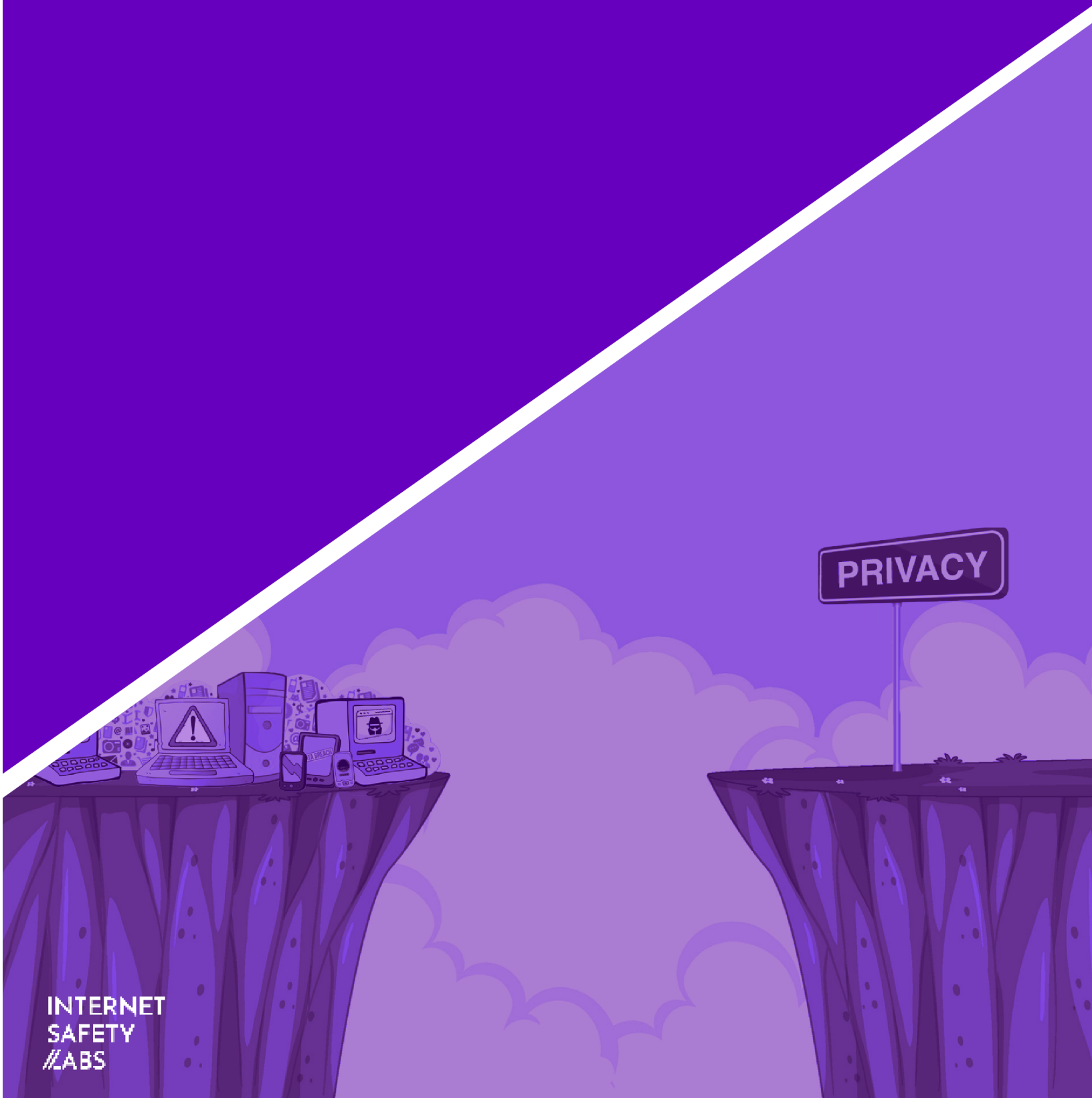
Privacy Inequity in EdTech:
A Demographic Analysis of US K-12 EdTech

February 6, 2024



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Abstract

In 2022, Internet Safety Labs, a US non-profit technology product safety organization, conducted a nationwide safety benchmark for edtech apps used in K-12 schools across the US. This report summarizes the research methodology, and key findings relating to App Safety, School Website Safety and School Technology Practices across five demographics: (1) Grade Level, (2) School Locale, (3) School Income Level, (4) School Majority Race, and (5) School Size.

One of the most striking findings from the demographic analysis regards the lowest income strata ($20K-$39K). None of the schools in this segment performed technology vetting (the lowest percentage among all demographic segments). These schools also had the highest percentage of apps containing digital ads and apps with behavioral ads. These schools also had one of the lowest rates of providing computing devices to students at only 50% of schools.

On the plus side, these schools recommended and required the smallest number of technologies on average (13.2 apps per school).

A similar pattern exists for American Indian/Alaska Native majority race schools which scored lowest on providing technology notice, allowing consent, and providing devices (at 41.7%). This segment also scored high on the percentage of apps with behavioral ads. Like the $20K segment, the American Indian/Alaska Native schools had one of the lowest average number of recommended/required apps (13.4), but even so, the students are more likely than other segments to encounter behavioral ads.

These schools have substantially less technology support, which has the curious effect of keeping students somewhat safer by limiting exposure to technology, while at the same time producing greater risk in the technology that is recommended/required for students. And there's a larger question here: are these students missing out on learning technologies that will be important later in their education and lives? Will they be disadvantaged with respect to key skills and know-how compared to students in schools provisioning more technology for students?

1 Introduction

In 2022, Internet Safety Labs (ISL) conducted a data privacy audit on EdTech apps recommended or required by a representative sample of 663 schools in the US and District of Columbia. The primary research objective of the benchmark was to provide a baseline assessment of the privacy (as an essential part of safety) of apps used by K-12 schools in the US. Two extensive studies analyzing the more than 120,000 data points collected have been published [1], [2]. This paper describes key findings to be published in the third report, sharing an in-depth demographic analysis of the data set.

2 Research methodology

The 2022 K-12 EdTech Safety Benchmark studied 13 schools in every state and the District of Columbia, ensuring an evenly distributed mix of grade level, and weighted by geography category: rural, town, suburban, and city [3]. The sample also included one private school in each state, resulting in 7.8% of the sample being private schools, closely approximating the 9% of students enrolled in private schools in the US [4].

Table 2.1 All Schools in Benchmark Sample by Grade and Public/Private

Elementary School	Middle School	High School	Private School (any grades)
204	204	204	51

Table 2.2 Public Schools in Benchmark Sample by Geography

Rural	Town	Suburban	City	TOTAL
154	99	195	164	612

Table 2.3 Private Schools in Benchmark Sample by Geography

Rural	Town	Suburb	City	TOTAL
5	3	18	25	51

2.1 Studied Apps

1722 apps were identified from the 663 schools as either recommended or required by the school or district. Of those 1722 apps, 1357 were able to be scored for privacy risks.

Table 2.4 Sample Summary

Total # of Schools	Total # Apps Recommended or Required by Schools	Total # of Apps Scored
663	1722	1357

Additional details regarding the sampling methodology and the data collection methodology can be found in the first findings report [1.].

2.2 Safety Analysis of Apps

Several attributes of the apps were analyzed to assess overall safety risk. Note that the researchers regard privacy as a core—but not singular—component of app safety. In this benchmark, the safety elements all had to do with privacy risks and the sharing or potential sharing of student data. Table 2.5 summarizes the behaviors and methods for assessing these privacy risks.

Table 2.5

App Safety Risk Behavior	Method / Tools Used
The number and riskiness of the Software Development Kits (SDKs) in the app	AppFigures (commercial app analytics tool); ISL SDK Risk Dictionary; California and Vermont Data Broker Databases
Presence of digital advertisements (ads) in app.	Manual testing/usage of app to recognize presence of ads.
Presence of behavioral ads in ap.	Manual testing/usage of app to recognize presence of behavioral ads based on tester's personal history or other attributes.
Presence of large platforms with data monetization businesses: Adobe, Amazon, Apple, Facebook, Google, Twitter	Analysis of SDKs and network traffic to identify SDKs or domains owned by the six platform companies.

App Safety Risk Behavior	Method / Tools Used
App usage of WebView APIs.	Manual testing/usage of app to recognize use of WebView within the app.

78% of the 1357 scored apps were rated Very High Risk, the highest risk category. 18% were High Risk, and only 4% were Some Risk, the best/safest score [1]. Additionally, 79% of apps collected student location data [1].

Table 2.6 summarizes the key metrics studied to assess safety of the school app portfolio. ISL quickly recognized that, since the school composite score calculation multiplies the weighted average of app Safety Scores by the total number of recommended/required apps, those two metrics were redundant.

Table 2.6

App Portfolio Safety Risk Metric	Method / Tools Used
Average number of Recommended/Required apps.	Manually found on school and district websites.
Average percentage of Very High Risk* apps in school portfolio.	Calculated from school's app Safety Scores.
Average percentage of apps with digital advertising.	Calculated from app advertising presence data.
Average percentage of apps with behavioral advertising.	Calculated from app behavioral advertising presence data.

* Note that when ISL launched App Microscope (https://appmicroscope.org), the highest risk (i.e. worst) safety score was renamed from "Do Not Use" to "Very High Risk". ISL continues to analyze the integrity of the Safety Scores and will address them again in a future report.

2.2.1 Website Safety

Website safety was measured by the presence of trackers and advertisements on school websites.

Table 2.7

Website Safety Risk Metric	Method / Tools Used
The average number of trackers on the schools' websites.	The Electronic Frontier Foundation's (EFF's) Privacy Badger browser extension[1].
The average number of red trackers[2] on the schools' websites.	The EFF's Privacy Badger browser extension.
The percentage of school websites containing digital advertising.	Manual testing/usage of app to recognize presence of ads.

2.2.2 School Technology Practices

School Technology Practices were measured by the percentage of schools performing the practice (Table 2.8).

Table 2.8

School Technology Practice Metric	Method / Tools Used
Presence of a complete technology notice (i.e. a list of all technologies either recommended or required for students).	Manual review of school and district websites. The Student Data Privacy Consortium Resource Registry[3]
Presence of a consent or opt out form for technology use	Manual review of school and district websites.
Evidence of system app/tech vetting for student use, covering both recommended and required technology.	Manual review of school and district websites. Manual review of School Board policies.

[1] https://privacybadger.org/

[2] https://privacybadger.org/#What-do-the-red%2c-yellow-and-green-sliders-in-the-Privacy-Badger-menu-mean

[3] http://sdpc.a4l.org

School Technology Practice Metric	Method / Tools Used
Evidence of school-provided personal computing devices.	Manual review of school and district websites. Manual review of School Board policies.

3 Demographic Analysis

The App Safety, Website Safety, and School Technology Practice measurements were analyzed through each of the demographic lenses in Table 3.1.

Table 3.1: Demographic Lenses for Analysis

Demographic Lens	Data Source
School Grade Level	National Center for Education Statistics [a]
Income Level	National Center for Education Statistics
School Locale	National Center for Education Statistics
School Majority Race	National Center for Education Statistics
School Size (number of students)	National Center for Education Statistics

[a] https://nces.ed.gov

The key research questions from this exploratory demographic analysis were:

1. What are the notable demographic intersections in the national sample of schools?
2. Are there differences in app safety based on the five demographic lenses?
3. Are there differences in risky website behaviors based on the five demographic lenses?
4. Are there differences in school technology related practices (e.g. technology notice, consent, vetting, and providing of individual computing devices) based on the five demographic lenses?

3.1 Method

In order to analyze the national school dataset, several sets of charts were produced and studied to determine significant patterns by demographic categories:

1. Histograms of the sample set for each of the five demographic lenses.

2. Histograms of US National school data for each of the five demographic lenses.
3. Charts for each metric, for each demographic category.
4. Summary metrics tables by demographic (see Appendices A.3 through A.7).

4 Findings

4.1 Fitness of Sample

This section explores the question of how closely the demographics of the 663 sampled schools reflect the demographics of the US. As will be shown, the benchmark sample closely mirrors the demographics of the overall US, with these exceptions:

1. The ISL sample includes a higher proportion of high-income schools (section 4.1.2).
2. The ISL sample includes a lower proportion of Hispanic schools, though the sample size is large (86) and thus an accurate measure of these schools' behaviors (section 4.1.4).
3. The proportions of larger schools in the ISL sample was higher than the national reality. This doesn't appear to be a deficit, in that it allowed for greater sample sizes for larger schools, which gives greater confidence in the findings for those schools (section 4.1.5).

Any demographic segment that included fewer than 30 schools requires additional study before being deemed conclusive. Thus, the key findings in this report for the $20K income segment and the American Indian/Native Alaska schools, while striking, require additional research. In retrospect, for this kind of analysis, the ISL sample should have been somewhat larger to ensure at least 30 schools in each demographic category.

4.2 General Findings and Notes

1. **Private Schools:** private school websites were relatively opaque when it came to providing details on technology usage and behaviors. Thus, the most reliable data from the private school metrics is the Website Safety data. This report excludes private school metrics from the App Safety and School Technology Practices analyses.

2. **Technology vetting in schools appears to have positive effect on the percentage of apps with ads and behavioral ads in school portfolios.** The causal relationship, however, needs further analysis.
    - Schools with vetting have a 20.5% reduction in the average percentage of apps with ads in the school portfolio.
    - Schools with vetting have a sizable 48.4% reduction in the average percentage of apps with behavioral ads.
    - Vetting isn't having an effect on the percentage of Very High Risk apps in the portfolio.
    - Tech vetting isn't always a guarantee that a school's app portfolio will be safer. Schools in the $120K and above income segment had the highest rate of tech vetting, but also one of the highest rates of apps with digital ads.
    - ISL hypothesizes that technology vetting is a somewhat nascent practice (only 28.7% of all schools performed systemic vetting of technology) and schools need more guidance, funding, and rigor in technology vetting and software vendor management practices.

4.3 App Safety

The national averages related to school app safety are as following:

- Schools recommend or require an average of 19.9 apps per school.
- Public schools were somewhat higher at 20.7 apps per school.
- The average school composite score was 53.7.
    - Public schools were somewhat higher (worse) at 55.5.
- The average percentage of Very High Risk apps in school portfolios was 69.4%
    - Public schools were a bit lower at 69.3%
- The average percentage of apps with ads in school portfolios was 7.8%.
    - Public schools were a bit higher at 8.0%.
- The average percentage of apps with ads in school portfolios was 2.7%.
    - Public schools were a bit lower at 2.6%.

4.3.1 Demographic Trends

The following are the key app safety demographic trends.

- Elementary schools had the lowest percentage of apps with behavioral ads (2.1%), but one of the highest average numbers of recommended/required apps (Figure 4.1).
  - The hypothesis here is that elementary teachers are altruistically exposing these youngest of students to more technology. If apps had fewer privacy risks, this would be acceptable, but given the data sharing risk in apps, pushing more apps increases the student's privacy risks.

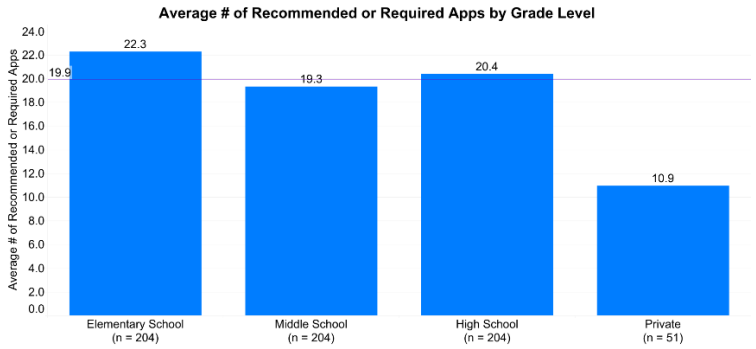

Figure 4.1: Average # of Recommended/Required Apps by School Grade Level

- Schools with the lowest incomes ($20K-$39K) had the highest likelihood of ads and behavioral ads in apps (9.8% and 9.5% respectively).
  - The rate of behavioral ads in these schools was more than 3 times higher than in schools with the highest income ($120K and above at 2.7%) (Figure 4.2).

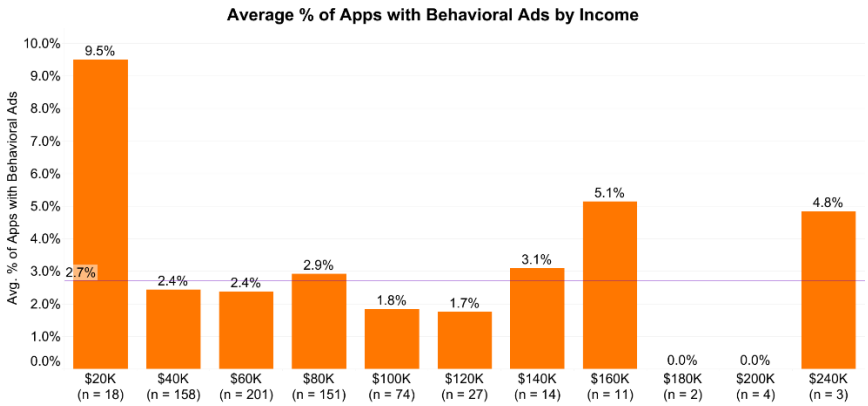

Figure 4.2: Average Percentage of Apps Containing Behavioral Ads by Income

- Schools in the highest income segment ($120K and above) had one of the highest average numbers of recommended/required apps, and correspondingly one of the highest school composite scores.

    - They also had one of the highest rates of apps with ads (9.1%) despite having the highest rate of tech vetting (60.6%).
- Schools in towns had the safest apps by locale.
- Native Hawaiian/Pacific Islander (n=4) majority race school app portfolios were the safest by race, though the sample size is quite small.
- American Indian/Alaska Native schools had the highest rate of behavioral ads by school majority race (Figure 4.3).

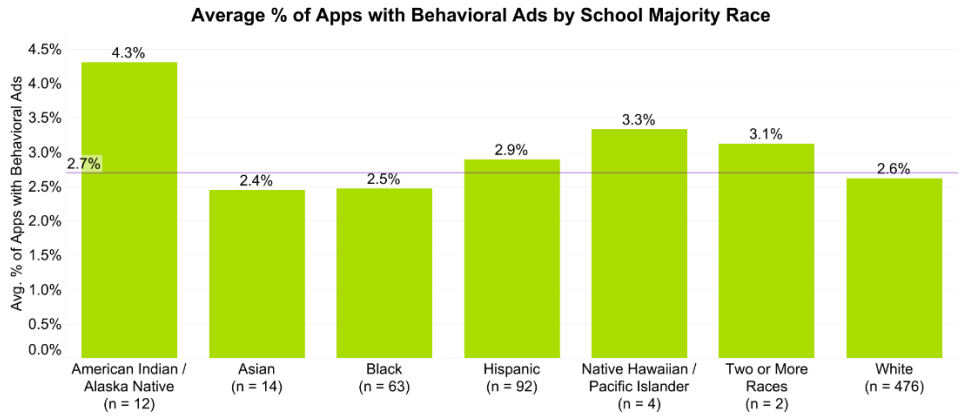

Figure 3: Average Percentage of Apps Containing Behavioral Ads by Race

4.4 Website Safety

Nearly all school websites contain trackers and a significant percentage (20.3%) include advertising. While these behaviors are of course reflective of website development and digital marketing technology norms, the associated risks of student data sharing are too high.

- 91.1% of school websites contain trackers, with an average of 6.5 trackers and 1.5 red trackers per website.
- 79.3% of school websites contain red trackers.
- 20.3% of school websites include digital ads.

4.4.1 Demographic Trends

The following are the key website safety demographic trends observed from the data. Note, however, that these findings are relative, given the risky nature of most school websites.

- Elementary school websites were overall somewhat safer than Middle and High school sites.

- Public schools were nearly twice as likely as private schools to include digital advertising on school websites (21.1% of public-school websites compared to 11.8% of private schools) (Figure 4.4).

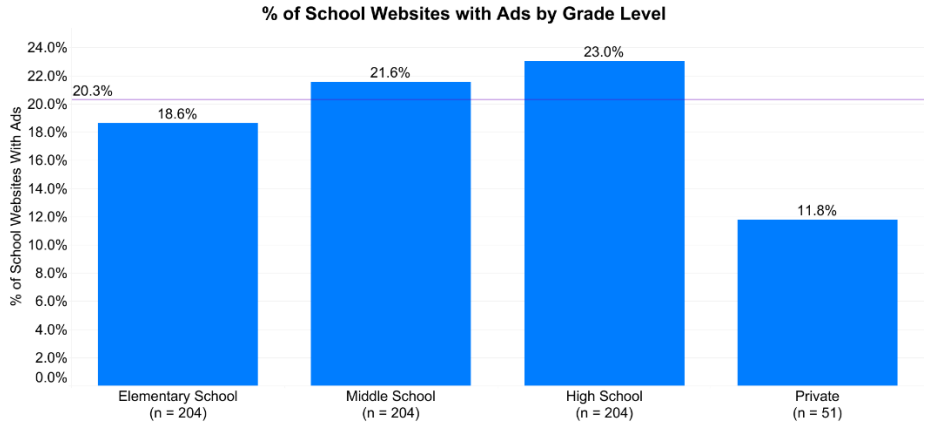

Figure 4.4: Percentage of School Websites Containing Ads by Grade Level

- Rural and Town school websites were safer than Suburban and City schools (and among the safest).
- Black and Native Hawaiian/Pacific Islander majority race school websites were the least safe by majority race.
  - One third of Black majority race school websites had ads, **64.0% higher than the national average and 76.2% higher than schools with White majority race (Figure 4.5).**

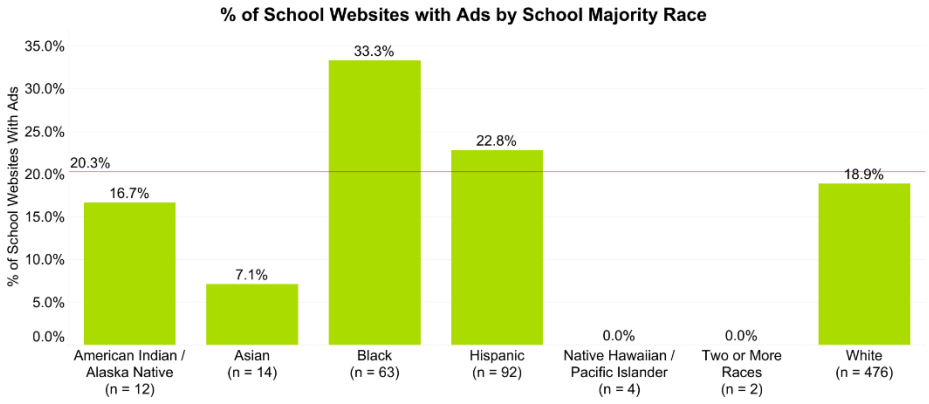

Figure 4.5: Percentage of School Websites Containing Ads by School Majority Race

- American Indian/Alaska Native school websites were among the safest overall by race.
- Larger schools (2000+ students) had greater likelihood of privacy risks in their websites.

4.5 School Technology Practices

The national averages for school technology practices are as follows:

- 44.8% of schools provided technology notice.
- Only 14.8% of schools allowed some kind of consent or opt out for technology use.
- Only 28.7% of schools were performing systemic vetting of technology recommended or required for students. Note that this doesn't mean that schools don't have technology procurement standards. The percentage of apps required and procured by schools is much lower than the percentage of apps recommended.
- 77.8% of schools provide personal computing devices to students.

4.5.1 Demographic Trends

The following are the key school technology practice demographic trends observed from the data.

- Schools in the lowest income segment ($20K-$39.9K) had among the lowest percentage of schools providing technology notice (27.8%, Figure 4.6), one of the lowest rates of providing devices to students (only 50% of schools, Figure 4.8), and lowest rate of technology vetting with *no* schools found to be performing systemic vetting of recommended/required technology for students (Figure 4.7).
- Conversely, the highest income level schools ($120K and above) had the highest rate of technology notice (65.6%) and the highest rate of tech vetting (60.6%).
  - Note that the high rate of tech vetting did not result in higher performance in app safety for schools in this demographic segment.

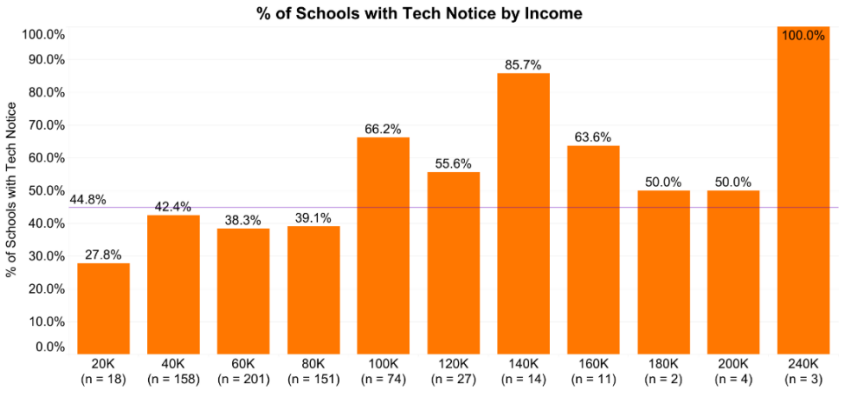

Figure 4.6: Percentage of Schools Providing Technology Notice by Income

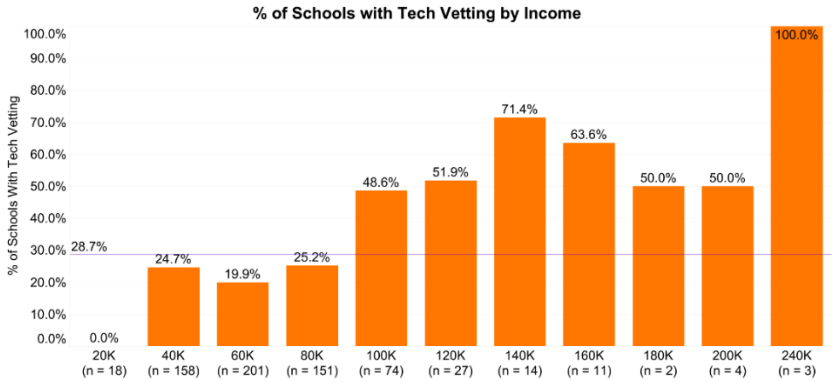

Figure 4.7: Percentage of Schools Performing Technology Vetting by Income

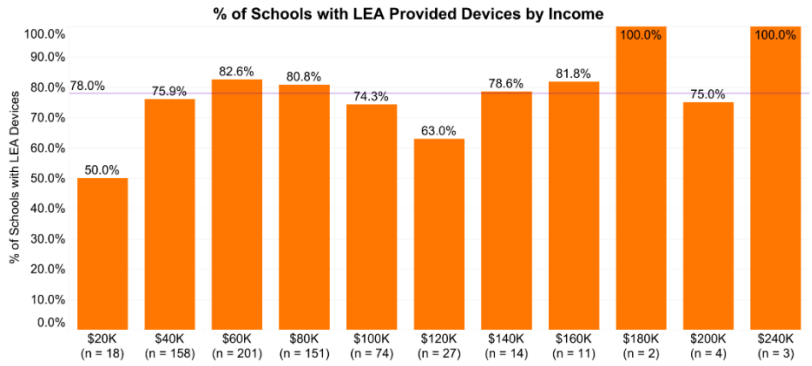

Figure 4.8: Percentage of Schools Providing Computing Devices by Income

- Suburban and City schools performed better than Rural and Urban schools in school technology practices.
- American Indian/Alaska Native (n=12) majority race schools had the lowest rate of tech consent (0.0%, tied with Native Hawaiian/Pacific Islander majority race schools), and providing devices to students (41.7%, Figure 4.10). They also had one of the lowest rates of tech notice (16.7%) and vetting (8.3%, Figure 4.9).
  - Note that these schools also had one of the highest rates of Very High Risk apps (72.9%) and apps with behavioral ads (4.3%).
- Native Hawaiian/Pacific Islander majority race schools (n=4) had no schools providing tech notice, allowing consent or performing tech vetting.

- These schools performed well in app safety despite an apparent absence of tech vetting, with the lowest rate of apps with ads (3.3%) and the lowest rate of Very High Risk apps in their portfolio (56.1%).

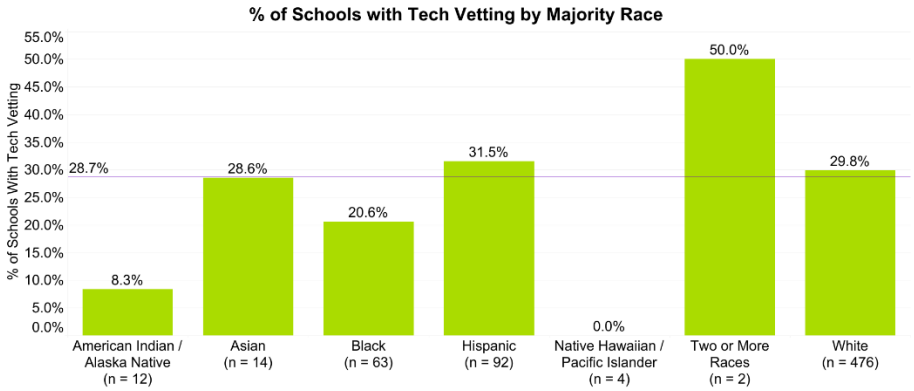

Figure 4.9: Percentage of Schools Performing Technology Vetting by School Majority Race

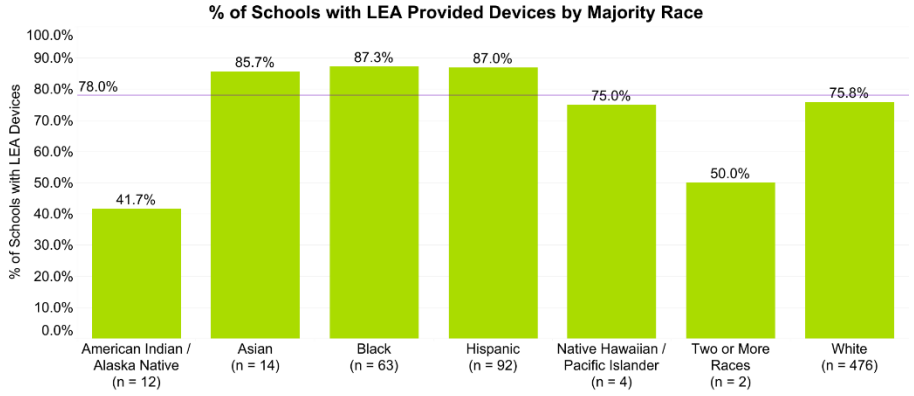

Figure 4.10: Percentage of Schools Providing Computing Devices by School Majority Race

- Larger schools (2000+ students, n=24) performed the best of all demographic segments, with 100% of schools providing devices to students, and 29.2% of schools allowing consent for tech usage.
  - The authors hypothesize that the larger the school, the stronger the need to have rigorous technology practices. However, it could instead be related to the data collection method of using school and district websites to find information. The larger schools may be more rigorous with their digital communication and information on their websites.

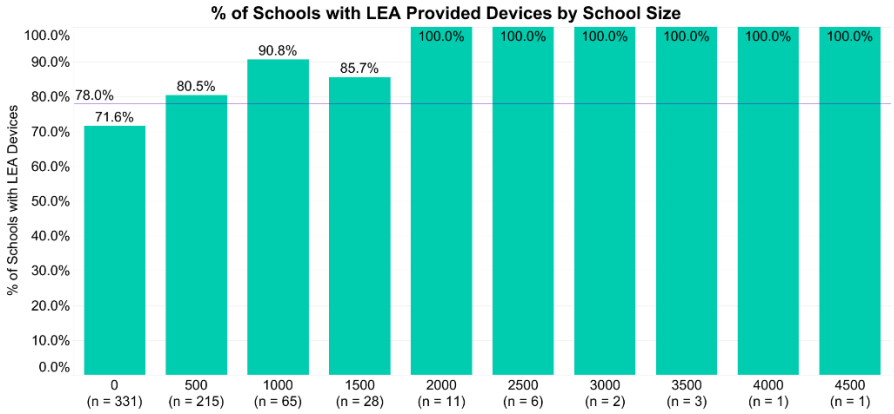

Figure 4.11: Percentage of Schools Providing Computing Devices by School Size

4.6 Highlights by Demographic Categories

4.6.1 Grade Level (Appendix A.3)

In examining the public schools by grade level, there were only subtle difference across the measured data. Generally, the technology in elementary schools was safer than middle and high schools.

Private schools had one of the highest average number of red trackers in school websites at 1.9 per website.

4.6.2 Income (Appendix A.4)

There were clear trends along income lines regarding school technology practices, with lower income schools being less likely to provide tech notice, allow consent, perform technology vetting, or provide devices than the higher income schools.

App safety was difficult to discern trends along income lines. Higher income schools recommended/required more technology than lower income schools, and the average school composite score was correspondingly higher than lower income schools. But the lowest income schools had the highest percentage of Very High Risk apps by a small margin (69.8% compared to 64.8%).

4.6.3 Locale (Appendix A.5)

Town schools had safer apps and school websites than any other locale. School app risk varied, with city schools having the highest percentage of Very High Risk apps, but also the lowest rate of apps with ads or behavioral ads. School website risk increased from smaller to larger locales.

School technology practices varied. Towns had the lowest rates of technology practices and suburban schools had the highest rates of technology notice and tech vetting, but the lowest rate of providing devices (73.4% compared to City schools which had the highest at 85.1% of schools.

4.6.4 School Majority Race (Appendix A.6)

For app safety, Native Hawaiian/Pacific Islander majority race schools (n=4) fared the best and American Indian/Alaska Native schools (n=12) had the highest rate of Very High Risk apps (72.9%) and the highest rate of apps with behavioral ads (4.3%).

Black school websites had the most and the most serious privacy risks with 33.3% of websites containing ads, 100% of websites including trackers, and one of the highest average numbers of trackers of 7.7 per site. American Indian/Alaska Native schools had a low percentage of websites with trackers and a low average number of trackers per site, but had a relatively high percentage of websites containing ads (16.7%). Asian majority race schools were overall the safest by race, followed closely by white majority race schools.

With respect to school technology practices, Hispanic schools had the highest rates of adoption. American Indian/Alaska Native schools had the lowest rates in all four practices.

4.6.5 School Size (Appendix A.7)

There were clear leaders and laggers in analyzing schools by size. For app safety, the smallest schools (0-499 students, n=331) had the lowest safety risks, and the largest schools (2000+ students, n=24) had the highest.

Similarly, the websites of smallest schools were the safest and the largest schools' websites were the riskiest.

A reverse pattern was found regarding school technology practices: the smaller the school, the less likely the school was providing technology notice, allowing for consent, performing tech vetting, or providing devices. The largest schools had the highest rates of technology practices.

5 Discussion

5.1 Correlation Between Tech Vetting and App Safety

As can be seen from the demographic findings above, that on average, schools with vetting have few ads and behavioral ads. But it can also be seen that there was no

clear correlation between high rates of technology vetting and the safety of the school's portfolio of apps. The authors believe that the quality of school vetting varies significantly, due to the relative nascence of privacy requirements and assessments in school technology procurement. Technology vetting and software vendor management are key areas for improvement.

5.2 Privacy or Digital Divide?

There is a significant disparity in technology safety and support for the lowest income schools and American Indian/Alaska Native majority schools in the US. One of the most striking findings from the demographic analysis regards the lowest income strata ($20K-$39K). Schools in this segment had the lowest percentage of technology vetting (0.0%, none of the schools were observed to be performing systemic tech vetting), and the highest percentage of unsafe apps with digital ads, and apps with behavioral ads. These schools also had one of the lowest rates of providing computing devices to students at only 50% of schools.

On the plus side, these schools recommended and required the smallest number of technologies on average (13.2), which the authors views as a positive given the privacy risks in most apps.

A similar pattern exists for American Indian/Alaska Native majority race schools which scored lowest on providing technology notice, allowing consent, and providing devices. This segment also scored high on the percentage of apps with behavioral ads. Like the $20K segment, the American Indian/Alaska Native schools recommend/require one of the lowest number of apps on average (13.4), but even so, the students are more likely than other segments to encounter behavioral ads.

The authors suspect that these schools have inadequate resources for technology management and distribution, a dynamic which keeps students somewhat safer by limiting exposure to technology, while at the same time exposing students to greater risk in the technology that *is* recommended/required.

All of these factors suggest a larger question: are students in the low income and American Indian/Alaska Native demographic segments missing out on exposure to technologies that will be important later in their education and lives? Will they be disadvantaged with respect to key skills and know-how compared to students in schools providing more technology for students?

As technology providers grapple with the repercussions of a surveillance advertising supported business model, exploring new monetization strategies, many of the

experiments result in “pay for privacy” schemes. This is no more acceptable than the current models that monetize surveilled data to provide “free” services. Privacy must not be the price K-12 students pay to remain current and competitive with technology. That does indeed appear to be the case today.

The only acceptable solution is to dramatically improve the privacy of technologies recommended and required by schools.

6 Recommendations

6.1 App Safety

1. All schools should have at least one full-time software procurement specialist empowered and responsible for developing and deploying technology vetting and oversight practices, as well as vendor management. Note that there is a significant difference between hardware procurement and device/asset management versus software procurement. These functions require differing skillsets and are often found in different people.
2. School software managers must develop processes and means to audit technology once a year. There are currently few tools to help analyze what’s happening “under the hood” of technology, but there are some tools that school software procurement/management professionals can utilize:
    a. Examine website risks using EFF’s Privacy Badger, or The Markup’s Blacklight tools.
    b. Examine app risks using ISL’s AppMicroscope.org and other resources.
3. Building on results from findings report 2[4] on the safety impact of certifications and promises, schools should:
    a. Have Data Privacy Agreements for all technologies the school is providing for students. (i.e. for school licensed technology, *not* off the shelf technology)
        i. SDPC has templates already in use by other schools around the country. Software vendors are already familiar with these templates and should be straightforward to deploy.
    b. Select apps that have been COPPA Safe Harbor certified.

[4] Pg. 49, https://internetsafetylabs.org/wp-content/uploads/2023/06/2022-K12-Edtech-Safety-Benchmark-Findings-Report-2.pdf

    c. In particular, hold Community Engagement apps under much greater scrutiny, as they are the "leakiest" apps in the benchmark. These apps are the utility apps that often bear the school's name (e.g. https://appmicroscope.org/app/1597/).
4. Schools should be mindful that they have no actual control over the behavior of off the shelf technologies and should take pains to scrutinize these services carefully before recommending or requiring them for student use.
    a. Schools are also reminded that even for licensed technologies, the vendor makes unilateral decisions regarding software behavior, and always has access to all of the data.
5. Less is more but too little may be leaving students behind. A good rule of thumb for schools is recommend/require no more technology than the school can reasonably manage and actively monitor on an ongoing basis.
    a. ISL encourages **elementary schools** in particular to reduce the amount of technology being foist upon these youngest of students.
6. American Indian / Alaska Native and low-income schools are at the greatest risk for experiencing a "digital divide" when it comes to EdTech. From this research, these schools seem most in need of additional support.
7. Additional research is required to determine the longer-term safety impacts of students with the lowest exposure to technologies in schools. Safety benefits may come with preparedness costs when compared to students in schools with higher use of technology.

6.2 Website Safety

1. Remove digital advertising on school websites—especially on public school websites, as these are funded by taxpayers. It's likely that schools are not substantially benefitting from advertising revenues given the relatively low website traffic. Moreover, any advertising on school websites also generates money for the ad platforms[5].
    a. Given the data leakage in real-time bidding (RTB), ISL suggests that all schools remove digital ads on school websites.
2. Remove advertising trackers on school websites. It's not enough to remove ads on the website, due to the presence of third-party trackers and scripts

[5] https://www.newsmediaalliance.org/google-ad-revenue-op-ed-70-percent/

running on websites. Similar to the above recommendation—and for the same reasons—ISL recommends that schools remove ad related trackers from school websites.

   a. Schools and districts should minimize third-party resources on school websites.

6.3 School Technology Practices

1. **Technology Notice**: while there is no mandate requiring schools to publish comprehensive technology lists, ISL urges schools to do so as a matter of practice. This should be a by-product of effective vendor/software management practices. Students and parents have a right and need to know what technology is required or recommended by the school. It's also helpful for schools to maintain accurate lists.

   a. Another best practice is to make clear which technologies are required versus which are not.

   b. As the FTC proposes new COPPA rulemaking in early 2024, ISL hopes they provide new guidance to schools regarding tech notice. It should not be considered a burden to schools to keep reasonable track of the technologies being used; it's a basic practice for any professional organization. If there's so much technology in use that it **is** burdensome, the school should consider pruning its technology.

2. **Consent**: There's no mandate requiring schools to obtain consent for technologies and the level of adoption across schools in the study reflects that. Sensitive to the challenges schools face in managing students, ISL has no strong opinion on whether schools should allow opt-in consent more frequently. In an ideal world, students and parents should have a choice, and ISL encourages schools to endeavor to allow this where possible. ISL recognizes that for some core technologies like Student Information Systems, opting out creates difficulties for teachers and school administrators.

   a. Improving technology selection and oversight and publishing accurate lists of recommended/required technology are more urgent safety concerns.

    b. See also Findings Report 2[6] for examples of overuse of schools consenting on behalf of students. Schools should pay close attention to FTC requirements around the types of services for which school consent is allowed[7].
3. **Tech Vetting**: schools should be performing systemic vetting of all technologies recommended and required for students; as even imperfect measures appear to have a positive impact in reducing student exposure to behavioral advertising
    a. This begs another question, however: why are there *any* apps with behavioral ads in school portfolios? How many of these apps with behavioral ads are apps for children and therefore governed under COPPA? **The ISL benchmark findings underscore the challenges faced by enforcers of privacy regulation.**
    b. From this and earlier reports, ISL observes that current technology vetting is not as effective as it could be. This could be due to the immaturity of this kind of vetting, in combination with a lack of dedicated resources. It's clear that greater investment in training and development is crucial for school professionals.
4. **Devices**: Most schools in the US are providing devices. While this research did not cover the safety risks of using school provided devices, surveillance is the greatest concern. Given the seeming immaturity of software vendor management by schools, ISL is concerned that providing devices preloaded with lots of technology may be risky for student privacy and safety. In particular, website surveillance tools like Securly, which is used by many schools in the US, require additional research.

7 ACKNOWLEDGMENTS

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[6] https://internetsafetylabs.org/wp-content/uploads/2023/06/2022-K12-Edtech-Safety-Benchmark-Findings-Report-2.pdf

[7] https://www.ftc.gov/business-guidance/resources/complying-coppa-frequently-asked-questions#N.%20COPPA%20AND%20SCHOOLS

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A APPENDICES

A.1 Sampling Methodology

This appendix is an excerpt from the first findings report [1] Section 7.1, pp. 87-98.

Sampling Procedure

To observe K12 Edtech app usage, 663 total school websites were reviewed by researchers. This sample size was chosen through a power analysis accepting 5% type 1 error and 1.5% margin of error. This suggests a sample size of 680, but in the interest of balanced representation across grades, we settled on 663. In selecting these schools, we made the following four design choices:

A. Representative and balanced sampling across the 50 states.
B. Representative and balanced sampling within the following school types: elementary school, middle school, high school.
C. Sample schools proportionally to the locale distribution of schools in the corresponding state.
D. Only sample schools with over 200 students. Note that we chose this threshold in order to maximize the impact of this benchmark, but this threshold may reduce the number of rural schools sampled.

To satisfy points A and D, we stratified our sample by the 50 states to account for possible differences in technology usage across the 50 states. To ensure balanced

representation, we filtered schools with less than 200 students and then sampled 13 schools within each state. For these 13 schools, we decided to sample 12 public schools and 1 private school, 8% of our sample size, approximating the actual private school enrollment of about 9% of all students in the US [4] . Due to lack of technology use disclosure on private schools' websites, we chose to not strive for representation within our sample of private schools as our results would be biased and likely incorrect. Therefore, the next two steps only apply to public schools.

To satisfy point B, these 50 subpopulations (stratum) were then stratified by school type to account for differences in technology usage across grade levels. Again, to ensure balanced representation for public schools we sampled 4 schools of each type.

To satisfy point C, we chose to perform a weighted random sample within each {*state, school type*} subpopulation. These weights were assigned based on the proportion of schools within the corresponding subpopulation that were in each locale. For example, if a subpopulation had 4 schools (2 rural, 1 suburban, 1 city) a higher weight would be assigned to the rural schools.

In layman terms, we split the population of all schools in the US to 150 sub-populations each corresponding to a particular {*state, school type*} combination. Within each of these 150 sub-populations 4 public schools were sampled where this sampling was weighted to represent the locale distribution of each respective subpopulation.

Sampling Procedure in Practice

Using the above sampling procedure, we used files exported from the National Center for Education Statistics(NCES) to characterize each population and subpopulation. NCES offers csv files containing every school within a particular state. Therefore, we had direct access to the full state subpopulations. Next, to form the school type subpopulations within these state files, each school was assigned to one or more school types based on their grade offerings. Schools were categorized using the following schema:

- Elementary Schools: NCES' *Low-Grade* designation is between PK and 6 and NCES' *High-Grade* designation is between 1 and 6.
- Middle Schools: NCES' *Low-Grade* designation is between PK and 8 and NCES' *High-Grade* designation is between 6 and 8.
- High Schools: NCES' *Low-Grade* designation is between PK and 12 and NCES' *High-Grade* designation is above 8.

This establishes the three subpopulations we want to sample from {*state*, elementary school}, {*state*, middle school} and {*state*, high school}. Next, within each of these subpopulations, we tally up the number of schools within each locale based on the NCES classifications and formulate the sampling weights which define the probability that each school would be selected using our random sample. Finally, the sampling was performed using a weighted random sample computer program forming a representative sample for all schools in the United States with over 200 students.

For example, for New York, we downloaded a dataset containing each school in the state of New York; this dataset is the population of all schools in the New York subpopulation. Then each school was categorized using the above schema and the weights were formulated.

App Selection

For each school in the sample, we utilized several methods to determine the technologies and apps in use by the school or school district, including:

- School or school district website manual discovery (looking for "Technology" information, for example).
- Site-search on the school or district website for key terms like "apps".
- Searching AppFigures for the school name or school district name.

Note that we did not contact schools to confirm the technologies found in this way.

A.2 Conventions Used in Metrics Tables

1. The following conventions are applied only to metrics with data sets where n is greater than three schools.
2. The following conventions are applied only to the Web Safety metrics for Private Schools. The App Safety and School Tech Practices were not included for private schools because they published the least amount of information of all schools. The authors are not confident that the data is truly reflective of private school behavior. Thus, it's excluded from the min/max color coding described in this section.
3. If the demographic segment had the best average number or percentage across all demographic categories, the cell is shaded green. Note that "best" is sometimes the highest and sometimes the lowest.
    a. Best maps to highest for School Technology Practices, else best maps to lowest.

    b. Worst maps to lowest for School Technology Practices, else worst maps to highest.
4. If the demographic segment had the worst average number or percentage across all demographic categories, the cell is shaded red.
5. If the demographic segment was the second or third best average number or percentage across all demographic categories, the cell is outlined in green.
6. If the demographic segment was the second or third worst average number or percentage across all demographic categories, the cell is outlined in red.

A.3 Metrics by Grade Level

Table A.3: Metrics by Grade Level

METRIC	National Average	Public Schools Average	Elementary	Middle	High	Private
APP SAFETY						
Avg # Rec/Req Apps	**19.9**	**20.7**	22.3	19.3	20.4	10.9
Avg # LEA Approved Apps	**186.3**	**187.3**	200.4	173.5	187.5	
Avg School Composite Score	**53.7**	**55.5**	59.2	51.8	55.5	32.8
Avg % Very High Risk Apps	**69.4%**	**69.3%**	68.0%	68.6%	71.1%	71.9%
Avg % Ads in Apps	**7.8%**	**8.0%**	8.0%	7.5%	8.5%	5.6%
Avg % Behavioral Ads in Apps	**2.7%**	**2.6%**	2.1%	2.5%	3.2%	3.3%
WEBSITE SAFETY						
Avg # Trackers in School Website	**6.5**	**6.6**	6.3	6.7	6.8	5.2
% School Websites with Trackers	**91.1%**	**91.0%**	89.2%	92.6%	91.2%	92.2%
Avg # Red Trackers in School Website	**1.5**	**1.5**	1.5	1.4	1.5	1.9
% School Websites with Red Trackers	**79.3%**	**79.0%**	78.9%	79.4%	78.9%	82.4%
% School Websites with Ads	**20.3%**	**21.1%**	18.6%	21.6%	23.0%	11.8%
SCHOOL TECHNOLOGY PRACTICES						
% Schools Providing Notice	**44.8%**	**47.8%**	52.5%	51.5%	39.2%	9.8%
% of Schools Allowing Consent	**14.0%**	**14.4%**	14.2%	15.2%	13.7%	9.8%
% of Schools Vetting Technology	**28.7%**	**30.1%**	34.4%	31.9%	26.0%	3.9%
% of LEAs Providing Devices	**77.8%**	**78.6%**	70.1%	83.3%	82.4%	70.6%
	(n = 663)	**(n = 612)**	(n = 204)	(n = 204)	(n = 204)	(n = 51)

A.4 Metrics by Income

Table A.4: Metrics by Income

METRIC	National Average	$20K-$39K	$40K-$79K	$80K-$119K	$120K & Above
APP SAFETY					
Avg # Rec/Req Apps	**19.9**	13.2	18.8	21.3	23.0
Avg # LEA Approved Apps	**186.3**	N/A	128.6	240.6	192.6
Avg School Composite Score	**53.7**	37.5	51.3	57.4	61.7
Avg % Very High Risk Apps	**69.4%**	69.8%	69.7%	69.3%	68.4%
Avg % Ads in Apps	**7.8%**	9.8%	8.2%	6.7%	9.1%
Avg % Behavioral Ads in Apps	**2.7%**	9.5%	2.4%	2.6%	2.7%
WEBSITE SAFETY					
Avg # Trackers in School Website	**6.5**	5.6	6.4	6.6	7.2
% School Websites with Trackers	**91.1%**	88.9%	91.1%	91.1%	91.8%
Avg # Red Trackers in School Website	**1.5**	1.7	1.4	1.6	1.7
% School Websites with Red Trackers	**79.3%**	83.3%	77.7%	80.6%	83.6%
% School Websites with Ads	**20.3%**	16.7%	22.3%	20.9%	8.2%
SCHOOL TECHNOLOGY PRACTICES					
% Schools Providing Notice	**44.8%**	27.8%	40.1%	48.0%	65.6%
% of Schools Allowing Consent	**14.0%**	11.1%	15.6%	9.8%	21.3%
% of Schools Vetting Technology	**28.7%**	0.0%	22.0%	32.9%	60.6%
% of LEAs Providing Devices	**77.8%**	50.0%	80.3%	78.9%	73.8%
	(n = 663)	(n = 18)	(n = 359)	(n = 225)	(n = 61)

A.5 Metrics by Locale

Table A.5: Metrics by Locale

METRIC	National Average	Rural	Town	Suburb	City
APP SAFETY					
Avg # Rec/Req Apps	**19.9**	19.2	17.8	21.7	20
Avg # LEA Approved Apps	**186.3**	116.7	66.9	191.6	246.6
Avg School Composite Score	**53.7**	51.4	45.9	58.9	54.8
Avg % Very High Risk Apps	**69.4%**	68.9%	68.0%	70.5%	69.4%
Avg % Ads in Apps	**7.8%**	9.0%	7.3%	8.1%	6.7%
Avg % Behavioral Ads in Apps	**2.7%**	3.6%	2.2%	2.2%	2.7%
WEBSITE SAFETY					
Avg # Trackers in School Website	**6.5**	5.6	5.4	6.8	7.4
% School Websites with Trackers	**91.1%**	85.5%	86.0%	94.0%	95.2%
Avg # Red Trackers in School Website	**1.5**	1.3	1.2	1.5	1.8
% School Websites with Red Trackers	**79.3%**	71.7%	75.0%	81.5%	85.6%
% School Websites with Ads	**20.3%**	17.6%	12.0%	22.2%	25.0%
SCHOOL TECHNOLOGY PRACTICES					
% Schools Providing Notice	**44.8%**	40.3%	35.0%	56.0%	41.0%
% of Schools Allowing Consent	**14.0%**	15.1%	9.0%	13.9%	16.0%
% of Schools Vetting Technology	**28.7%**	19.5%	16.0%	38.4%	31.9%
% of LEAs Providing Devices	**77.8%**	76.3%	75.0%	73.4%	85.1%
	(n = 663)	(n = 159)	(n = 100)	(n = 216)	(n = 188)

A.6 Metrics by Majority Race

Table A.6: Metrics by Majority Race

METRIC	National Average	American Indian/Alaska Native	Asian	Black	Hispanic	Native Hawaiian/ Pacific Islander	Two or More Races	White
APP SAFETY								
Avg # Rec/Req Apps	**19.9**	13.4	17.0	22.0	20.6	17.3	24.0	19.8
Avg # LEA Approved Apps	**186.3**	5.0	368.8	171.1	149.7	N/A	560.0	187.3
Avg School Composite Score	**53.7**	36.4	45.6	59.2	55.6	43.3	64.8	53.7
Avg % Very High Risk Apps	**69.4%**	72.9%	64.7%	70.0%	67.6%	56.1%	69.8%	69.9%
Avg % Ads in Apps	**7.8%**	4.6%	4.4%	7.9%	8.0%	3.3%	6.3%	8.0%
Avg % Behavioral Ads in Apps	**2.7%**	4.3%	2.4%	2.5%	2.9%	3.3%	3.1%	2.6%
WEBSITE SAFETY								
Avg # Trackers in School Website	**6.5**	3.9	6.5	7.7	7.4	7.8	9.0	6.2
% School Websites with Trackers	**91.1%**	83.3%	92.9%	100.0%	98.9%	100.0%	100.0%	88.4%
Avg # Red Trackers in School Website	**1.5**	1.4	1.7	1.7	1.7	1.5	3.0	1.4
% School Websites with Red Trackers	**79.3%**	83.3%	78.6%	85.7%	88.0%	100.0%	50.0%	76.7%
% School Websites with Ads	**20.3%**	16.7%	7.1%	33.3%	22.8%	0.0%	0.0%	18.9%
SCHOOL TECHNOLOGY PRACTICES								
% Schools Providing Notice	**44.8%**	16.7%	42.9%	33.3%	53.3%	0.0%	100.0%	45.6%
% of Schools Allowing Consent	**14.0%**	0.0%	14.3%	15.9%	16.3%	0.0%	0.0%	13.9%
% of Schools Vetting Technology	**28.7%**	8.3%	28.6%	20.6%	31.5%	0.0%	50.0%	29.8%
% of LEAs Providing Devices	**77.8%**	41.7%	85.7%	87.3%	87.0%	75.0%	50.0%	75.8%
	(n = 663)	(n = 12)	(n = 14)	(n = 63)	(n = 92)	(n = 4)	(n = 2)	(n = 476)

A.7 Metrics by School Size

Table A.7: Metrics by School Size

METRIC	National Average	0-499 Students	500-999 Students	1000-1999 Students	2000+ Students
APP SAFETY					
Avg # Rec/Req Apps	**19.9**	17.6	21.4	22.1	29.4
Avg # LEA Approved Apps	**186.3**	148.4	213.8	177.4	292.2
Avg School Composite Score	**53.7**	47.9	57.4	60.1	80.9
Avg % Very High Risk Apps	**69.4%**	69.5%	68.2%	71.2%	73.2%
Avg % Ads in Apps	**7.8%**	7.1%	8.1%	9.2%	8.7%
Avg % Behavioral Ads in Apps	**2.7%**	2.7%	2.4%	3.2%	3.3%
WEBSITE SAFETY					
Avg # Trackers in School Website	**6.5**	5.9	6.8	7.7	7.2
% School Websites with Trackers	**91.1%**	87.9%	92.6%	96.8%	100.0%
Avg # Red Trackers in School Website	**1.5**	1.4	1.5	1.6	1.7
% School Websites with Red Trackers	**79.3%**	76.1%	81.9%	80.6%	95.8%
% School Websites with Ads	**20.3%**	19.0%	21.4%	22.6%	20.1%
SCHOOL TECHNOLOGY PRACTICES					
% Schools Providing Notice	**44.8%**	36.9%	51.6%	53.8%	58.3%
% of Schools Allowing Consent	**14.0%**	11.8%	14.0%	18.3%	29.2%
% of Schools Vetting Technology	**28.7%**	24.8%	30.7%	33.3%	45.8%
% of LEAs Providing Devices	**77.8%**	71.6%	80.5%	89.2%	100.0%
	(n = 663)	(n = 331)	(n = 215)	(n = 93)	(n = 24)

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