

## Position Paper

# Learning with speed: A guide to SSDs in the virtual classroom

Remote learning may have gained popularity due to the global health crisis, but the virtual classroom is here to stay. With that comes the need for laptops and desktops, as well as any other technical equipment that maintains optimum uptime so educators and students can communicate quickly and effectively during the school day.

In this white paper, we'll look at how solid state drives (SSDs) can benefit the virtual classroom, answering these questions:

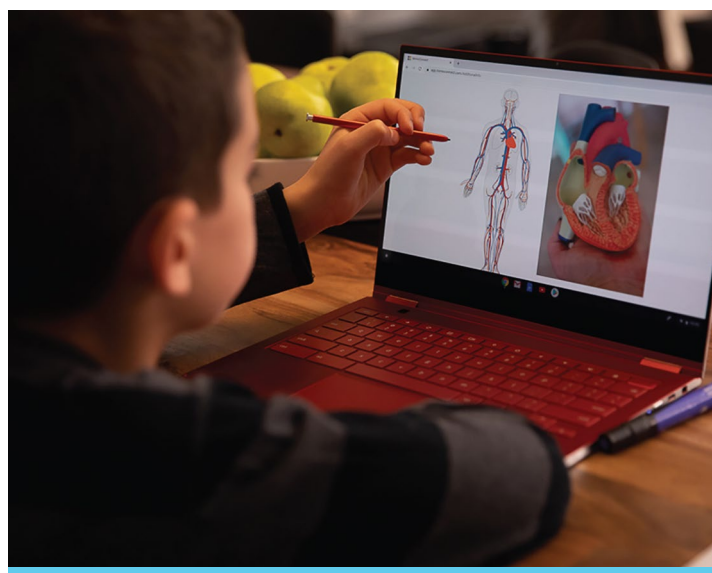
- How does an SSD improve overall performance in laptops and CPUs?
- Why is reliable, fast storage important for educational institutions, and what are the risks if your current storage architecture isn't prepared?
- What kind of drives make sense for various applications — on laptops, on desktops and in a data center?

## The bottom line up front: SSDs improve overall performance

The most attractive quality of solid state storage by far is its performance. Educational apps depend on high-speed delivery. Visually rich apps with dynamic content load a massive number of art and video files from the disk, and without a high-performance storage subsystem, users are left waiting — downtime that's unproductive and noneducational. With systems that lag, computers that take several minutes to boot and drives that are simply too slow, students miss out on critical learning opportunities.

Storage speed and capabilities depend on your specific drive and controller combination, but for the sake of comparison, a 7,200 RPM serial advanced technology attachment (SATA) traditional spinning media hard disk drive (HDD) can typically send data at around 100 MB/s in terms of throughput depending on how old the drive is, if it's in good working order and if the disk is relatively contiguous and not too fragmented.

Contrast that with some of the newest SSDs based on non-volatile memory express (NVMe), which can write as fast as 3,500 MB/s. As a rule of thumb, you can expect NVMe drives to perform five to seven times better than SATA SSDs and at 25 to 35 times the speed of your legacy spinning media.



## Choosing the right SSD for education

To decide which drive makes the most sense for your learning environment, you should first understand how different applications and workloads need different approaches to storage. Samsung offers a range of SSDs for all sorts of setups, from portable drives to racks of disks in a storage array. Let's take a look at various scenarios — at all levels of education — and what kind of drives are the best fit:

### Laptops

Laptops and notebooks offer a convenient form factor, particularly in educational settings where desktop computers may not fit — literally or logistically — or in school systems that want to provide students individual computers that they can easily carry to and from class.

Apart from their performance, where SSDs really shine is in their durability. Since SSDs don't have any moving parts the way HDDs do, they're much better equipped to handle rough operation in the hands of playful children or quick-moving teenagers. Laptops equipped with traditional hard drives would almost certainly be taken out of commission by a drop — and incur costly repair or drive replacement bills due to drive heads crashing into the magnetic storage platters. SSDs are just silicon, so they eliminate this point of failure entirely.



Another benefit of SSDs in laptops is their reduced energy usage, which makes for longer battery life. Without the need to power a motor to drive spinning platters, the storage subsystem requires much less energy in normal operation. SSDs also generate less heat than traditional media, which keeps system temperatures down, so the case and motherboard fans need to spin less — all of which reduces battery draw.

There's no better drive choice for modern laptops and notebooks than Samsung's 970 EVO Plus. Its small M.2 form factor uses the peripheral component interconnect express (PCIe) NVMe interface to communicate with the PC. That channel is six times as wide as the traditional SATA interface, delivering four times faster performance. What's more, 970 EVO Plus' memory allows for better error tolerance, making rewrites less likely and extending the durability of the drive.

## Desktops

For computer labs, offices and faculty use, SSDs present an opportunity to create a more responsive, capable computer that won't stand in the way of office workloads — from everyday tasks like email, word processing and spreadsheets to complex research involving data analytics and heavy number crunching and simulation. For some users, laptops are not the right answer, but that doesn't mean an SSD can't be a part of a solution worth considering.

You can find SSDs at home in a number of full desktop settings, whether in a traditional mini tower or even a new mini computer like the Intel Next Unit of Computing (NUC):

- For student use in computer labs, SSDs provide a fast boot time so students and instructors can immediately get to work and start learning.
- For office and faculty use, SSDs make quick work of email and spreadsheet tasks, and they're quiet enough to sit in shared offices without being disruptive — additionally helped by the fact that SSDs use less energy and generate less heat, which slows fans down. In slowing down the use of the fan, it creates less wear on that component of the device, offering more durability.
- For higher education research and science labs, SSDs can help send data to the processor and into memory faster — and get the results of simulations, analyses and complex algorithmic work in a flash.

With versatile form factors and a wide range of capacities, Samsung's series of SSDs have become the go-to for everyday storage. In many cases, Samsung SSDs have replaced traditional HDDs with faster processing and more reliable sustainability. Samsung's newest model — the 870 QVO — takes the SSD line to the next level, hitting a top capacity of 8TB while achieving a 530 MB/s read and 560 MB/s write speed.

## Data center use

An educational organization's data center has many of the same requirements as the data center of any other outfit: It needs to be secure, highly available, well-connected and high-performing at scale. Scale is important, of course, because in some secondary schools and college environments, hundreds or thousands of users at a time could be hammering what may be a limited resource — an educational app, a certain database, lesson streams or research simulations. Responsiveness is important, as is the ability to capture and retain streaming information. SSDs can provide this responsiveness and can now be used in both application and data archive workloads, due to the widening spectrum of products in various capacities and form factors at reasonable prices.

For educational institutions' data centers, Samsung's 883 DCT is a logical choice. 883 DCT is composed of advanced V-NAND chips for optimal performance in data centers, at a reasonable price point. When you need a storage solution that's both large and fast, but not necessarily the largest and fastest on the market, 883 DCT has great value. This particular drive is an

ideal component of a storage area network (SAN) or network-attached storage (NAS), perhaps providing fast tier-one storage for commonly used files while also providing enough capacity to keep a hot archive nearby. Additionally, 883 DCT is built for around-the-clock usage, so students and teachers alike can put their machines to the test all hours of the day and night.

Available in the standard 2.5-inch form factor at capacities of 960GB, 1,920GB and 3,840GB, 883 DCT offers a sequential read speed of up to 550 MB/s and sequential write speeds of up to 520 MB/s. It also comes with a limited five-year warranty with 0.2 drive writes per day (DWPD). 883 DCT's main purpose is to replace server HDDs, streaming servers and content delivery network servers, but it also provides significant power and compelling performance compared to spinning hard drives and other media.

## The last word

The education sector has a growing technology footprint. Uptime, reliability and low total cost of ownership (TCO) are all tenets that are more important than ever for education's IT teams. SSDs can meet all those needs — and more — for years to come.

Learn more about Samsung SSDs [here](#).

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