly by allowing many bondholders to claim an income tax deduction for the interest they receive, which allows school districts to pay lower interest rates for what they borrow.

The federal government could make more funds available for borrowing by lowering interest costs further, for example, by allowing school districts to issue bonds for which investors can claim tax *credits* instead of tax *deductions* and thereby make bonds even more attractive and further reduce localities’ cost of borrowing.³⁰ But it’s unlikely that such an approach would have a sufficiently big impact on school infrastructure.

Another reason that additional loan subsidies will likely be insufficient is that many local governments will be hesitant to increase their debt since they already hold \$1.9 trillion in long-term debt and pay some \$65 billion in interest each year.³¹ And with interest rates already at historically low levels, it is not clear how much difference additional loan subsidies would make. Federal *grants* — if appropriately targeted — likely would do more to provide immediate investment in school facilities that need it most.

The American Jobs Plan would provide \$50 billion to upgrade and build new public schools through direct grants. This investment could be a significant step toward addressing the need to

²⁹ H.R.1319-American Rescue Plan Act of 2021, 117th Congress, <https://www.congress.gov/bill/117th-congress/house-bill/1319/text#toc-HC9CE46A721204EB081A88ACD8FB287D5>.

³⁰ An example of this approach, the Build America Bonds established under the 2009 Recovery Act, funded \$181 billion in state and local infrastructure projects, 30 percent of which were for educational facilities. Robert Puentes, Patrick Sabol, and Joseph W. Kane, “Cut to Invest: Revive Build America Bonds (BABs) to Support State and Local Investments,” Brookings Institution, August 28, 2013, <https://www.brookings.edu/research/cut-to-invest-revive-build-america-bonds-babs-to-support-state-and-local-investments/>. A U.S. Treasury study (<https://www.treasury.gov/initiatives/recovery/Documents/BABs%20Report.pdf>) found that the program allowed state and local governments to save an estimated \$20 billion in interest costs compared to what they would have spent on conventional tax-exempt municipal bonds. Subsidizing loans through tax credits is preferable to conventional tax-exempt bonds since tax-exempt bonds provide a large subsidy to investors, most of whom are wealthy individuals or institutions; in comparison, subsidizing bonds through tax credits generally provides a smaller subsidy to investors relative to the reduction in interest rates paid by schools, so the investors receive a smaller windfall.

³¹ U.S. Census Bureau, 2018 State & Local Government Finance Historical Datasets and Tables, <https://www.census.gov/data/datasets/2018/econ/local/public-use-datasets.html>.

build and repair the nation's schools, along with subsidies for another \$50 billion in loans. To ensure the direct grants are allocated where the needs are greatest, the funds should be prioritized to schools that serve many children from low-income families and that have significant infrastructure needs.

The Reopen and Rebuild America's Schools Act of 2021, introduced in the House and Senate, could be a model for how to structure the American Jobs Plan funds.³² The Act includes \$100 billion in grants to states (including the District of Columbia and Puerto Rico) and an additional \$30 billion in subsidized bonds to fund school construction over the next eight years, with priority for high-poverty school districts and those that have faced historical and continuing challenges raising capital construction funds. BIE-operated schools and schools in Outlying Areas (that is, the U.S. Virgin Islands, Guam, Commonwealth of the Northern Mariana Islands, and American Samoa) would each receive 0.5 percent of the bond allocation. The Act also includes provisions that will lead to the collection of better data on the condition of the nation's schools.

Federal funding for capital construction for K-12 schools is needed to bring all of the nation's public schools to good condition. Federal funding is also critical for creating more equitable spending on school capital construction. Investing in school infrastructure, as proposed by the America Jobs Plan, would improve school environments and academic outcomes, helping give all students the opportunity to thrive in a healthy and productive learning environment.

³² H.R.604-Reopen and Rebuild America's Schools Act of 2021, 117th Congress, <https://www.congress.gov/bill/117th-congress/house-bill/604>. Companion legislation (S.96) was introduced in the Senate: <https://www.congress.gov/bill/117th-congress/senate-bill/96/text>.