Web Filtering in Education

Cloud, On premise or Hybrid

A complete guide to choosing the right deployment strategy for your school district.

Linewize by Qoria

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Introduction

Our aim in this paper is to give you a better understanding of the deployment options around web filtering and to achieve a more informed allocation of resources.

We expand on the on-premise versus cloud debate and share perspectives on why some school IT leaders are choosing to follow a hybrid model where on-premise and cloud computing coexists.

Essential reading for: IT Directors and CTOs. Also, other district administrators wanting a more practical understanding of their IT environments as it relates to student safety and online filtering.

If you have any questions about web filtering, its implementation or student safety solution in general, please contact us. We're ready to help.

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2.0 The Changing Face of Web Filter Deployment

The online world in education is rapidly developing. Deployment options are expanding and cloud-based web filtering is becoming more common than ever before.

Indeed, many schools have chosen to ditch their on-premise environments altogether.

A recent report on K-12 schools by Zipdo found that 83% of educational IT professionals agree that cloud-based systems will replace individual classroom tech.[1]

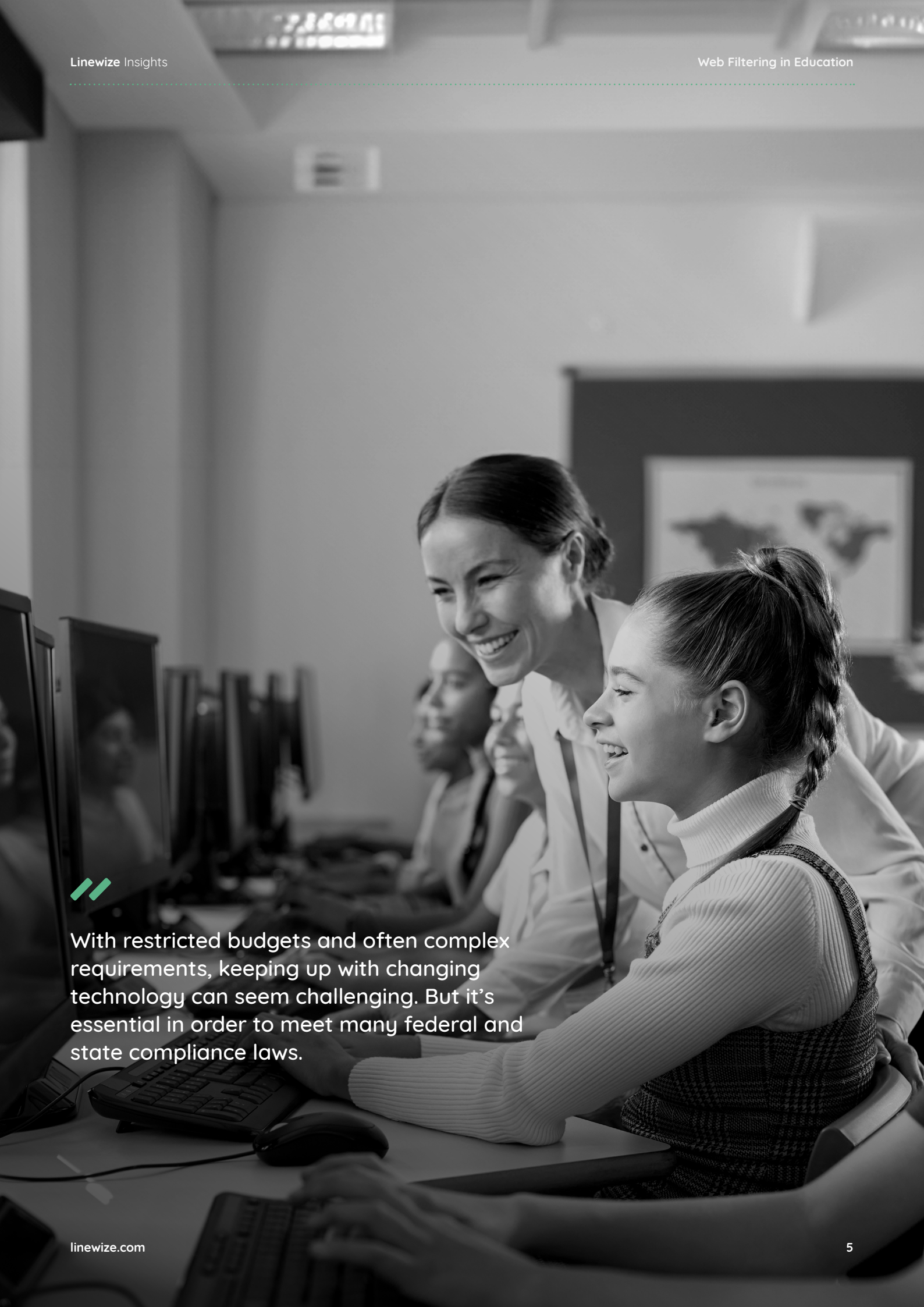
There are, however, valid reasons why a school district might choose to stay with their traditional on-premise system; which, after all, was the norm in education until very recently.

Major technology vendors emphasise the benefits of storing data and running applications, platforms, and infrastructure in the cloud - whether public or private.

But many IT leaders remain caught in the debate over maintaining on-premise appliances versus moving their infrastructure to the cloud.

With restricted budgets and often complex requirements, keeping up with ever-changing technology can seem challenging for school districts; but it's essential in order to meet many federal and state compliance laws.

1. Zipdo. 2023. https://zipdo.co/statistics/cloud-computing-in-schools/



With restricted budgets and often complex requirements, keeping up with changing technology can seem challenging. But it's essential in order to meet many federal and state compliance laws.

2.1 Web filtering in the cloud

Types of cloud filter:

DNS filter

Easily deployed but deficient in an education setting, the DNS filter can block sites at domain level.

Public cloud pass-through proxy

Increasingly rare in Education, these are traditional proxies which work in public cloud data centers and can suffer from bandwidth tromboning, poor latency performance and high running costs.

Client-led cloud filter

Cloud managed, but with much of the heavy lifting done on-device, these filters work best with managed devices and offer none of the drawbacks of earlier types of cloud filtering.

This report will focus on the client-led cloud filter, as it's generally regarded as a more suitable deployment option for an education setting.

Cloud Filtering enables you to remove filtering from your on-site server and apply it directly to your client machines. This gives you more freedom in how you filter managed devices and is particularly useful when you have devices going off-site. It also gives the benefits of faster internet access and more comprehensive data reporting.

Cloud Filtering gives you more freedom in how you filter managed devices.

Cloud filtering has many benefits to suit your district needs:

- **Student safety** - Allows you to provide filtering both on and off-site and is less restricted by server dependency. This is particularly useful for 1:1 schools.
- **Fast investigative reporting** - Cloud provides faster reporting than on-premise solutions, as it eliminates the need for an appliance to process large volumes of data. Faster reporting means resolution on issues.
- **Fast internet access** - Gives students and staff fast access on any device. The simplification of authentication of users also makes for a more streamlined process.
- **Fast deployment** - Removes the need for the installation of complicated hardware, or staff training, to get it onsite and working speedily.
- **Lower IT maintenance** - With the cloud hosting your filtering maintenance time is reduced, you can give valuable hours back to your IT team.
- **No capital expenditure** - Eliminates the need to purchase and maintain expensive servers upfront. Cloud filtering allows you to subscribe for exactly what you require over time.
- **Scalability without new appliances** - The cloud is a dynamic solution that allows your school district to expand or contract quickly, ensuring optimisation for current usage.
- **Always latest edition** - Cloud filtering will always run the latest version without the need for running updates on servers.
- **No bottlenecks avoiding choke points** - Cloud filtering happens at device level and so activity is distributed across all devices.
- **Security** - Data in the cloud is encrypted and held on remote, physically secure sites.
- **Back-up of data** - Cloud services are much more likely to have easy recovery of any lost data.
- **Simplified content filtering** - Some solutions allow you to achieve real-time, content-aware filtering without the complexity of man-in-the-middle (MitM) decryption, certificates or exceptions.
- **Lower energy costs** - With no need for high power servers to run, energy bills can reduce.

2.2 Traditional on-premise

Most education IT leaders are familiar with installing their web filter on their school's own computers and servers. In many cases, on-premise systems are easier to modify and an ability to customise to specific needs is important.

On-premise web filtering puts more control in your hands, including the security of your data. It's therefore essential that your school is capable of protectings its most sensitive information.

Filtering on BYOD can often pose an issue for districts. On-premise delivers the best option for creating effective BYOD functionality.

On-premise web filtering may be better suited for larger schools with higher budgets, a desire to customise system operations, and the existing infrastructure to host, maintain and protect its data.

The benefits of on-premise filtering:

- **Budgets for improvement** - Your school may have separate budgets for significant infrastructure changes. A major on-premise filtering purchase might not have to come from your mainstream IT budget.
- **Cost upfront/subscription** - With most of the cost arising from the initial outlay, institutions that use systems for long periods of time may calculate a smaller overall spend than a regular subscription service.
- **Data security** - Data security remains in the hands of your school or college. This can give peace of mind provided you have adequate protection in place.
- **Customization** - Deployment may take longer but it allows you to add more customisation to your infrastructure. This can benefit you if your school or college has large or complex systems.
- **Existing infrastructure** - You should review your current infrastructure and existing contracts carefully to make sure introducing cloud will not result in cost duplication.

> Perfectly workable local solutions should not be retired before their natural end of life.

- **Being ready** - Big changes to infrastructure and systems can be another upheaval in times of change. It may not be the right time for your school to consider a complete systems overhaul.
- **Extra training of staff** - Existing IT staff will need to understand the system changes for moving over to cloud. This will involve extra training and may require extra support initially.
- **BYOD & unmanaged devices** - On-premise can be the best solution for protecting on-site BYOD devices. Additionally, other unmanaged devices are easily handled at the network level.
- **Control** - Your school may want to retain total control over your filtering set-up.
- **Consolidation** - Filter appliances might double up as firewalls, saving money, and maintaining the same consumption power, cooling, and rack space.
- **Assured filtering** - With a filter inline on your network, it's much more difficult for a device to escape filtering, whether it's by mistake or through malicious means.

On-premise systems are generally considered a capital expenditure, whereas cloud-based systems are typically considered an operating expenditure.

2.3 Hybrid deployment

While the debate of the pros and cons of an on-premise environment pitted against a cloud computing environment is a real one, there is another model that can offer the best of both worlds.

A hybrid solution features elements of both on-premise and cloud, and can leverage the benefits of both.

Usually such a deployment retains a less powerful hardware appliance on-site and is combined with client deployment for a proportion of student systems.

Sometimes these deployments start heavily skewed towards the existing on-premise solution, where a school or district is migrating to a more balanced hybrid setup.

A hybrid solution can be the best solution for some schools and colleges if you are concerned about any of the following:

While the debate of an on-premise or cloud environment is a real one, there is another model that can offer the best of both worlds - Hybrid deployment."

How might a hybrid deployment work for filtering?

- **Load distribution** - As internet traffic increases, the need for powerful filter hardware can arise. With cheaper bandwidth, it can prove expensive to keep up. Cloud filtering can alleviate the bottleneck at the gateway edge and extend the capability of more modest hardware.
- **Authentication** - By introducing the cloud solution for some devices, you can remove the need for additional authentication methods, particularly for modern devices such as Chromebooks, improving the accuracy of filtering and logging, and ultimately improving safeguarding outcomes.
- **Managed devices off-site** - There is a growing need for schools and colleges to filter managed school devices off-site. If that applies to you and you wish to still retain your on-premise filtering model, a hybrid solution will allow you to add a cloud solution to all devices that go off-site and may be an ideal option.
- **Flexibility** - A hybrid solution can provide your district with the flexibility to match evolving needs. For example, you may wish to choose how to distribute depending on available resources. Or you may be a district planning to roll out programs such as 1:1, which will involve adding more devices over time. Hybrid can be ideal for meeting flexible and changing requirements.
- **BYOD** - Some schools require the benefits of cloud but also want the most effective filtering for BYOD. Hybrid allows you to achieve both scenarios.

3.0 Compliance Requirements & Guidelines

When reviewing your filtering arrangements for your district, it's a good idea to revisit the compliance requirements and guidelines to ensure you are up to date.

To maintain CIPA compliance[1], schools must:

- Block or filter Internet access to harmful online content and images
- Have online safety policies that include monitoring the online activities of minors
- Provide resources for educating minors about appropriate online behavior, including interacting with others on social media and cyberbullying awareness and response.

To maintain compliance with the Children's Online Privacy and Protection Act[1] (COPPA), schools must:

- Provide notice and get parental consent before collecting information from kids
- Have a "clear and comprehensive" privacy policy
- Keep information they collect from kids confidential and secure

These requirements make it clear that, while it is essential for distrcits to ensure optimum protection from the security risks that the internet exposes, there is also an expectation to ensure that their filtering provides a granular approach that allows appropriate access while also not enforcing unreasonable restrictions.

[1] Children's Internet Protection Act (CIPA). 2019. https://www.fcc.gov/consumers/guides/childrens-internet-protection-act

[2] Complying with COPPA: Frequently Asked Questions. 2020. https://www.ftc.gov/business-guidance/resources/complying-coppa-frequently-asked-questions#top

CIPA compliance & E-rate funding

Schools are required to compliance with CIPPA, COPPA, FERPA, and other state laws in order to receive e-rate funding and/or be meet qualifications for additional state and federal grants.

The following definitions can help you better understand how to define illegal and inappropriate content:

- Discrimination: Any form of unjust or prejudicial treatment of people.
- Drugs / substance abuse: Anyone displaying or promoting illegal use of drugs or substances.
- Extremism: Anyone promoting terrorism and terrorist ideologies, violence or intolerance.
- Malware / hacking: Anyone who promotes the compromising of systems including anonymous browsing and other filter bypass tools as well as sites hosting malicious content.
- Pornography: Displays of sexual acts or explicit images.
- Piracy and copyright theft: Illegal provision of copyrighted material.
- Self-harm: Promotion or display of deliberate self-harm (including suicide and eating disorders).

Key features

The following checklist is designed as asimple, but unofficial, guide for determining whether a school or library meets the CIPA compliance guidelines. This includes criteria for both internet filtering and privacy policies.

Dedicated filter provider	Filtering is incorporated with the service provided by the Internet Service Provider.
Local filtering on the network	Filtering is provided locally for all Internet-enabled computers on a networked basis.
Filtering on individual devices	Filtering is provided individually on each Internet-enabled computer.
Filtering on shared devices	Filtering will be provided for all Internet-enabled computers used by students, patrons. and staff.
Proper protocals for filter modification	Filtering will be disabled only for bona fide research or other lawful purposes.
Digital education resources	Minors will be educated, supervised, and monitored with regard to safe and appropriate online activities
Monitoring online activity	Safe and secure use by minors of direct electronic communications (including e-mail, chat rooms, and instant messaging) will be assured.
Unauthorized activities are communicated	Unauthorized online access, including “hacking” and other unlawful activities, is prohibited.
Protected of PII	Unauthorized disclosure, use, and dissemination of personal identification information regarding minors is prohibited.
Policy communication	The Policy was adopted with reasonable public notice and after at least one public meeting or hearing.

4.0 Choosing the Right Deployment Strategy

With more and more software migrating to the cloud and the clear benefits that brings, a natural progression for many schools will be migrating to cloud filtering or hybrid over the next few years. That said, on-premise is unlikely to disappear altogether and there are valid reasons why a district may wish to stick with their on-premise set up.

4.1 Where are you now in your filtering roadmap?

The following table offers some points to consider when considering your deployment strategy.

Current needs	Possible solution	Solution detail
You are a school/district that has heavily invested in an on-premise solution. You have the staff available to maintain and manage this equipment. You want to have full responsibility over your system and data, you don't mind completing updates on your devices, and do not want to overhaul a system that is mainly reliable with some.	**Traditional: On-premise**	Updating your on-premise solution may be the right place for you now. You're aware that cloud is coming and that you need to move to it in the future, but you would like to wait for cloud filter solutions to be more established.
You are a schoo/district that has good on-premise equipment but is noticing gaps in some of the filtering requirements you need. You have available staff to maintain the equipment but need to find a solution that will cover these gaps. You need to keep costs to a minimum and need a solution that can cover your changing environment.	**Hybrid: Traditional on-premise combined with cloud add-on**	A hybrid solution can allow you to retain your functioning on-premise solution but create an add-on using a cloud solution on top. This can be an easy fix to your situation without having to do a big overhaul of your solution yet. You can gradually progress over to the cloud, giving you time to plan for meeting all your complex requirements through the cloud exclusively. By using a combination of on-premise and the cloud, you will be able to make better cost efficiencies while simplifying management improving your filtering's overall performance.

The following table offers some points to consider when considering your deployment strategy.

Current needs	Possible solution	Solution detail
You want to overhaul your filtering system and bring your school/district fully into the modern IT environment. You don't want to have a huge capital expenditure outlay and are looking for a solution that makes costs more manageable and subscription based. You want to be able to have flexibility in your offering as your device requirements are changing with different numbers of students and everincreasing devices. You want a no-nonsense solution where your data is protected. You want to reduce the need for running updates to the latest version, freeing you up for the vast amounts of other IT demands that need to be acted upon. You want to avoid bottlenecks with your vast datasets which can be hard on your processors and affect the speed of your reporting. You have overwhelmingly managed devices and no BYOD.	**Cloud: Advanced all in the cloud filtering**	Installing a fully cloud-based solution will enable you to create a filtering infrastructure designed for future years. A cloud solution will enable you to manage filtering costs over time without significant upfront expenditure in on-site equipment. The IT infrastructure will be simplified without the need for complicated configuration. The way a cloud solution works will enable you to keep your solution flexible so that you can scale up or change flexibly over time rather than having to plan for all eventualities on day zero. Data in the cloud is normally encrypted and stored in a remote and physically secured site. This is likely more secure than you can achieve on your school or college site. There will be no need for updates as the cloud will automatically run the most current solution. Cloud computing allows filtering to occur at device level and so activity is distributed across every device avoiding bottlenecks.

4.2 Illustrative scenarios

Illustrative scenario A

School with 1,300 students

300 PCs, 400 iPads

School A would like to simplify filtering on their wireless devices. They find the complexity in on-premise with certificate based MitM filtering causes problems with some key sites and occasional issues with authentication. They are reasonably happy with their set-up and have invested in expensive equipment that is working well for them on their windows devices. They have a good level of maintenance available on-site and are just looking for a solution to streamline their wireless filtering.

Solution: Hybrid

The addition of cloud filtering would ease the problems they find, as it uses simplified authentication and no MitM. As they are happy with filtering for their wired computers, using a hybrid solution will improve their filtering service and they can review migrating fully to the cloud in the future.

Illustrative scenario B

School with 3,000 students

700 PCs

School B have invested heavily in their on-premise filtering equipment. They are currently reasonably happy with their filtering set-up but are wary that with many schools moving over to the cloud, they will soon be unable to meet the level of filtering required. They have the staff to keep up the essential maintenance but know that the system needs an update. They are wary of overhauling a system that is generally working and don't want to pursue a big change at this time.

Solution: On-premise update

With the right staff in place that are able to maintain an on-premise solution, the college will be able to keep up-to-date by simply updating their appliance-based solution. Although they will not be able to benefit from the benefits cloud computing offers, they will be able to run a fully up-to-date filtering system and be able to review again when cloud solutions are more established.

4.2 Illustrative scenarios

Illustrative scenario C

School with 1,700 students

500 PCs, about to introduce 400 Chromebooks with more to be added over following years.

School C has a number of wired desktop PCs used by staff and students. However, they are planning to implement a 1:1 strategy and want to be able to achieve fast deployment for these devices while being able to filter the devices on and off-site. They are also looking for flexibility and scalability as they want to trial with their sixth-form before rolling it down to the lower year groups.

Solution: Hybrid or cloud

The school are clearly changing their IT structure significantly. With the plan to roll out 400 managed devices to sixth form, and then to increase this across more of the school over time, cloud filtering would provide the best solution. It will enable the school to achieve fast deployment and easy scalability as the number of devices increase.

Illustrative scenario B

District with 40,000 pupils

1:1 School district with several hundred on-site PCs.

District D have busy IT staff who are struggling with the time needed to maintain an up to date on-premise filter while having to manage all the other IT needs in the college. They also have vast data sets and are looking to reduce the demand on their processors to improve their reporting. They want to be able to see filtering data over time so that they can gain a full contextual picture of a student when necessary. They have 1:1 Chromebooks and need easy deployment and flexibility of filtering on and off-site. However, with a large distract, they would prefer an extra layer of security.

Solution: Hybrid

Cloud reporting will reduce the need for staff management and maintenance. The most updated version of filtering will automatically be available without the need for lengthy installation processes. The right cloud solution will also enable them to be able to access a much more comprehensive picture as it will be able to report on 100% of data. An inline device would act as a backup generator should any issues arrive on the network.

Cloud reporting will reduce the need for staff management and maintenance.”

5.0 How to Choose a Vendor

When choosing a vendor, it is important to choose a solution that covers all applicable federal and state requirements. Looking for a vendor that is established, has relevant certifications, and is a specialist in student safety solutions for schools, is a good starting point.

5.1 Checklist of functionality

100% Real-time content analysis	Ensure their solution does not just use a URL block list, but instead uses real-time content analysis to look at pages objectively and avoid unnecessary blocking or missing any pages that should be blocked. For example, a provider that categorizes content by analysing the content, context and construction of individual pages is much more effective at finding and blocking inappropriate content without overblocking entire sites. Relying on URL block lists also often means subdomains are not included in the filtering provision – a key and growing concern amongst teachers.
Powerful real-time reporting	Look for a provider that offers timely reporting. There is little point finding out about an incident days after the event.
On/off-site protection	Make sure if you have any managed student devices, you have the option for them to be filtered off-site. Check to see if there is granularity in this.
Full incident reporting	Make sure your provider is able to report on 100% of the data created. This will help build a full contextual picture of an incident.
Authentication	Look for a simple authentication process which makes access smoother and the ability to track all users easier.
Social media controls	Check that the solution gives you options around social media including read-only access.
Support	Look for a provider that offers a reliable support service operating in times that suit your time of day.

5.1 Checklist of functionality

Data security	Ensure that any vendor understands the specific requirements around school data and has the correct certification.
Easy bandwidth management	Make sure the solution will enable you to control and allocate bandwidth to allow media and file-sharing.
Layer 7 application control	Check the solution will enable you to identify and stop applications you don't want to run on your network and prioritise the ones you do.
Anonymous proxy blocking	Look for a simple authentication process which makes access smoother and the ability to track all users easier.
Age appropriate	Look for filtering providers that use a wide variety of directories (e.g. Microsoft AD, Google Directory) allowing filtering to be set appropriately at group and user level.
Simplified configuration	Sometimes elements of on-premise solutions can make filtering more complex than it needs to be. Cloud filtering simplifies the approach making filtering easier to configure and less likely to fail. For instance, some cloud filtering solutions are able to analyse content in real-time without the need to add on-premise additions including man-in-the-middle decryption, certificates, or exceptions.
Multiple options	Make sure you choose a vendor that can look for a solution that suits you. A good vendor will be able to look at your needs and provide a tailored solution to meet all your requirements. All institutions are different. Some may want a full cloud solution; some may want a hybrid solution.
Deployment	Check that the speed of deployment and the resources you will need on-site match up. Many cloud solutions tend to have a faster set-up than on-premise. Less configuration and equipment on-site often make cloud filtering a speedy process.
Scalability	Check that your solution will easily expand or contract depending on your ever-changing needs. Adaptability is key for a long-term solution.
Vendor reviews	Look for providers that can show you an established history in providing filtering for K12 education. Many vendors offer more than they can deliver, as they do not fully understand the needs and challenges of filtering in education and may not be able to deliver what they are promising.

6.0 Frequently Asked Questions

Why do we need to filter devices off-site?

One of the concerns parents have when schools look to introduce 1:1 programs are the protection of the devices when they are in the home environment. They want you to offer peace of mind that you have the risks covered in and outside of school. Students are more likely to try to take risks outside of the classroom environment.

Will my data be secure in the cloud?

With schools and colleges being vulnerable targets for sensitive data theft, data security is paramount. Most providers using the cloud are likely to suggest that using the cloud is more secure than on-site. Linewize uses Microsoft Azure – some of the most certified and secure datacentres, with tried and tested software.

Is cloud filtering more expensive?

Most cloud filtering solutions will give you a more costefficient set-up and allow you to plan for your budget by regular payment options rather than initial large upfront cost. This gives you the flexibility and ease to change your set-up over time.

Is on-premise more customisable?

In complex or large systems, on-premise or hybrid solutions can give institutions more detailed customisation options.

Will a cloud solution be scalable?

One of the main reasons so many solutions are moving to the cloud is the fact that cloud solutions are easy to adapt to your current needs. Many providers operate in bands of users with the possibility to change your band over time.

Will cloud filtering make my old equipment redundant?

Not necessarily. If you have invested in expensive equipment, a hybrid model could add the aspects you currently need without replacing equipment that is working for you.

How quickly can cloud filtering be deployed?

Depending on the provider, most good solutions will significantly reduce the time for deployment from weeks to days.

How can I check that a cloud filtering solution doesn't create over-blocking?

Look for providers that use highly granular categorization and assess the content of pages. Leading providers like Linewize have intelligent rules-based mechanism that allow sites to be more accurately classified and filtered upon, without unduly restricting access.

Have a question that's not answered here?

Contact our web filter experts.
We'll be happy to help.

Tel: (844) 723 3932
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7.0 About School Manager

At Linewize we know that schools' needs are changing. We know that the internet is now an integral part of school life and that the need for flexibility and mobility of devices is increasing.

Varying requirements mean districts may need a variety of solutions. Linewize's filter, School Manager, is designed to meet the modern and quickly evolving needs of diverse districts across the country. Our filter enables you to take your web filtering to an advanced level. No longer are you restricted to filtering only on-site or the speed in which your filtering can be deployed.

The added benefits that School Manager offers are:

- Filtering devices both on and off-site.
- Flexibility and easy scalability so that your needs can be met overtime.
- Simpler configuration without the need for man-in-the middle, certificates or exceptions to use real-time content analysis.
- 100% time-line reporting meaning that a full contextual picture can be created around incidents.
- Side-stepping choke and throughput issues.
- Safe and fast internet access.
- Faster installation process and more robust user authentication.
- Security of data encrypted within remote, physically secured sites.

Other key elements offered by Linewize's filter, School Manager, include:

Real-time dynamic content analysis: Linewize provides filtering and reporting that analyses and categorizes web content in real-time. This gives schools better protection as URL blocklists often become outdated.

Social media controls: You may want to allow access to social media in your school environment but control how much activity can take place. Linewize filtering allows you to have flexible options including creating read-only settings or forcing age-related controls specific to each site.

Gateway anti-malware (on-premise only): Whether a user opens something by accident or deliberately tries to access something containing malware, this anti-malware will protect your school or college from the malware and ransomware threats.

Layer 7 application control: (on-premise & hybrid only): You can choose which applications you want to prioritise on-site and remove applications you don't want on your network.

Easy management (on-premise): Easy bandwidth management and allocation means you can minimise the impact when departments need high media usage or file sharing.

Anonymous proxy-blocking (on-premise): When students/staff try to circumvent your filtering by using proxy servers, this can be blocked in real-time.

Next generation firewall (on-premise & hybrid only): Protect yourself from all web and non-web threats by monitoring all incoming and outgoing traffic.

Linewize is the leading provider of digital safeguarding solutions in the U.S. For more information, visit our website or get in touch with our team of experts.

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Linewize is part of Qoria, a global technology company, dedicated to keeping children safe and well in their digital lives. We harness the power of connection to close the gaps that children fall through, and to seamlessly support them on all sides - at school, at home and everywhere in between.

Find out more
www.qoria.com