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Variation in Student Access to High-Speed Internet

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Research Brief:
Variation in Student Access to High-Speed Internet Access

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INTRODUCTION

Access to high-speed internet remains a key challenge for students across the U.S. Home internet access is associated with improved student outcomes, improved digital literacy, and an increased interest in STEM careers (Daoud et al., 2020; Hampton et al., 2020). Students in rural contexts and students who are economically disadvantaged face the greatest hurdles to accessing the internet. A key challenge in addressing these issues is that there is relatively limited data on internet availability (Hampton et al., 2020).

The sudden pivot to virtual learning in the spring of 2020 due to the COVID-19 pandemic highlighted disparities in student access to the internet. In 2020 and 2021, policymakers and researchers called for increased investment to reduce inequities in high-speed internet access (Lee et al., 2022; McWhirter, 2022; Lehr, 2020; Chambers, 2020). In recognition of these issues, many school districts provided students with devices such as laptops and tablets for economically disadvantaged students (Hampton et al, 2023).

DATA ON STUDENT ACCESS TO HIGH-SPEED INTERNET IS LIMITED

Broadband internet access for students is defined as access to the internet with a minimum download speed of 5-25 megabits per second (MBPS) (FCC, 2022a). This is the minimum required speed that a student would need to use the internet for education-related activities such as teleconferencing or streaming video. One could have access to a high-speed connection through several means, such as a home internet connection, a public Wi-Fi network, a mobile internet connection, or an internet connection via a satellite (FCC, 2022b).

While government and research organizations have estimated high-speed internet availability across the United States, student access to broadband is difficult to measure because factors beyond the availability of high-speed service shape students' access to the internet for learning. To use the internet for learning, one must have a high-speed connection, it must be reliable, and a student must have a device that can connect to the internet. This implies that a student may be in an area with broadband availability but may not have a device to facilitate access, or they may own a device and not have sufficient signal strength to connect (Hampton, 2020; Hampton, 2023). Due to these complicating factors, estimates of actual student broadband access are typically determined via surveys.

ACCESS TO HIGH-SPEED INTERNET IMPROVES STUDENTS' DIGITAL LITERACY

Substantial research indicates that access to high-speed internet improves student digital literacy, including the evaluation of web page reliability and speed and accuracy of information gathering (Geyer, 2009; Kuhlmeier & Hemker, 2007). Student time spent using the internet is directly correlated with digital skills, including internet searching ability and internet terminology awareness, which is consistent across numerous studies and when controlling for student socioeconomic status (Wong et al., 2015). Notably, some research indicates that increased access is not associated with strategic or ethical skills related to digital literacy, so access combined with

courses on digital literacy might be necessary to cultivate digital citizenship (van Deursen & van Diepen, 2013).

In addition, significant correlational evidence suggests that access to high-speed internet directly improves student test scores in reading (Casey et al., 2012), math (Erdogu & Erdogu, 2015), and science (Liu & Whitford, 2011). This is challenged by experimental evidence on student access to home internet, which indicates that test scores tend to decrease after the introduction home internet access (Beuermann et al., 2015; Vigdor & Ladd, 2010; Malamud & Pop-Eleches, 2008). This mixed evidence implies that increased access may need to be paired with oversight and management of computer use by parents and teachers to promote positive outcomes (Vigdor & Ladd, 2010).

STUDENTS IN RURAL AREAS AND STUDENTS WHO ARE ECONOMICALLY DISADVANTAGED HAVE LESS ACCESS TO HIGH-SPEED INTERNET

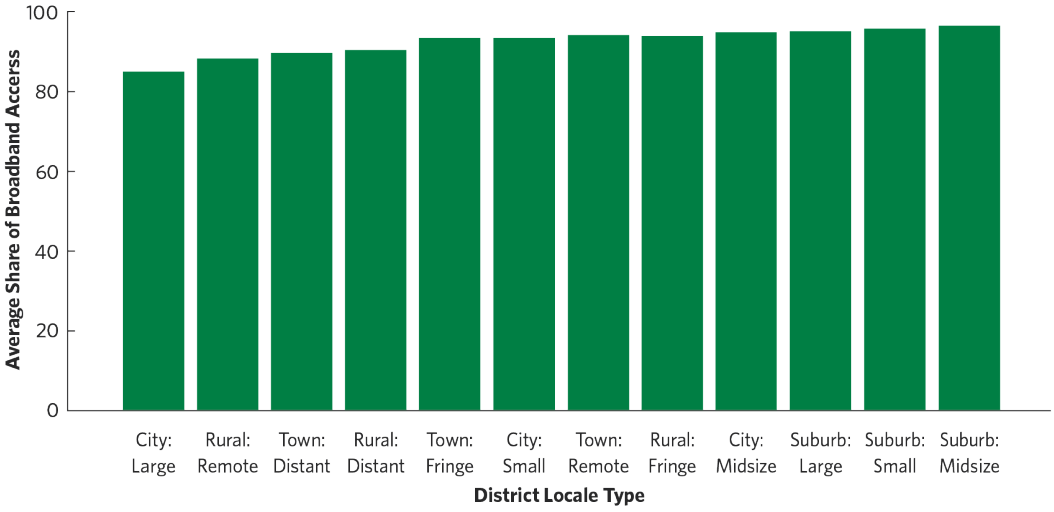
Despite significant gains in broadband access starting in the mid-2000s and especially during the COVID-19 pandemic, rural students continue to lag behind their peers in terms of broadband access (Humphreys, 2019). In Michigan, a 2023 report found that "nearly one in three rural students still lack adequate, fast, broadband home internet," (Hampton et al., 2023, p. 6). State and federal efforts have increased to make high-speed internet accessible in rural communities, but these efforts ultimately rely on private internet providers to invest in rural infrastructure (Humphreys, 2019).

In addition to the urban-rural broadband gap, students who are economically disadvantaged are less likely to have high-speed internet due to the cost of a connection or because they lack a device to connect to the internet (Hampton et al., 2020). In 2018, 44.5% of households across the U.S. with annual incomes below $25,000 did not have high-speed home internet relative to 8.4% of households with annual incomes above $150,000 (Horrigan, 2020). Low-income families are more likely to only have cell phone access to the internet or slow internet relative to fast internet (Hampton et al., 2020; Lee et al., 2022).

HIGH-SPEED INTERNET ACCESS IN MICHIGAN

Internet access in Michigan reflects the gaps in high-speed internet access between students in rural and urban areas and between students who are and are not economically disadvantaged. Hampton et al., (2020) and Hampton et al., (2023) provided strong evidence before and after the COVID-19 pandemic that disparities in access to high-speed internet were key drivers of student achievement gaps. Notably,

Figure 1: Student Access to High-Speed Internet in Michigan



Notes: Data drawn from 5-year 2021 ACS estimates of individuals under the age of 18 in Michigan school districts with a computer at home and dial-up internet or a broadband internet subscription. Locale designations drawn from MI School Data 2021 school district information file.

Hampton et al., (2023) observed that the urban-rural gap in internet access declined in Michigan between 2019 and 2022, though increases in internet access have stagnated since students returned to the classroom.

The urban-rural gap in internet access in Michigan is illustrated in Figure 1. This graph uses district-level data from the American Community Survey to illustrate home broadband access for different school district locales. Notably, the only district included in the "City: Large" category is Detroit Public Schools, and this district has the lowest proportion of students with broadband access in the state. Following this, districts in rural and town areas of Michigan have greater access than Detroit, though less access than students enjoy in suburban areas. Note that estimates from the ACS include any students with a computer at home with dial-up or a broadband internet subscription, and this may produce overestimates of student access due to the lack of speed information for each connection.

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