Schools, IT, and Cloud Computing
The Agility for 21st Century eLearning

Introduction

Cloud computing is one of the most talked about solutions on the education scene. School IT managers and educators know firsthand that technology changes—and the potential they create for young learners—have been constant and swift. Each new offering brings opportunities for pedagogy and challenges for deployment. Here you will find a brief overview of cloud computing and some things to consider when deciding if it is right for your school.

What Is Cloud Computing?

The National Institute of Standards and Technology (NIST) defines cloud computing as follows: Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

There are two basic types of cloud infrastructures: internal and external. In an internal cloud, servers, software resources, and IT expertise are used inside the school system to build a scalable infrastructure that meets cloud computing requirements. In an external cloud, service providers sell on-demand, shared services to a school. IT support, services, and expertise are included in the package; the school needs to run only the provided applications and services.

What does this mean for your school or district?

1. **Teaching and learning platforms**: Servers can provide some or all software applications, operating systems, and Internet access, rather than having these installed and maintained on each platform separately. Servers deliver on demand, as needed by the school population, to the full spectrum of learning platforms and devices. For example, a single application might be shared by hundreds of students and teachers on notebooks, tablets, and desktops.

2. **School IT**: Cloud computing allows for cost- and energy-efficient centralization of school infrastructures. It takes advantage of server capabilities to adjust allocation based on demand—all invisible to teachers and students. Remote management and maintenance can save time and increase security. For instance, an application or operating system served by the cloud can be upgraded once at the server level, rather than on each individual platform. Platform access can be restricted or denied in the event of a loss or theft.

3. **Access**: Along with the greater control for IT comes increased flexibility for teachers. They can select from the entire pool of available applications those which best complement their curriculum and students at any given time. The wide range of Internet-based software and tools can also be quickly and easily served by the cloud.

Cloud Myths

Cloud computing is…	Benefits
All or nothing	Actually, schools can determine how much and what gets served over the cloud. They also decide whether their cloud is private (for the school or school district), shared (with other districts in their state or region), or public (accessible to a wider group, such as Internet users). Hybrid clouds may offer a combination of restricted and public access.
"Thin" platforms	Schools will want to determine the combination of rich client platforms and cloud services that best meets their needs. Thin platforms are one of the many possibilities offered by cloud-based solutions. The thinnest platforms are hardware that receives most or all of their applications and operating systems from the server. With thin platforms, some applications and operating systems are installed and some delivered through the cloud. Schools can find the right balance for their application and operating system mix and student needs. Whatever choice you make, cloud computing works with any combination of platforms—desktop, laptop, or tablet.
Not secure	Security needs to be managed with cloud, as with any other computing strategy. Clouds can help IT centralize and control infrastructure and data, and ensure backup. Shared and public clouds can be monitored to prevent security risks. If working with a service provider, schools can look for a comprehensive Service Level Agreement (SLA) that includes robust security, and protects confidential student information.
Free	Cloud computing can bring cost savings, but it is not free. Server consolidation can significantly reduce power and management costs, while increasing productivity for IT. Many open source and Internet-browser-based applications are available for free to educators. Licenses are still required, however, for many of the common applications and operating systems used in this one-to-many delivery model.

Top Six Reasons to Go Cloud

1. Provides a flexible, scalable, cost-effective model that does not tie schools to out-of-date infrastructure or application investments
2. Offers the flexibility to meet rapidly changing software requirements for today's and tomorrow's teachers and students
3. Allows software standardization, a shared pool of applications for use school- or district-wide, and easier maintenance through centralized licensing and updates
4. Enables rapid development and deployment of complex solutions without the need for in-house expertise
5. Can eliminate the upfront financial burden of deploying new technologies through a pay-as-you-go model
6. Supports multiple client platforms both inside and outside the school infrastructure

Key Questions When Considering Cloud

1. Have you (or your cloud vendor) ensured that school data, content, and student intellectual property are secured? State and federal regulations (such as FERPA) may dictate what can be done internally and externally.
2. Do your infrastructure and network have the capability to support cloud solutions now and in the future? Cloud solutions can put an increased demand on networking requirements, and may require assessment of both internal and external network connections.
3. If you choose a vendor for your cloud solution, and you are not satisfied or wish to change, how easy or difficult will this be? Cloud can mean a long-term commitment with an external vendor, so you will want to thoroughly check the terms in advance.
4. Do you want an internal or external cloud solution? Both models have their benefits. Internal offers full control of applications, data, and resources, but can also require a robust technology infrastructure (network, staff, expertise, etc.). External requires adequate security, confidentiality, and a solid, trusted vendor relationship.
5. Is the cost model suited to your budget and planning cycle? Cost models vary from up-front capital expenditure that is depreciated over time, to an ongoing, pay-as-you-go model.

Intel® Technology: A Reliable Choice for Cloud

Teaching and learning platforms based on Intel® processors have the performance, reliability, and flexibility to support any type of cloud computing configuration. Intel® vPro™ technology adds an advanced level of security and manageability ideal for cloud computing, and is available in Intel® Core™ i5 and Intel® Core™ i7 processor-based platforms.

- **Grades K–6**: Education purpose-built learning platforms provide an energy-efficient, durable platform and support both school and Internet applications.
- **Grades 7–8**: Intel® Core™ i3 or Core i5 processors power energy-efficient, full-sized, capable platforms for graphics, video, research, collaboration, and multitasking across multiple school and Internet applications.
- **Grades 9-12**: Intel Core i5 or Core i7 processors power energy-efficient, high-performance platforms for adult workloads, data analysis, modeling and visualization, video encoding and editing, Internet usage while managing other content, research, collaboration, and multitasking across multiple school and Internet applications.

- **Teachers and Higher Education**: Intel Core i5 or Core i7 processors power energy-efficient, high-performance platforms for adult workloads, classroom management (for teachers), data analysis, modeling and visualization, video encoding and editing, Internet usage while managing other content, research, collaboration, and multitasking across multiple school and Internet applications.

- **IT**: Intel® Xeon® 5000 and Intel® Xeon® 7000 sequence servers support all forms of internal cloud deployments. Servers powered by the Intel Xeon processor family are designed for intelligent performance, smart energy efficiency, and 24/7 dependability, while providing schools with the flexibility and scalability to adapt as requirements change.

For more information on cloud computing and the advantages of Intel® technology-based teaching and learning platforms talk to your local solution provider or an Intel representative, and visit **www.intel.com**.

EDUCATION AND COMPUTING: A SPECTRUM OF CHOICES

Look for more information about the entire continuum of education computing models on www.intel.com/education.