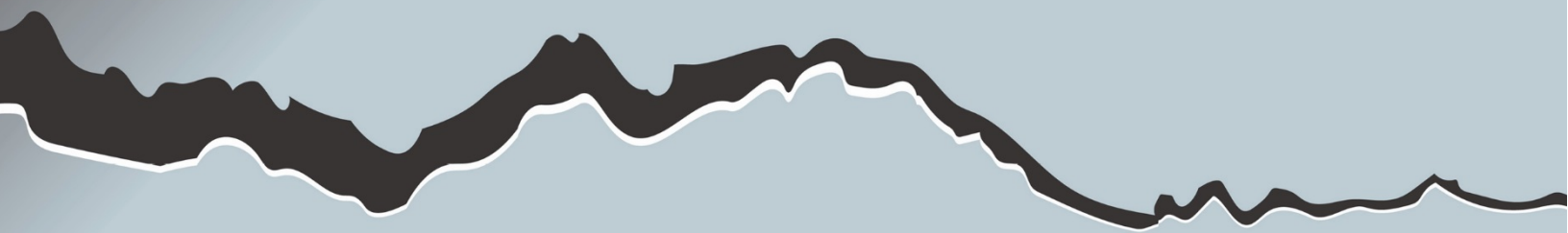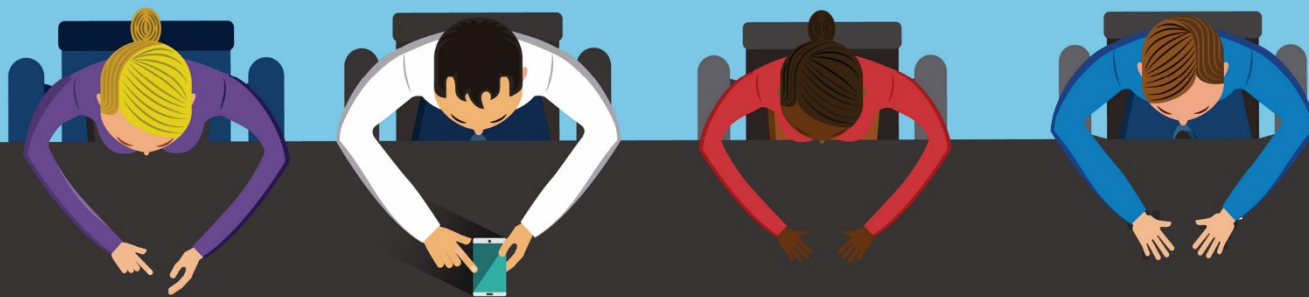# The Digital Divide and Educational Equity

A Look at Students with Very Limited Access to Electronic Devices at Home

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RELATED WORK

This paper is one of a series of reports on students' access to technology. For more information, see:

Moore, Raeal, *Smartphones and Laptops are the Most Accessible Technological Devices Students Have at Home* (Iowa City, IA: ACT, 2018), https://www.act.org/content/dam/act/unsecured/documents/R1680-tech-devices-at-home-2018-05.pdf.

Moore, Raeal, and Vitale, Dan, *High School Students' Access to and Use of Technology at Home and in School* (Iowa City, IA: ACT, 2018), https://www.act.org/content/dam/act/unsecured/documents/R1692-technology-access-2018-08.pdf .

SUMMARY

Access to technology is essential to educational success as well as workforce and community development. However, geographical, income-based, and racial/ethnic disparities in technology access persist.[2]

This "digital divide"—the gap between people who have sufficient knowledge of and access to technology and those who do not—can perpetuate and even worsen socioeconomic and other disparities for already underserved groups.

This brief takes a closer look at one particular group: students who have access to only one device at home, a group representing 14% of all survey respondents.

Taking a deeper dive into the data on students with access to only one device is important because these students may face challenges not faced by students with access to two or more devices.

SO WHAT?

ACT surveyed a random sample of students who took the ACT® test as part of a national administration in April 2017.[5] We asked the students numerous questions about their access to and use of technology specifically for educational activities, both at home and in school, including the number and kinds of devices they have access to, the kind and reliability of the internet connection(s) available to them, and how often they used electronic devices for school-related activities.

NOW WHAT?

Access to devices and internet appears to be somewhat uneven among the ACT-tested students we surveyed. Policy recommendations are to expand device access and internet among those who lack them and ensure students can access materials needed for school related activities via mobile technology.

The Digital Divide and Educational Equity

A Look at Students with Very Limited Access to Electronic Devices at Home

Raeal Moore, PhD, Dan Vitale, & Nycole Stawinoga

Students in the United States use technology daily, and access to it is essential to education success.[1] However, the "digital divide"—the gap between people who have sufficient knowledge of and access to technology and those who do not—persists.[2] In education, this digital divide is often referred to as the "homework gap" because of the challenges that students in technology-deficient circumstances face when trying to do their homework. This gap continues to widen as teachers incorporate technology-based learning into their daily curricula. To date, most research about the digital divide has focused on the US population generally, with little attention paid to determining whether the divide exists among students in the US education system.[3]

> **To date, most research about the digital divide has focused on the US population generally, with little attention paid to determining whether the divide exists among students in the US education system.**

ACT, therefore, surveyed a random sample of high school students who took the ACT® test as part of a national administration in April 2017.[4] We asked the students numerous questions about their access to and use of technology specifically for educational activities, both at home and in school, including:

- **the number and kinds of devices they have access to (e.g., smartphones, laptop computers, tablet computers);**

- **the kind and reliability of the internet connection(s) available to them; and**

- **how often they needed to use electronic devices and the internet for school-related activities.**

The *High School Students' Access to and Use of Technology at Home and in School* brief[5] focused on overall survey results and results for selected subgroups. This brief takes a closer look at one particular group: students who have access to only one device at home, a group representing 14% of all survey respondents (Figure 1).

Figure 1. Number of devices students have access to at home (all respondents n=7,233; respondents with one device n=1,013)
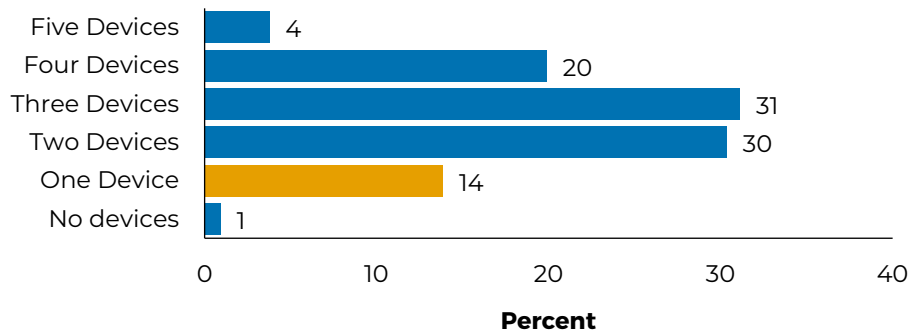
In contrast, 85% of respondents reported having access to anywhere from two to five devices at home. The remaining one percent of respondents reported having access to no devices at home, and thus a group about whom we can report little about device type and use. Taking a deeper dive into the data on students with access to only one device is important because these students may face challenges not faced by students with access to two or more devices. For example, students with access to only one device may need to share that device with other family members in their household. These family members might include siblings who also need the device for homework and other school-related activities. This limits the availability of the device for homework, college applications, and the like. In addition, if the device breaks, students will not have an additional device with which to complete school–related activities. Students with access to more than one device are less likely to face these challenges.

> **Taking a deeper dive into the data on students with access to only one device is important because these students may face challenges not faced by students with access to two or more devices.**

Demographic Characteristics

Understanding the demographic characteristics of the students with access to one device compared to students with access to more than one device can help uncover equity gaps in education and help inform policies to help close those gaps. Below, we present survey results by "served/underserved" status (and its individual components: annual family income range, parents' education level, and racial/ethnic group membership), gender, and geographic location of residence.

"Served/Underserved" Status

Overall, just under one in five (19%) students from "underserved" backgrounds report having access to only one device at home—more than three times higher than the percent of students not qualifying as underserved who reported this (Figure 2).

Figure 2. Percentage of students' access at home to one device, including only a smartphone, by "served/underserved" status
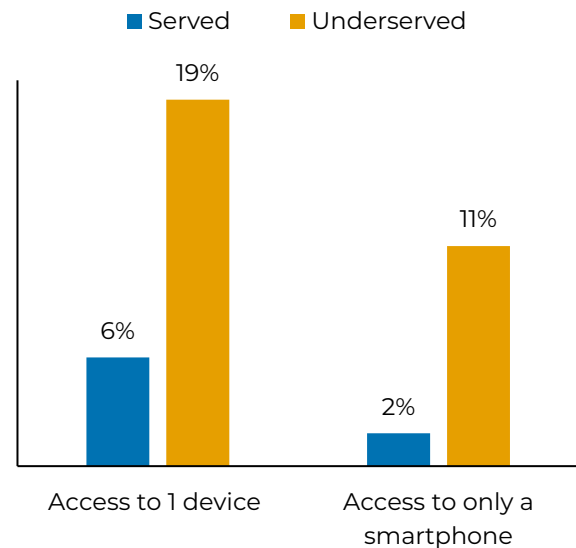
ACT identifies underserved students using characteristics that are often related to a lack of access to high-quality educational and career planning opportunities and resources. Specifically, this definition encompasses students who have at least one of the following characteristics:
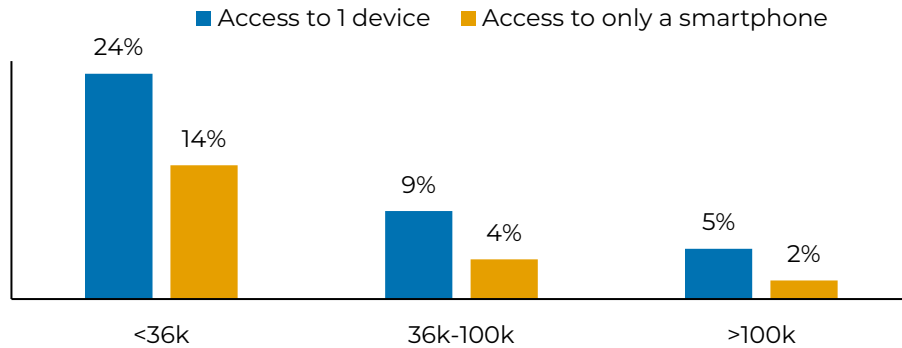
- **low income: combined parental income is less than or equal to $36,000 per year**

- **first generation in college: highest parental education level is high school diploma or less[6]**

- **minority: race/ethnicity is African American, American Indian/Alaska Native, Hispanic/Latino, or Native Hawaiian/other Pacific Islander**

Looked at conversely, 85% of the students who had access to only one device were classified as underserved. These data, of course, might also suggest that students whose families are wealthier or whose parents are more highly educated tend to have access to a higher number of devices.

Annual Family Income Range

Nearly one quarter (24%) of students whose self-reported annual family income was below $36,000 also report only having access to one device—a gap of 19 percentage points compared to students from families with annual income above $100,000 (Figure 3).

Figure 3. Percentage of students' access to one device at home, including only a smartphone, by annual family income range

■ Access to 1 device ■ Access to only a smartphone

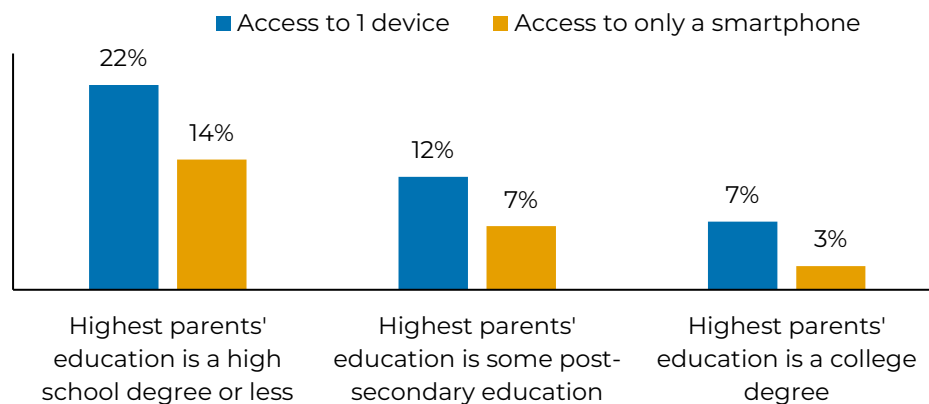| Income	Access to 1 device	Access to only a smartphone
<36k	24%	14%
36k-100k	9%	4%
>100k	5%	2%

Parents' Education Level

Twenty-two percent of first-generation students—those whose parents' highest education level is a high school degree or less—indicate they only have access to one device at home, and 14% indicate they only have access to a smartphone at home (Figure 4).
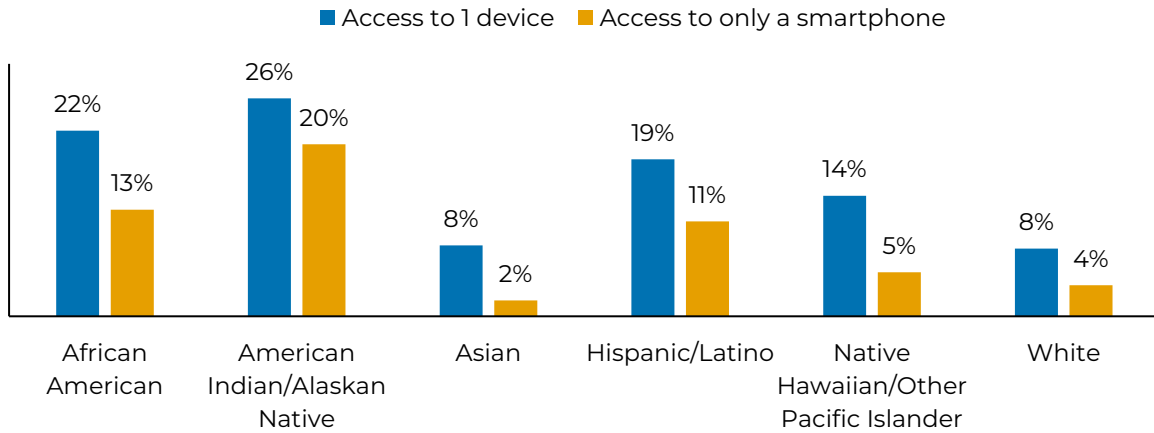
On the other hand, the majority of students whose parents have a college degree had access to more than one device at home; just 7% of this group have access to only one device and 3% only have access to a smartphone—a disadvantage of 15 percentage points for first-generation students. These data highlight the importance of ensuring that first-generation students have technological tools available to help them access higher education and attain a college degree.

Figure 4. Percentage of students' access to one device at home, including only a smartphone, by parents' education level

■ Access to 1 device ■ Access to only a smartphone

	Access to 1 device	Access to only a smartphone
Highest parents' education is a high school degree or less	22%	14%
Highest parents' education is some post-secondary education	12%	7%
Highest parents' education is a college degree	7%	3%

Race/Ethnicity

Figure 5. Percentage of students' access to one device at home, including only a smartphone, by race/ethnicity

■ Access to 1 device   ■ Access to only a smartphone

|	African American	American Indian/Alaskan Native	Asian	Hispanic/Latino	Native Hawaiian/Other Pacific Islander	White
Access to 1 device	22%	26%	8%	19%	14%	8%
Access to only a smartphone	13%	20%	2%	11%	5%	4%

Looking at the third component of underserved status, race/ethnicity, one quarter (24%) of American Indian/Alaskan Native students reported access to only one device at home,[7] as did 22% of African American students, 19% of Hispanic/Latino students, and 14% of Native Hawaiian/Other Pacific Islander students (Figure 5).

Comparatively, only 8% of White students and 8% of Asian students reported having access to only one device at home. Further, 20% of American Indian/Alaskan Native students only have access to a smartphone, compared to 4% of White students—a gap of 16 percentage points.

Gender

Turning to gender, male and female students were equally likely to report only having access to one device at home, although male students were slightly more likely to report that the device was a smartphone (Figure 6).

Figure 6. Percentage of students' access to one device at home, including only a smartphone, by gender

■ Access to 1 device   ■ Access to only a smartphone

	Female	Male
Access to 1 device	14%	14%
Access to only a smartphone	7%	9%
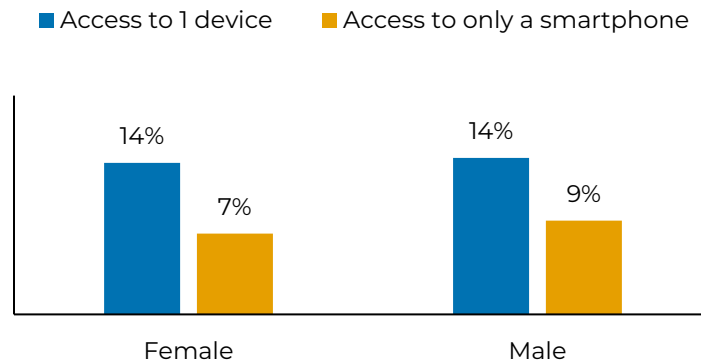
Geographic Location of Residence

Finally, students reporting access to only one device at home were far more likely to reside in a rural area than in an urban or suburban area or a town (Figure 7).

Figure 7. Percentage of students' access to one device at home, including only a smartphone, by geographic location of residence
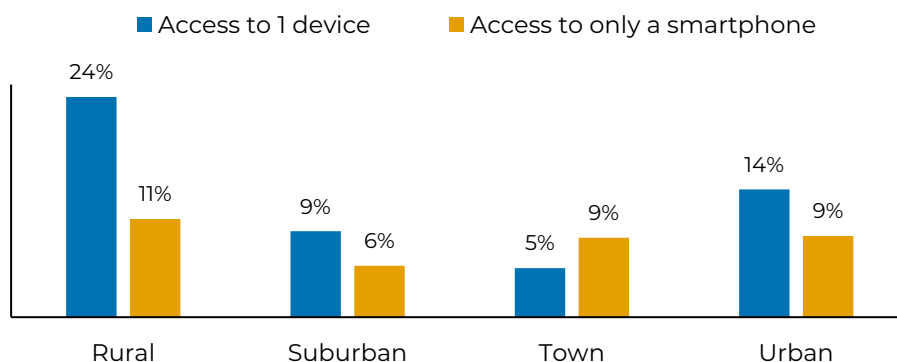
Device Type and Source

Figure 8 shows that more than half (56%) of the students who reported access to only one device at home indicated that the device was a smartphone. We specifically draw attention to those students whose sole device access is to a smartphone because some schoolwork assignments (e.g., writing papers) could be more difficult to complete on a small device like a smartphone than on a large device like a tablet or laptop.

Figure 8. Sole type of device students have access to at home
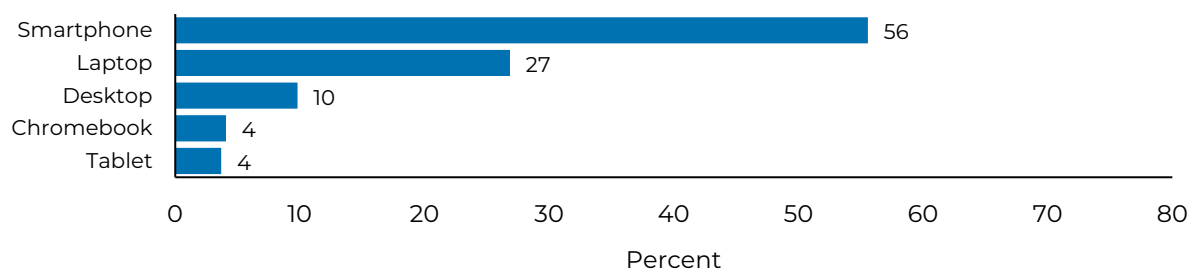
Twenty-eight percent of students who rely on one device at home reported that the device was provided to them by their school. The type of device provided by the school varied, with most students (40%) reporting they received a laptop computer, followed by a smartphone (31%). Fewer students reporting receiving a desktop (14%), Chromebook (10%), or tablet (6%) from their school.

Internet Access and Quality

Nearly half (47%) of students who report relying on one device at home depend exclusively on a monthly cellular data plan for home internet access.

A recently published study found that nearly three million Americans lived in higher education desserts, meaning they live more than 25 miles from a public university and do not have access to high-speed internet.[8] Many families with access to internet rely solely on mobile technology. According to a separate study published in 2016, one-third of families whose sole access to the internet is via mobile technology quickly hit data limits on their phone plans and about one-fourth have their phone service cut off for lack of payment.[9]

This is of concern with respect to the "homework gap" because, even as far back as 2009, about seven in ten teachers were assigning homework that required broadband internet; [10] in 2015, nearly half of students responding to a survey said they had had the experience of not being able to complete a homework assignment due to lack of internet or computer access—and 42% said they had received a lower grade on an assignment as a result.[11]

Students in the present survey also indicated the quality of their home internet access. Figure 9 compares these results for the students reporting access to only one device to those students who reported having access to two or more devices.[13] Reported home internet quality was roughly similar across the two groups, although it is worth noting that 5% fewer students with one device described their home internet quality as "great" than students with two or more devices, and 5% more described it as "unpredictable."

Since most students with access to one device are underserved, this further widens the already large equity gaps in education.
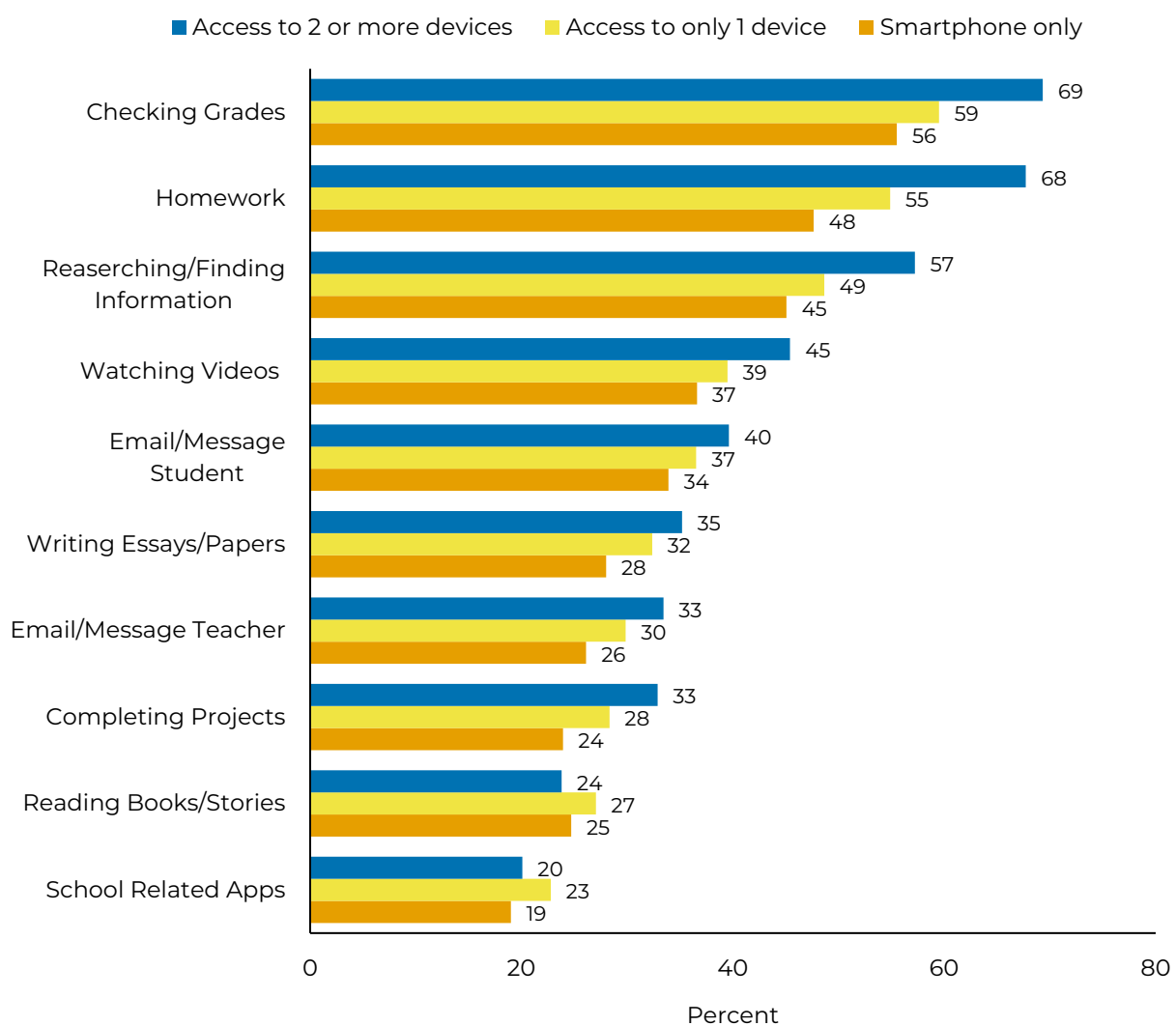
Figure 9. Reported quality of home internet, by number of device students have access to
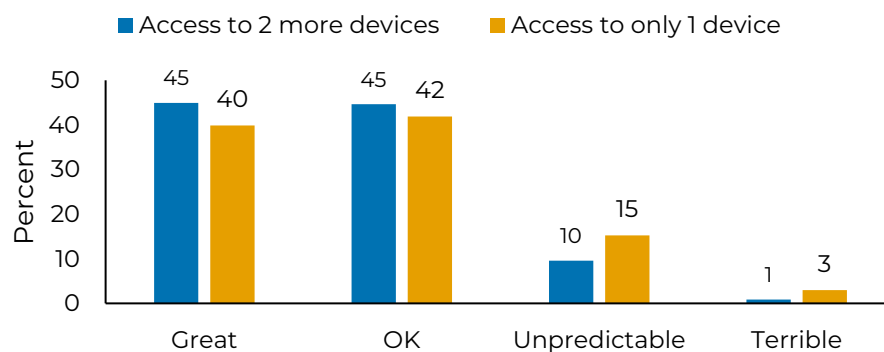
Amount and Frequency of Device Use for School-Related Activities

For most school-related activities, students who have access to more than one device are using their devices more frequently than students who have access to only one device, especially those who have access to only a smartphone (Figure 10). These differences could also be a reflection of the homework gap discussed earlier. For example, 68% of students with access to two or more devices are using those devices for homework. Only 48% of students who only have access to a smartphone are using their smartphone for homework—a gap of 20 percentage points.

Figure 10. Daily use of devices for various school-related activities, by number of devices students have access to and access to only a smartphone.

Legend: ■ Access to 2 or more devices　■ Access to only 1 device　■ Smartphone only

Activity	Access to 2 or more devices	Access to only 1 device	Smartphone only
Checking Grades	69	59	56
Homework	68	55	48
Reaserching/Finding Information	57	49	45
Watching Videos	45	39	37
Email/Message Student	40	37	34
Writing Essays/Papers	35	32	28
Email/Message Teacher	33	30	26
Completing Projects	33	28	24
Reading Books/Stories	24	27	25
School Related Apps	20	23	19

Percent

Policy Recommendations

1. Expand device access and internet among those who lack them.

Underserved students have access to fewer devices and lower-quality internet than students who are not disadvantaged. Inequitable access to electronic devices and effective internet connections contributes to opportunity, achievement, and equity gaps in education. Programs that help to rectify device and internet access imbalances—such as the Wireless Reach initiative[14] or the private-sector Kajeet[15]—can help improve educational opportunity and access for those in greatest need of assistance in preparing for and succeeding in the 21st-century economy.

2. Ensure that all students have easy access to the applications they need for school-related activities via mobile technology.

Given that more than half of the students in our survey with access to only one device at home reported that the device was a smartphone, and that almost half reported that their home internet connection was via a monthly cellular data plan, educators should do their best to ensure that students can easily find, view, and use required electronic materials via their phones and that such use does not place an unmanageable burden on their or their families' data plans. Further, colleges, universities, and other institutions of higher education should ensure that electronic documents students need to complete to apply for college, such as application and financial aid forms, can be easily accessed using a smartphone.

Notes

1. See, for example, Darling-Hammond, L., Zielezinski, M. B., and Goldman, S., *Using Technology to Support At-Risk Students' Learning* (Stanford, CA, Washington, DC: Stanford Center for Opportunity Policy in Education, Alliance for Excellent Education, 2014), https://edpolicy.stanford.edu/sites/default/files/scope-pub-using-technology-report.pdf; "TES Global 2015 Teachers and Technology Survey Shows That Tech in the Classroom is Now Universal," TES Global, March 10, 2015, http://www.marketwired.com/press-release/tes-global-2015-teachers-technology-survey-shows-that-tech-classroom-is-now-universal-1999005.htm; Perdue, B. E., and Hansen, W., "The Only Metric That Matters in EdTech: Student Outcomes," Forbes, May 11, 2015, https://www.forbes.com/sites/schoolboard/2015/05/11/the-only-metric-that-measures-the-success-of-education-technology/#5e6c1bc33d54.

2. *Closing the Digital Divide: A Framework for Meeting CRA Obligations* (Dallas, TX: Federal Reserve Bank of Dallas, 2016).

3. See, for example, Pew's series of research reports on technology access: http://www.pewinternet.org/2015/04/01/chapter-one-a-portrait-of-smartphone-ownership/.

4. 61,639 students who registered to take the ACT (17% of all registrants for the April 2017 test date) were invited to participate in the online survey, and 7,233 students participated (response rate of 12%). Some questions were adapted from the American Community Survey (ACS) and the Pew Research Center, while others were developed internally by ACT researchers. A random sample of students who did not finish the web survey or never started it were mailed a paper survey to ensure that responses from the online administration were not a function of mode of survey delivery. A comparison of web and paper survey respondents showed that the percentages of students with internet access and electronic-device access were virtually identical across the two delivery modes.

5. Moore, R., and Vitale, D., *High School Students' Access to and Use of Technology at Home and in School* (Iowa City, IA: ACT, 2018).

6. In the present context, "first-generation" thus differs from the standard definition of the term (which refers to students currently attending college).

7. The percentages of students who have access to only a smartphone by racial/ethnic category are similar to those reported by the Pew Research Center for adults (source: http://www.pewinternet.org/2015/04/01/chapter-one-a-portrait-of-smartphone-ownership/).

8. Rosenboom, V., and Blagg, K., Disconnected from Higher Education: How Geography and Internet Speed Limit Access to Higher Education, *Urban Institute*, January 2018, https://www.urban.org/sites/default/files/publication/96191/disconnected_from_higher_education_1.pdf

9. Rideout, V., and Katz, V. S., *Opportunity for All? Technology and Learning in Lower-Income Families,* (New York, NY: The Joan Ganz Cooney Center at Sesame Workshop, 2016), http://digitalequityforlearning.org/wp-content/uploads/2015/12/jgcc_opportunityforall.pdf.

10. "Comments of the Education & Libraries Networks Coalition (EdLiNC) before the Federal Communications Commission in the Matter of Second Further Notice of Proposed Rulemaking, Order on Reconsideration, Second Report and Order, and Memorandum Opinion and Order," *FCC*, June 22, 2015, https://ecfsapi.fcc.gov/file/60001123246.pdf.

11. *Taking the Pulse of the High School Student Experience in America: Research Findings, "Access to Technology," Phase 1 of 6* (Lee's Summit, MO: My College Options, April 29, 2015), https://www.fosi.org/documents/142/Taking_the_Pulse_Phase_1_Research_Findings_FINAL.pdf.

12. One percent of students reported having no internet access in school. In the survey, quality-of-internet indicators included descriptions: Great = I never have problems connecting to the internet when I need to; OK = Most days I have a good internet connection but occasionally the internet doesn't work; Unpredictable = Sometimes the internet connection is good, sometimes it's not; Terrible = Allegedly we have access, but it doesn't work.

13. *"Wireless Reach,"* Qualcomm, https://www.qualcomm.com/company/wireless-reach.

14. Kajeet, http://www.kajeet.net/

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