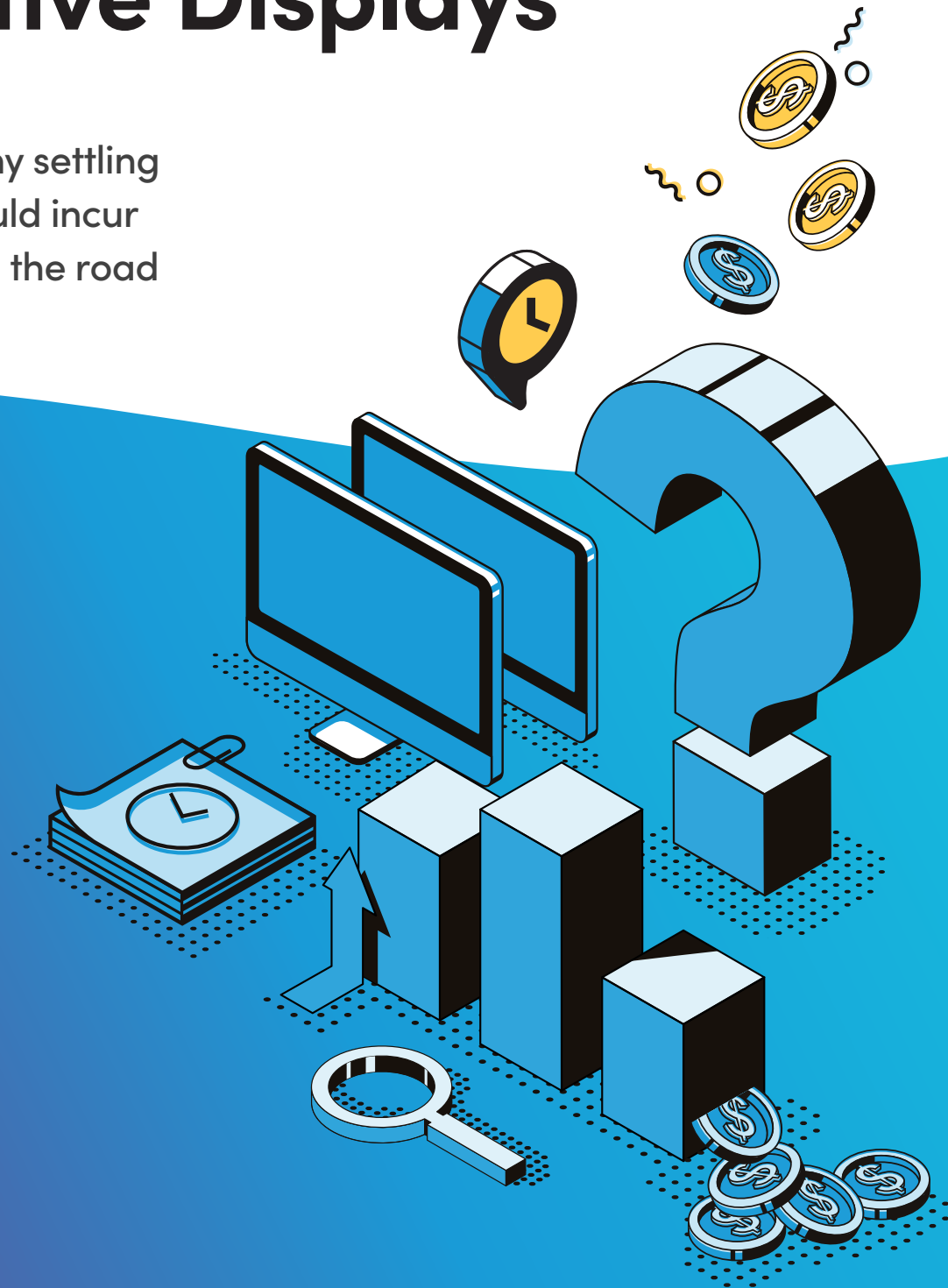


Hidden Costs of Lower-Quality Interactive Displays

Research shows why settling
for less up front could incur
greater costs down the road



SMART®

Table of Contents

The true cost of a technology investment	3
Why hidden costs matter in tech	4
How to spot a lower-quality interactive display	5
Uncover the hidden costs of lower-quality interactive displays: Critical areas that can carry hidden costs	6
Better evaluations make for smarter technology investments	23
Selecting a partner for sustainable success	23

The data in this white paper was sourced through research, user testing, and interviews with subject matter experts. These subject matter experts include Directors of Technology, Design and Standards Managers, EdTech vendors, teachers and other education professionals, who have contributed to this paper and the data herein.

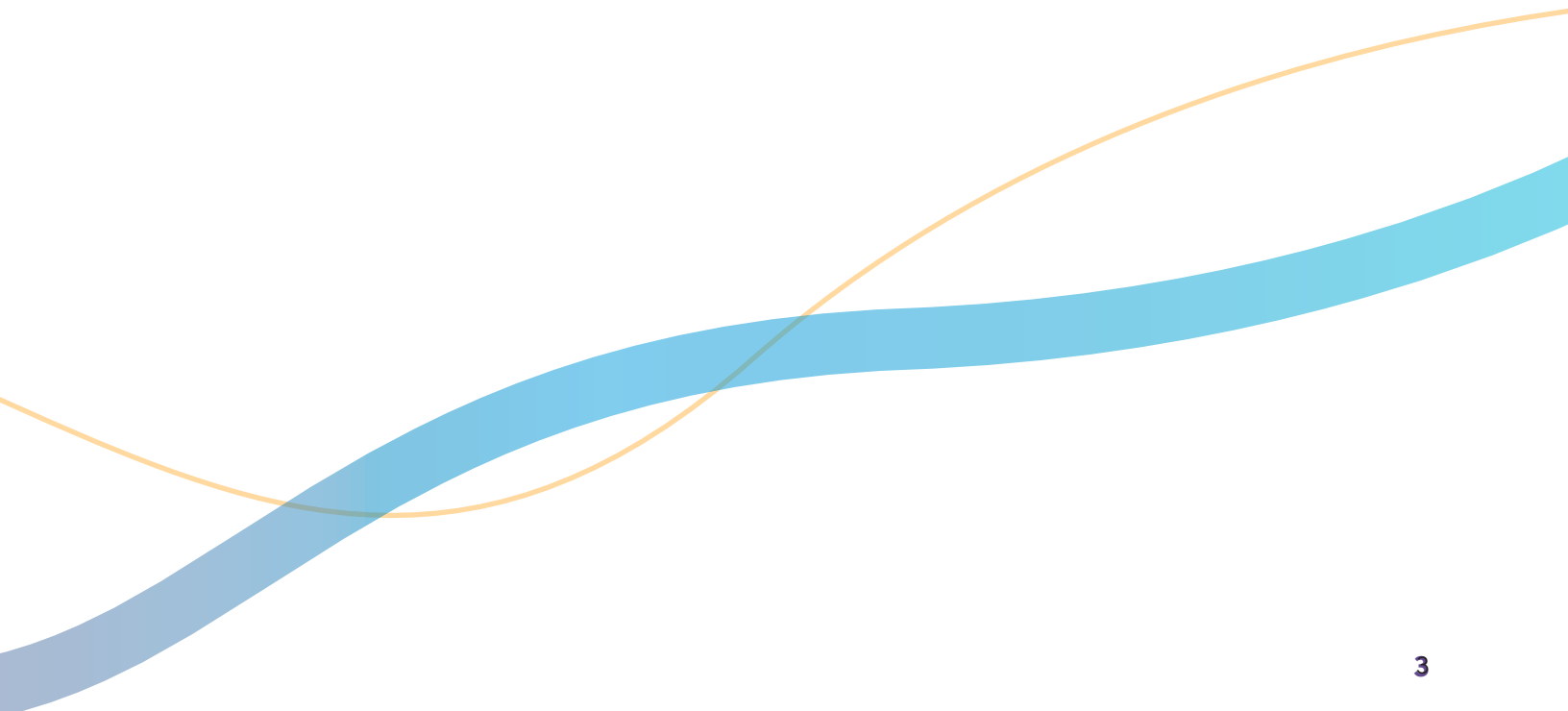
Introduction

The true cost of a technology investment

When choosing between interactive display options, price point can feel like the most important factor when technology budgets are tight. The lowest-priced display may appear to be a budget friendly option, but what's missing up front matters.

It's critical to consider the myriad hidden costs of lower-quality tech as part of your evaluation process. To help you make the most informed purchase possible, we've done the math for you.

This white paper is designed to help you explore the hidden costs and expenses that districts often incur when they choose lower-quality interactive displays. It will also enable you to draw clear comparisons between your options, so you can make more informed procurement decisions that will better serve your teachers, administrators and students.



Problem

Why hidden costs matter in tech

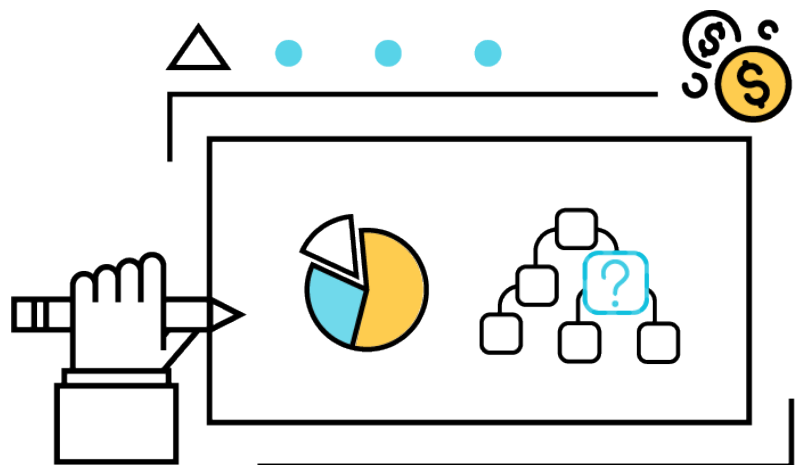
Balancing the needs of learners, educators, and support staff with district objectives and budgets is not an easy undertaking. The upfront costs are only part of the story, and the experience of using and maintaining EdTech over time has an exponential impact.

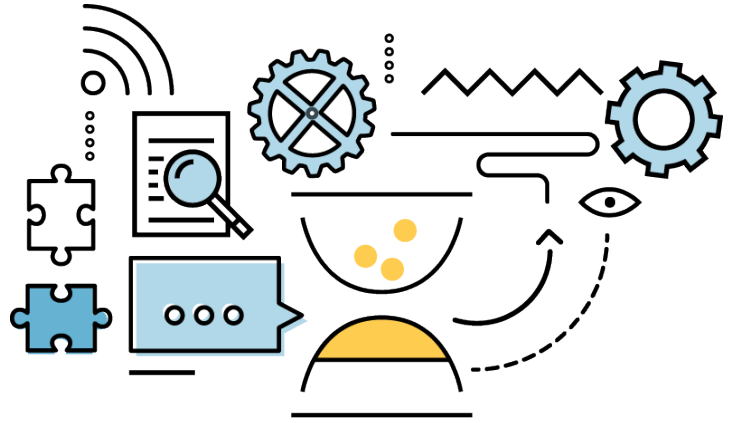
The right interactive display technology can fuel incredible collaboration and interaction, sparking opportunities and driving positive outcomes for all stakeholders.

That's why it's imperative to ensure that the technology you invest in isn't underused, or worse, not used at all. In addition to poor uptake, lower-quality interactive displays can come with unanticipated—hidden—costs to your district from both a time-based and financial perspective.

Choosing effective, high quality technology solutions that support easy workflows, seamless integration, and effortless collaboration is crucial for keeping your total cost of ownership as low as possible—technology leaders and educators know this well. Any investment must be made with confidence in the lifetime value of the technology.

Quantifying the complete cost of one solution over another aids evaluation, protects against hidden costs, and ensures a better return on your investment. With that in mind, let's explore 7 questions you can ask during the evaluation process to gain a deeper understanding of the costs associated with lower-quality interactive displays.





How to spot a lower-quality interactive display

What exactly constitutes a lower-quality display?
Here are a few signs to watch for:

- Basic whiteboard features not designed to support education
- No built-in education content
- Does not update automatically over the air
- No upgrade path for the display's embedded system as the hardware ages
- No accelerated life testing for temperature, humidity, and voltage
- The manufacturer has not been in business long enough to have proven their warranties

Plus Many more - keep reading to discover >>

Uncover the hidden costs of lower-quality interactive displays: 7 critical areas that can carry hidden costs

By broadening the discussion around hidden costs when evaluating interactive displays, you can more accurately assess the true lifetime cost of a product, as well as how much time may be lost addressing quality-related issues.

Let's dive into 7 critical areas that can carry hidden costs.

1. Maintenance and lifecycle
2. Quality standards
3. Ease of use
4. Interaction with student devices
5. Privacy and security
6. Integration with classroom tech
7. Quality of software and resources

1 Maintenance and lifecycle

Question for evaluation:

Is the display easy to maintain, and is it future-proof?

With interactive displays that are difficult to maintain and not built for longevity, the costs associated can be substantial. Let's walk through financial and time-based costs, as they relate to differences between high-quality and lower-quality displays.

Mobile device management

Some interactive display brands come with some form of remote management or mobile device management software, but not all will have the features you need. Some lower-quality displays don't offer this feature at all.



Hidden cost:

Setting up a standardized app deployment at the beginning of the school year without the use of mobile device management on 100 displays manually could take 15 minutes per display, or over 25 hours of your administrator's time.

On the other hand, cloud-based device-management tools

provide a one-stop solution for administrators to maintain, control, support, and secure devices from any web browser. Updating a group of high-quality displays at once using mobile device management software takes just 5 minutes.



Hidden cost:

In addition, if mobile device management is not included with the interactive display you select, you have the option to purchase one separately, which would add to the total cost of your display by up to \$9 per month.

25 hours

to update displays
without a mobile device
management system

\$9 /month

per display

Automatic over-the-air updates to the embedded system

Much like your personal device, interactive panels that are not updated can become obsolete and unable to support key features and apps. Lower-quality display manufacturers lack the ability to upgrade the Android versions of their devices and the internal development teams needed to perform those upgrades.

Planned obsolescence means each panel only uses the version of Android it was sold with, forever. In addition, administrators must spend time and effort resourcing updates manually, monitoring Android system updates for their display model, instead of benefiting from the convenience of their technology provider handling this for them.



Hidden cost:

With the pace of change, **a district could see reduced functionality in a display that does not support Android updates in as little as five years.** After their version is out of date, the interactive display may not connect well with web and third-party apps. This could cause a district to double their monetary investment, due to early display replacement, after only five years of product use.

2X monetary investment

Districts may need to make double the monetary investment after five years due to the inability to upgrade Android versions



Hidden cost:

Updating patches and fixes manually takes roughly 15 minutes per interactive display. To update patches and fixes manually on 100 displays require could 25 hours of a system administrator's time. Situations like this also carry potential security risks if fixes to problems are delayed due to manual labor. Districts can expect to update patches and fixes between 4-12 times per year.

25 hours more

Alternatively, high-quality interactive display manufacturers employ internal development teams to push updates, security patches and bug fixes over-the-air. **The best interactive displays will release updates automatically, for a truly effortless, no-cost update.**



Hidden cost:

The financial cost associated with updating just 1 display manually may seem small at first, but this can add up to land you with a hefty price tag. Travel time, the update itself, and overtime or after-hours classroom time if required could total \$500.

With over-the-air updates and appliance-based upgrades, interactive displays remain functional for much longer. **An interactive display should support updates with a future-proofed design, and upgradeability should be tested to last for 10 years.** Over-the-air updates to Android versions, along with high-quality chip selection and the ability to upgrade via appliance module, means your display's operating system will last as long as the display hardware.

\$500

financial cost associated with updating 1 display

External WiFi dongles

Not all interactive displays include built-in WiFi. Lower-quality panels may require schools to purchase a WiFi dongle separately, which costs more, and requires time to source.



Hidden cost:

A WiFi dongle can cost anywhere from \$49 to \$116 to purchase separately. Delivery can take up to 8 weeks, and setup can take 1 hour per device.

Up to \$116 per WiFi dongle + up to 8 weeks for delivery

In contrast, high-quality interactive displays have built-in, integrated WiFi, eliminating the need to purchase dongles, wait for them to be delivered, and spend time on setup.

\$116

per WiFi dongle + up to 8 weeks for delivery

Warranty variances

Some interactive display providers offer shorter warranties than others, and may not include 2-way shipping or onsite support for removal and replacement. In the event that there is an issue with a display, a shorter warranty means you'll need to pay out of pocket. In addition, consider that **some companies offer warranties longer than their company has even been in business.** Even if you have a longer warranty, if it does not include two-way shipping and onsite service, you'll incur additional costs to fix any problems.



Hidden cost:

Extending a 3-year warranty to 5 years may cost \$250 to \$300 per panel. Extending a 5-year warranty to 7 years could cost approximately another \$335 to \$400.

It's important to understand that less than 2% of high-quality panels fail within 7 years of purchase, and 90% of those fail within the first 30 days.



Hidden cost:

For an out-of-warranty product needing repair, the cost for onsite service (or removal and replacement) could run from \$1,500 to \$3,000 by the time labor, two-way shipping, repair, and reinstallation are factored into the price. **Alternatively, high-quality displays offer longer warranties that may also include two-way shipping and onsite service.**

Up to \$3,000 per panel for onsite service or removal and replacement as required

up to

\$400

per panel to extend warranty

up to

\$3K

per panel for onsite service or removal and replacement as required

Technical support

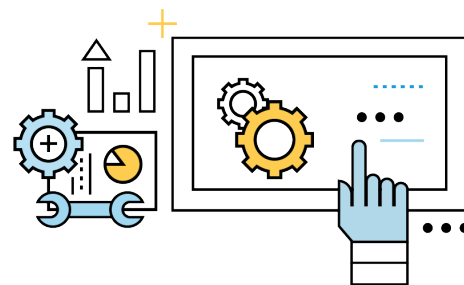
When choosing an interactive display, it's important to consider the depth of support resources available. Support teams without a global presence may not be able to assist you during business hours in your region. Providers of lower-quality displays may not offer in-person or over-the-phone technical support. Their downloadable materials and support guides may be of lesser quality, too.



Hidden cost:

To troubleshoot an issue with live tech support, it might take 30 minutes. Without good support and documentation, this same issue could take 45 to 60 minutes to resolve.

Alternatively, a global team that deploys follow-the-sun ticket support can work on your issue continually, for a **much faster resolution and less downtime, beyond downloads and guides, providing ongoing technical support, online, over the phone and over email, worldwide.**



2 Overall quality standards

Question for evaluation:

Does the display brand have high quality standards?

Who you buy technology from matters. The following key considerations can help you distinguish between interactive displays with high-quality standards and those without. Purchasing the latter can result in significant costs to your school district, and the planet.

Product longevity

Not all interactive displays are rigorously tested for longevity. Lower-quality interactive panels may fail sooner, accelerating replacement costs if they are out of warranty, or resulting in downtime even if they're under warranty. **Lower-quality displays can also develop flaws more quickly, including hot spots, color distortion and lack of clarity, further impacting the lifespan of your display. The lifespan of these panels could be 20,000 hours shorter than high-quality products.**

Display failure can occur as many as 20,000 hours sooner than with high-quality products

Premium interactive displays are designed with stringent requirements for commercial display quality—not just any old LCD. They also survive intensive testing, ensuring display and pen components are tested extensively for shock and vibration. **The best interactive displays undergo Accelerated Life Testing, which includes extreme temperature, humidity, and voltage testing, to maximize product life and minimize hardware replacement.**



Environmental impact

Displays that draw more power cost more to operate. **With rising energy prices, these costs can add up to tens of thousands of dollars over the life of a display deployment.**

They also impact the planet negatively. In fact, the CO2 offset over 5 years for 100 inefficient 300W displays is around 63 tons. This is the equivalent of CO2 sequestered by 4000 trees or 75 acres of forests in a year.

Inefficient displays can more than double energy costs



Hidden cost: A 130-180W display can be up to 2x more efficient than a higher power-consuming (300W) display, saving thousands of dollars to operate over 5 years.

Up to \$28,552 more in energy costs over 5 years to operate 100 high-power-consuming 300W displays

2X energy costs

3 Ease of use

Question for evaluation:

What are the implications of selecting a display that is not user friendly?

Purchasing interactive displays that are difficult to use leads to low adoption, frequent support calls, and a technology deployment that never reaches its full potential. This impacts teachers, students, and your budget, as well as your system administrators' time. Let's examine some scenarios that illustrate this point.



User experience: number of clicks to take an action

Lower-quality displays require teachers to click through longer workflow paths, use multiple tools and applications, or establish their own workarounds to access the functionality they need.

Having to click numerous times to perform basic actions and wait for multiple tools to load has a significant negative impact on classroom time. Let's explore how long it takes to complete 5 basic actions with lower-quality displays vs. high-quality displays:

Action	Time to complete: lower-quality display	Time to complete: SMART display	Teacher time wasted
Access and write over a website	Up to 39 seconds	Up to 6 seconds	8 minutes per week (if performed up to 14x)
Save an annotation as a whiteboard file from a browser or third-party app	Up to 2:17 minutes	Up to 39 seconds	11.5 minutes per week (if performed up to 7x)
Add an image from search, followed by a video from the same search	Up to 1:21 minutes	Up to 18 seconds	7 minutes per week (if performed up to 7x)
Add a ready made activity, such as a static resource or background, to a whiteboard	Up to 31 seconds	Up to 6 seconds	15 minutes per week (if performed up to 35x)
Save work as a PDF to device's hard drive	Up to 32 seconds	Up to 10 seconds	1.5 minutes per week (if performed up to 5x)



Hidden cost: High-quality interactive displays offer easy workflows with fewer clicks and a straightforward user interface, preventing more than 40 wasted minutes per week, per teacher. (This is calculated using only the 5 common actions noted above, so the real number is likely much higher).

40 wasted min.
per week

At least 40 minutes wasted per week, per teacher to complete basic actions with lower-quality displays

Navigating menus: impact on tech support and class time

With lower-quality displays, the ability to recognize touch, pens, erasing, and gestures automatically is limited or non-existent. Inking tools may require the teacher to manually launch an overlay program, rather than working automatically when the pen is used. This means teachers must stop what they're doing and navigate through menus to change tools and settings, instead of intuitively using their technology, teaching naturally and collaboratively from day one.



Hidden cost: A district could receive as many as 10 support calls per week from teachers unable to figure out how to use various menus for touch, ink, and gesture recognition. At a conservative estimate of \$25 per support call, this could amount to at least \$250 per week.

At least \$250 extra per week in support call costs due to automatic recognition inability

High-quality interactive displays offer the ability to recognize touch, pens, erasing, and gestures automatically, and software that intelligently activates when a user wants to annotate, saving teachers from switching between menus and settings, making them more likely to use the tech—and saving you time and money on support calls.

4 Interaction with student devices

Question for evaluation:

Does the display integrate well with student devices?

Low-quality interactive displays rely on screen casting and screen mirroring alone for student contribution. In contrast, high-quality displays offer student contribution tools and multi-way inking directly from the whiteboard application, in addition to a robust screen sharing experience. These displays provide an easy way for students to connect through a browser without requiring user accounts or logins. They also provide ways for the entire class to contribute, rather than taking turns screen casting.

Displays that lack this kind of integrated functionality will rely on tools or apps that require users to leave the whiteboard and use a web browser, disrupting the lesson.



Hidden cost: A district could waste up to 14 hours per week of tech support time managing displays that integrate poorly with student devices.

14 hours/week
of tech support time



5 Privacy and security

Question for evaluation:

What are the potential risks associated with displays that have lower privacy and security standards?

Ransomware attacks on organizations occur every 14 seconds, according to data from Cybercrime Magazine. On average, cyberattacks cost organizations \$200,000.

However, even smaller security breaches, like a student accessing a teacher's device, can be problematic and costly for a district to resolve. Let's run through a few scenarios that shed light on the hidden security costs of low-quality tech.

No user profiles

If an interactive display doesn't support individual user profiles, anyone with access to the display can access connected cloud storage, files, and more. This puts teachers' data at risk of being breached by unauthorized users.



Hidden cost: Unauthorized access to teachers' files by students or other staff can result in issues that take anywhere from 1 hour to several months for technology and administration teams to resolve, depending on the severity of the incident.

Up to several months to resolve breaches due to unauthorized access

Limited user profiles

User profiles that admins have to set up and/or administer result in one more thing to manage on their already-full plates. If a teacher forgets their password, the entire profile needs to be reset. In addition, only a small number of teachers can leverage profile benefits on shared interactive displays.



Hidden cost: Creating and managing dedicated user profiles for interactive displays that don't offer single sign-on could require a significant amount of time. At 30 minutes per teacher in a school with 30 teachers, at least 15 hours would be eaten up by this task—and that's assuming each teacher only needs help signing in once, which is unlikely to be the case, especially for teachers that work in multiple classrooms or at different schools.

15 of tech and admin time wasted

At least 15 hours of tech and admin time wasted due to the lack of single sign-on

High-quality interactive displays offer individual user profiles, which are secure. Displays that offer authentication with Google™ or Microsoft® credentials allow users to self-serve, without administrators creating new accounts. When they're finished working, these displays enable teachers to securely sign out of their profiles with one click.

In addition, these types of displays support a password reset process that doesn't require dedicated IT team time. Teachers can simply follow your district's protocols for resetting their passwords through Google™ or Microsoft®, and move on to their next task.

6 Interactive experience

Question for evaluation:

Does the display integrate well with other classroom technology?

Seamless integration from one device to another is critical to improving efficiency in the classroom. Here are some key areas that can help you understand the hidden costs of interactive displays that don't integrate well with other classroom devices.

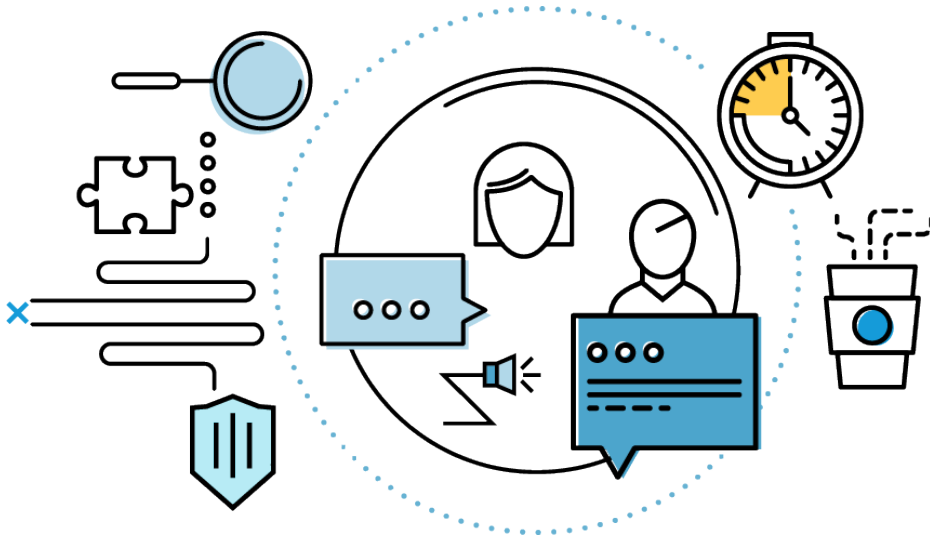
Touch and interactivity experience

Lower-quality displays often claim they offer a certain type of interactivity, but this may not extend to connected operating systems. This 'bait and switch' means that the user experience on a connected Windows device may be drastically different than embedded computing, and even more different on a Mac OS device, which may not even support multiple touchpoints. They also may not provide plug & play functionality with connected touch devices.

A lack of interoperability and lack of consistency between platforms and operating systems means teachers won't have the same ease of use they were promised, leading to a need for more training or less product adoption.

Users may also expect a certain level of plug & play functionality based on their experience with other touch products. A high quality interactive display should work fluidly with Windows Ink and interactive functions, such as One Note, even without any product drivers installed, allowing teachers and students to leverage the interactive display for their Windows devices without having to waste time installing additional software.

Other types of connected devices may not offer access to ink tools that integrate with the embedded whiteboard. Markup is saved as a screen capture that can't be edited once it's incorporated into the lesson.



Hidden cost: A district could likely receive 10 support calls per week if displays worked significantly worse when plugged into a Windows® or macOS® or device. While standardizing on Windows-based computers would provide some additional functionality, this would involve additional cost. And in the end, you're not getting the touch & interactivity you were sold.

10 extra support calls per week

10 extra support calls per week due to lack of systems interactivity

SMART displays offer touch and ink on Windows®, Mac®, and embedded Android, creating a more consistent touch and ink experience from one platform to the next with multi and single touch gestures with a connected PC experience.

SMART provides a consistent interactive experience across these platforms:

- Automatic detection of pen, touch and erase and gesture interaction types
- Continuous Pen, Touch & Eraser differentiation
- Automatic pen color and tool type detection on displays with Tool Explorer™

Plus:

- Windows®: Up to 40 points of touch
- macOS®: 20 points touch
- iQ embedded computing (Android): Up to 40 points of touch

Annotation tools

Lower-quality displays only offer annotation tools as an acetate overlay. This means teachers can only annotate over one app or piece of content at a time, and have to close and save the annotation to navigate to another screen, video, or annotation. They're unable to revisit previous annotations and continue working on them, and must freeze the screen to write into and over files, browsers, and applications. In addition, overlay annotation does not convert digital writing to text and annotations get lost.



Hidden cost: A teacher could likely waste 10 to 20 hours per year taking screen captures of acetate layers, changing modes, and re-writing annotations.

20 wasted teaching time

20 hours per year of wasted teaching time due to poor annotation tools

In contrast, high-quality displays have integrated tools, like SMART Ink, that allow teachers to pick up a pen and write over any application or program. Annotations stay with the application and web browser tabs they are placed on.

7 Quality of software ecosystem and resources

Question for evaluation:

Does the display include high-quality software and resources?

While the flexibility to use helpful apps with an interactive display is important, the display should also provide value on its own and not rely completely on third-party technology. Some lower-priced interactive displays have only basic whiteboard features, not designed for education, leaving teachers struggling with tools intended for corporate meetings. In addition, some displays may not include any content for education, or only provide basic, static education templates and backgrounds that aren't easy to search and find.

In addition to the time spent, and complexity introduced, sourcing third-party apps and content for low-quality displays, teachers also waste a significant amount of time switching and moving content between apps.



Hidden cost: Cobbling together a comparable set of software applications to what SMART interactive displays offer free, costs significant time and effort. Switching between apps to support these different tasks wastes a significant amount of class time and disrupts teacher workflows.

Hundreds of hours of teacher time to source different apps to meet administrative, teaching & learning needs

Instead of cobbling EdTech applications together, high-quality interactive displays include free designed-for-education tools, like SMART's embedded iQ experience and SMART Notebook software. These free tools include built-in education content and interactive manipulatives, so teachers get the functionality they need, instead of trying to adapt tools designed for a corporate environment.



Conclusion

Better evaluations make for smarter technology investments

You should feel empowered to explore how the experience of interactive displays will affect your organization, and to use your knowledge and insights to bridge the gaps that exist in many evaluation processes.

Understanding the hidden costs of lower-quality displays can help you communicate the full picture to your stakeholders. In addition, with a clear perspective on what to consider when evaluating displays, you can pull together the data you need to estimate the true costs of your different options. These insights can create a more comprehensive view of each option, even before your formal evaluation begins.

The risks are significant when it comes to making a poor interactive display selection. When users are demotivated to use the technology, districts lose money on their investments. Worse yet is the cost to students' education.

An interactive display is an important investment with a powerful purpose. You're best positioned to make the right choice when you can accurately estimate the total cost of ownership of the technology. This way, you can act with confidence to make the decision that will ensure positive impacts on your learners, educators, and support staff.

**Speak to an expert.
Experience the difference.**

A proven track record in EdTech
SMART is a leading tech company that puts meaningful connections at the core of everything we do. We work to create and advance technology that helps teachers, learners, and teams make meaningful connections every day.

With more than 35 years in the industry, SMART's pioneering innovations are built to last. From conception to engineering and manufacturing to testing, our products are created to use less energy, be easy to install and maintain, and last for years to come - all while providing unparalleled collaborative, engaging learning experiences.

Consult a SMART representative on how you can maximize your return on investment, and lower your total cost of interactive display ownership

SMART[®]

