How Smarter Filtering Means Safer Learning

A GoGuardian E-Book
Introduction

K–12 educators and administrators are tasked with building safe and effective digital learning environments, and this responsibility includes shielding students from inappropriate content online.

Traditionally, this has involved monitoring and filtering web access by keeping lists of appropriate and inappropriate websites. But the Internet is constantly changing. The dynamic nature of the web makes traditional URL-based filtering—the process of categorizing entire web pages by their domains—a largely ineffective method of controlling the kinds of content that students access.

Fortunately, a new method has emerged that uses artificial intelligence to analyze the actual content on web pages in real time, allowing students to see only material that educators deem safe and productive. Content-based filtering marks a different approach to keeping students safe online—one that's proving to be both more accurate and easier for educators to manage.
WHY TRADITIONAL WEB FILTERING FALLS SHORT

When the Internet was first created, web pages were static HTML documents whose contents changed infrequently. This allowed Internet filtering software to shape students’ online activity by blocking or allowing access to certain websites based on their URLs. Because the Internet has become increasingly dynamic and interactive, it's no longer possible for the software to filter in this way.

The sheer pace at which new web pages are created makes it impossible to add every inappropriate web page to a backlist. In March 2017, there were more than 330 million registered domain names on the Internet; as of August 2017, there were an estimated 1.2 billion websites worldwide. That's an average of 236,928 new websites created each hour.

In addition, the actual content on these websites is constantly changing. Even if it were possible to keep up with the number of unique URLs created, the dynamic nature of today's Internet means the contents of a web page might be fine the first time a student visits the page and inappropriate the next.

Few websites these days are static. Instead, they contain scripts, or short computer programs that define how the site behaves and what content it will load for the user. For example, a news-based website might contain a script that delivers fresh content on a regular basis, so visitors are seeing new headlines each time they access the site.

“On many websites today, it's very likely that every time you hit the ‘refresh’ button, a completely different page will load,” says Tyler Shaddix, head of product and innovation at GoGuardian. “A website's address no longer uniquely identifies the content like it used to.”

FLAGGING TERMS—AND THE PROBLEMS WITH THIS APPROACH

Many products aim to solve the shortcomings of URL-based filtering by using a technique known as keyword flagging. The software looks for preselected words or phrases that are likely to indicate that the content is inappropriate, and the presence of these keywords on a web page or in a search query triggers a response—such as blocking the page and/or notifying an administrator.

In theory, this approach is intended to help administrators. The idea is that K–12 leaders would review flagged websites and then add them to the software’s list of blocked sites if they’re considered inappropriate.

But keyword flagging is troublesome, because it can’t account for the context in which a word or phrase appears. This results in a large number of false positives: web pages that

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are flagged as inappropriate when they are not. And that creates an additional hassle for K–12 leaders.

For example, a program might be set up to flag a student's use of the word “bomb” online. But depending on the context, the use of this word can mean very different things. A search query such as “what kind of bombs were used in World War I?” might indicate that the student is researching a history project, while a search for “how to make a bomb” might suggest a potential threat.

Sorting through a list of flagged activity to determine which instances are harmless and which require further action can be an onerous task—especially when there are so many false positives. Busy administrators don’t have time to divert from other projects to sift through browsing terms.

Instead of looking for certain keywords, or blocking a website based on its URL, the solution analyzes the material on the page to determine what it's about and whether it's appropriate for the student.

HOW ARTIFICIAL INTELLIGENCE ENABLES TRUE CONTENT-BASED FILTERING

A content-based filter powered by artificial intelligence (AI) technology can solve this problem. Instead of looking for certain keywords, or blocking a website based on its URL, the solution analyzes the material on the page to determine what it's about and whether it's appropriate for the student.

Here's how it works: Developers show the software hundreds of thousands of examples of web page content that are appropriate or are not appropriate for students at different age levels, and the software "learns" how to distinguish between these.

“The AI starts to learn patterns between the words and the content on the page,” Shaddix explains. "Word flagging doesn't understand what the page is about. It's just counting words, whereas this software is actually comparing a web page to hundreds of thousands of other pages it has seen to determine how similar it is to those other pages."
Because AI looks at the context in which certain words or phrases are used, web filtering becomes more accurate. And because it's doing this in real time, the dynamic nature of the web is no longer an issue.

What's more, “the best thing is that the system is constantly learning,” Shaddix says. When K–12 leaders indicate that a web page was flagged or blocked, either correctly or incorrectly, the software learns from this incident and becomes even better able to categorize web content over time. The software is continually improving as it receives feedback from educators.

GETTING AS CLOSE TO THE WEB USER AS POSSIBLE

How schools implement content-based filtering is important as well. For this method to work, the software must be able to examine the actual contents of a web page in real time. But the use of scripts makes this more difficult.

When a user requests a web page from a server, the server often sends back a blank HTML page with a script. As the page loads in the user’s browser, the browser runs this script, which pulls data from multiple sources and renders the information as the page the user sees.

Some content filters intercept and inspect web content as it travels on the network from the server to the user. But these network-based solutions only see an empty page and a script, which is meaningless by itself. The software can’t tell what the contents of the page will be or whether it will be appropriate for the student.

A network-based solution can see the data that a script is pulling from multiple sources, but again, these packets of data are hard to analyze by themselves and may be meaningless until they are rendered to the user as a full web page.
“These network-level filters don't actually know what the user is seeing,” Shaddix explains. “At the end of the day, that's what we're trying to do—to get closer to understanding what the user is actually seeing.”

A solution that resides at the browser level, such as a Google Chrome extension, solves this problem. It can look at a web page from the student's perspective and determine whether the content is appropriate. This type of solution gets “as close as you can to having someone sitting there with a student and pulling things away that are harmful or disruptive,” Shaddix notes.

LESS WORK FOR ADMINISTRATORS

Not only does filtering improve with AI, but the automatic notifications that K–12 leaders receive when a student tries to access explicit web content—or types something explicit within a Google Doc, or posts inappropriate content to a social media website—also become more accurate.

Greater accuracy means that administrators aren't overwhelmed with unnecessary alerts. Instead, they only receive alerts that deserve their attention, which streamlines their workflows.

This results in “a huge increase in productivity,” Shaddix says. “It actually makes it possible for administrators to manage their notifications. And every time they check these alerts, there is actionable activity that can inform immediate changes.”

Seth Hemken, Director of Technology, explains how the software offers secure control for popular sites like YouTube allowing teachers to integrate content within their lessons.
GoGuardian Helps Shape Students’ Online Behavior

GoGuardian’s Admin 2.0 software is a content-based, context-aware Internet filtering and monitoring solution for Chromebooks. It uses powerful artificial intelligence technology to help educators understand and shape students' online behavior in real time.

GoGuardian Admin 2.0 is deployed quickly through the Google Admin console. It’s a Google Chrome extension that can analyze the content of web pages as they’re rendered within the browser, comparing this content with tens of thousands of similar pages to determine if it’s appropriate for students based on customizable, pre-defined rules.

The system’s policy settings give administrators precise control over how students can use the Internet—based on their grade level, location, and the time of day. For instance, administrators can apply one set of rules for using YouTube and social media websites at school—and another set for when students are at home, after school, or on weekends.

“Because the software sits at the browser and OS (operating system) level, it can analyze anything that’s displayed within the web browser,” says Tyler Shaddix, head of product and innovation at GoGuardian. “That includes the text that students are typing into Google Docs or any other rich-format page.” This means the software can monitor the content that students are posting as well as the websites they’re requesting online.

Customers have shared that this system reduces the number of false positives by a factor of 100 when compared to traditional keyword flagging algorithms.

“One thing we learned pretty quickly is that everyone has different strategies for how to deal with inappropriate or unsafe behavior,” Shaddix says. “So we created a very flexible workflow, through which administrators can tell the AI engine easily: ‘When you see behavior of this nature, perform this set of actions.’ This list is completely customizable for each district; it often includes blocking the webpage, sending the student a message, and sending the administrator a notification.”

Administrators can decide for themselves what they want messages to students to say, but it’s typically something like, “When you received this computer, you agreed not to visit sites like these. Please make wise choices online.”

“We figured that if we made it more of a conversation instead of just blocking the activity, we would build better digital citizenship,” Shaddix says. Sure enough, many school districts report seeing five times fewer online transgressions after implementing real-time reminders.

“The students feel like they’re being treated with respect,” the tech admin of one school district reports. “It works phenomenally.”
EVIDENCE OF SUCCESS

Brian Seymour, director of instructional technology for Pickerington Local School District in Ohio, remembers using a web filter based solely on a page’s web address before switching to GoGuardian.

“I don’t have the time or the manpower to search the Internet looking for websites that might be inappropriate for our kids,” he says. “Having an AI-based solution that can analyze the contents of a web page before students even see it has been one of the best things we’ve done to ensure that our kids are getting only age-appropriate material.”

Seymour’s district of 10,000 students has gone fully 1:1. Students in prekindergarten through second grade use iPads that are stored in carts after school. Students in grades three and four use Chromebooks that stay at school, and students in grades five through twelve receive Chromebooks they can take home at night.

“We needed a way to assure parents that if students were taking the devices home, their Internet access would be safe and educational even from home,” he says. “With GoGuardian, we can ensure that students are using their Chromebooks for learning—which has relieved parents’ fears.”

Before GoGuardian introduced an AI-based solution, “I was getting a lot of false positives,” Seymour says. “I would probably get 100 emails a day [reporting inappropriate online behavior], and maybe about five were something I needed to follow up on. Now, I very rarely get any false positives—so I know that if I do get a notification, I need to look at it and take care of it immediately. It has made a very big difference in my ability to take action.”

California’s Grossmont Union High School District is in the third year of a 1:1 program called Future Forward, in which all of its 17,000 high-school students receive a Chromebook they can take home. The devices are used in class to foster innovative, student-centered learning environments. The district uses GoGuardian’s AI-based software to ensure that students remain on task.
Dan McDowell, director of instructional technology, compares URL-based filtering to trying to hit a moving target. “This is a far better way to ensure that our students are not accessing materials they shouldn’t be,” he says. “Having a system that is as dynamic as the web itself is essential.”

McDowell has set up the software’s alerting feature to give students a gentle nudge when they violate the district’s acceptable use policy. “Students get a message saying, ‘You probably shouldn’t be here, and continued behavior could result in suspension of your Internet privileges,’” he explains.

Upon implementing this message, McDowell says the district saw “a huge decrease” in violations—along with fewer repeat offenders.

Oak Park Unified School District, also in California, has seen similar success. This district of 4,600 provides students with Chromebooks for use at school.

“In rolling out devices to students, we had to address not only high-quality instruction but also digital citizenship,” says Jay Greenlinger, director of curriculum and instruction. “GoGuardian is a tool that helps teachers model appropriate use of technology.”

“Why use 1:1 Chromebooks in schools

**CONCLUSION**

Because of the dynamic nature of the Internet, flagging terms and filtering based on a website’s URL are outdated methods of safeguarding students’ digital learning. Solutions that use artificial intelligence to evaluate the actual content of a web page and the context of the request must become commonplace if schools are to ensure that students only have access to appropriate material online.
AI-based filtering systems are more accurate than traditional approaches, resulting in fewer false positives and more actionable insights. This not only reduces the likelihood of over- or under-blocking; it also reduces the burden on administrators by streamlining their monitoring of Internet activity on school-issued devices. Modern systems also incorporate feedback from administrators so the systems are continually learning and improving.

"AI has the ability to grow with the user, becoming a true partner to educators," Shaddix says. "The technology provides an immediate picture of what is going on. What should they do next? That's still completely up to human administrators who understand their students' unique needs—and that's exactly the way it should be."
Smart technology needs smart management.

As more schools implement technology programs—either through 1:1 initiatives or shared carts—the need for powerful, easy-to-use device management tools is greater than ever. From device assignment and repair tracking, to web filtering and classroom management, many districts often end up using a patchwork of tools and apps to accomplish their strategic technology goals.

With a full suite of position-tailored products designed and built just for Chromebooks, GoGuardian makes it easy for school districts to manage large or small device deployments, keep their students safer online, and gain valuable insights into how their technology programs are working.

Learn More

Visit goguardian.com or call us at 888-310-0410

About GoGuardian

Based in Los Angeles, GoGuardian is a leader in Chromebook management solutions for K-12 school districts. GoGuardian products are used by 44,000+ educators in all fifty states, impacting millions of students and teachers every day as they use the Internet for collaboration and learning.

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