WHITE PAPER

# Defining and Administering Modern Blended Learning

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# Introduction

The benefits of technical training to both students, instructors, training managers, and Independent Software Vendors (ISVs) is well-known. Better-trained students are prepared to use technical systems in ways their untrained peers may not be. This user training allows for the more effective use of software and systems allowing trained students — and their employers — to enjoy a higher level of benefit from the myriad of functions a given technical product solution provides.

Those who know how to use the varied functions of a complex system will receive greater benefit from that system. As such, those customers with well-trained users are much more likely to renew support contracts and upgrade existing systems. These customers also cost less to support and retain. Well-trained users can become advocates and evangelists for vendor solutions both inside and outside of their own organizations.

Technical training presents opportunities to create and sustain new revenue streams, lower support and operational costs, and develop happy, loyal customers.

But delivering effective training that serves both organizational goals as well as the learning objectives of students is a unique challenge in itself, and one that training managers now face with limited resources and increased expectations. A key aspect of technical training is providing hands-on lab experiences to students. Students learn by doing and technical training provides them an opportunity to learn to work with and experiment with systems in a non-production environment. Yet managing and maintaining these student lab environments remains a challenge.

Over the past 10-15 years there has been significant change in how technical training is designed, delivered, and consumed. In 2000, a typical technical training session consisted of a vendor-authorized instructor presenting a mixture of lecture and hands-on lab exercises over a set period of time. While this mode of technical training was effective, it was also expensive and time consuming. Students (and many times instructors) were required to travel and miss at least several days of work. The high cost — both in terms of dollars and time — of attending training represented a significant barrier to potential students.

In order to scale and reach larger audiences, ISVs began exploring and investing in technologies made possible by the increased ubiquity of broadband internet connectivity and new web technologies capable of supporting dynamic, real-time training delivered online. However, these new technologies — while capable of expanding the potential reach of ISV technical training — have presented new challenges for training managers to address.

This paper examines the most common forms of technical training delivery used today and offers recommendations on leveraging cloud-based, hands-on labs as part of a larger blended learning solution.

## Instructor-led Training (ILT)

Instructor-led training is much like the typical classroom setting found in schools and colleges. Broadly speaking, students gather in a single room along with an instructor. Training is a mixture of both lecture and hands-on lab activities with the instructor being an expert on the software or systems the students are being trained.

There are benefits to this approach. First, the close proximity between students and instructors allows for immediate feedback and quicker resolution of any technical issues or questions a student may have. Another benefit is direct student-to-student interaction. In technical training, each student comes to class with a unique set of experiences and perspectives on how the product or system under question is best configured, deployed, and leveraged. These students are eager to share their knowledge with one another in becoming more effective in using technical systems to meet organizational goals.

For vendors and their instructors there is yet another benefit to ILT which is having more direct control over the learning environment. With ILT, training managers and instructors have an opportunity to ensure that the learning environment is conducive to both training goals and student learning objectives. With a controlled environment, training managers can take steps to minimize student distractions and ensure that both lecture and lab exercises are set and ready for easy use.

ILT is not without challenges. This approach requires major resource expenditures in the form of physical classroom environments, travel for instructors, students, or both, and the opportunity cost of lost time due to traveling. ILT by nature is highly restrictive for both vendors and their students; physical classrooms limit the amount of students who can participate and benefit from coursework. Given these restrictions, it is not surprising that many training organizations have evolved in order to expand reach while maintaining student learning experience.

## Virtual Instructor-led Training (VILT)

Virtual instructor-led training is very similar to traditional ILT in terms of content, lab exercises, and format. However, coursework must be tailored for the needs of geographically dispersed students and instructors. VILT almost always involves remote students and instructors and, as such, relies heavily on Web 2.0+ technologies as well as high-bandwidth internet connections. As both technology and internet connectivity continue to improve and simplify, so does the delivery for VILT.

VILT requires several key components to be an effective training delivery vector. First, there must be technology support for audio, courseware delivery, lab work, student-to-student interaction, and student-to-instructor interaction. Training managers must ensure that all of these pieces — often provided by different vendors — work well together toward the training delivery goal. In many ways when adopting and promoting VILT, training managers become systems integrators who work with technical resources to design and implement a solution suitable for delivering high-quality and effective training to students.

VILT represents a transition wherein training managers have shifted from not just delivering training

itself but also to providing a platform through which training is consumed. When developing and deploying VILT, it is essential to remember that the best technology platform for delivering training is the one which students notice least. That is to say, technology failures or sub-par system performance can negatively impact a student's perception of class quality — even in cases where the delivered material was high quality. As such, it is best to minimize technology disruptions as much as possible through careful planning, thoughtful design, and use of the right technology.

## Self-paced Learning

Self-paced learning is becoming an essential part of technical training. The way students learn today is much different than it was even a few years ago, and training managers have learned that in order to train students effectively they must offer self-paced training in some format.

Self-paced training is broadly defined as training that is on-demand. That is to say, a student decides they want to learn about a specific subject so they go out seeking training on that subject. Through a LMS or similar system these students register for the classes that interest them and then go through course material and exercises at their own pace. Training managers have learned that it can be a challenge to offer hands-on lab solutions as part of the larger, dynamic, self-service student experience.

During self-paced training, students rarely have direct interactions with an instructor and are much more likely to seek help answering questions or solving problems by consulting online sources or working with other students working through the same material.

Similar to VILT, the seamless and effective integration of disparate technology systems is key to providing a high-quality, self-paced learning experience for students. If students encounter technical difficulty or become "stuck" due to either a technology issue or poor technology implementation they are very likely to abandon their training or, at the very least, become frustrated with the experience. And, given that direct interaction with self-paced training students is very low, it becomes essential to gather student feedback throughout the learning process and have systems in place to make improvements to both courseware and technology integrations based on student feedback.

## Blended Learning

While ILT, VILT, and self-paced learning all offer certain advantages and are appropriate for a variety of technical training scenarios, today's students demand learning solutions that meet their specific needs. As a result, modern technical training programs are likely to include elements of all three training delivery methods. The combination of these methods is known as "blended learning" as it provides students with a variety of learning vectors including in-class and online lectures as well as self-paced labs and exercises. For example, an ILT class may include self-paced labs. Conversely, primarily online self-paced courses may include an occasional VILT class for students to work together and directly interact with the instructor.

When developing a blended learning program it is essential to assemble a technology platform that provides the flexibility to offer the best of ILT, VILT, and self-paced training in a unified and cohesive

learning experience for the student. In practice this means tight integration between technology and the use of flexible technologies that can adapt to specific vendor and student requirements. A specific LMS, for example, may be an excellent solution for self-paced learning but may not provide the needed flexibility, in isolation, to provide an effective blended solution. However, a LMS tightly integrated with content and labs, for example, may provide a more complete solution.

## Hands-on Labs Technology

There are several technology components that, when integrated, make blended learning both possible and effective. The first, is virtualization. The second, cloud computing, and the third, standardized and flexible APIs. When brought together, these technologies allow training managers to design and deliver effective content in a manner easily consumed and understood by students.

For this reason it is extremely important that training managers are prepared to evaluate a range of technologies and services and also understand how to bring those technologies together to create a holistic blended learning solution.

### Virtualization

Virtualization makes it possible to provide students with their own isolated computing environments or "sandboxes". This eliminates the need to manage physical hardware to provide a hands-on lab experience. It is much simpler to reset a virtual machine to some pre-defined state than it is to physically image and re-configure computer hardware. Virtual labs are what make it possible to deliver a hands-on lab experience to students with nothing more than a laptop.

However, managing virtual labs introduces its own problems. ISVs are delivering new updates and new offerings more rapidly than ever before and so training managers find themselves in the difficult position of ensuring labs are prepped with the latest software, security patches, etc... A second challenge is getting virtual lab environments to students. Virtual machines can be very large and, in many cases, these labs consist of multiple machines.

Once in place, virtual machines require configuration and in some cases virtual labs can be extremely complex and nearly impossible for a student to assemble and manage themselves. Virtualization is an incredibly powerful technology and vendors such as VMware, Oracle, and Citrix offer powerful tools to manage virtual environments.

Even with these tools, a certain level of expertise is needed to manage virtual labs and ensure seamless access for students. Time spent by students configuring their virtual environments is time wasted. For training managers with less technical backgrounds, support from IT is often required to create, configure, and manage virtual labs. Additional tools including virtual meeting providers like WebEx and GoToMeeting may also be required to enable the audio components of virtual labs.

### Cloud Computing

Cloud computing makes it possible to deliver pre-configured lab environments to students over a network, most commonly the internet. Training managers can build and manage fully configured cloud-based labs and provide remote access to these environments to students for hands-on activities.

The cloud simplifies management of complex virtual environments. These lab environments can be brought up when needed and then discarded once training has been delivered.

Leveraging the cloud to deliver hands-on labs provides several benefits to students as well. First, these labs may be accessed from nearly anywhere, giving students maximum flexibility for when and where they consume training. Second, cloud-based lab environments remain under the complete control of training managers and technical experts, ensuring a consistent and uniform student experience. Third, cloud computing offers the tools and flexibility required to be used in ILT, VILT, and self-paced training.

### Flexible APIs

One common challenge in the training industry is a surplus of tools and platforms that each specialize in offering a different component necessary for training. While virtualization and cloud computing enable hands-on labs, training managers also rely on a mix of LMS, audio/visual tools and software, exam administration and certification, and other tools necessary for each organization's unique training needs.

APIs allow training managers to integrate these disparate technologies into a cohesive blended learning solution. For example, Salesforce users may use an LMS API to register students or schedule classes when a contract that contains training is signed. Similarly, an LMS may automate the creation of student lab environments whenever a new registration is received for a specific class. APIs are what allow the creation of cohesive workflows while leveraging a wide range of technologies.

## Blended Learning and Hands-on Labs

After a technical training department has identified its goals and objectives, it can begin to build out a blended learning solution that will help meet organizational needs while providing students with an exceptional learning experience. To do this, managers must focus on integrating and automating the right technologies to build a solution.

Any blended learning system will be made up of a mix of technologies and systems out of necessity. All of these systems must be tightly integrated, usually with the help of open APIs described above, to enable the automation of common tasks such as student registration, lab provisioning, and class-related lab-related communications. Successful integration and automation are often necessary to gain the full benefits of a blended learning solution.

## Cloud-based Labs

As mentioned above, cloud-based labs simplify the maintenance of class lab environments and allow students to use these labs from virtually anywhere. And while each cloud vendor provides the essential platform for the use of virtual machines, they differ in how those virtual machines are managed. Therefore, when choosing the right cloud platform for hosting and managing hands-on labs, it is essential to choose a vendor whose management tools best fit the requirements for a particular blended learning solution.

### Keep it Simple

Training departments may not always have access to deep technical expertise to help build and maintain lab environments. One cloud vendor may offer the ideal toolset for a scalable and robust web application while lacking simpler tools intended for use by training managers and coordinators. Therefore, it is important to work with a cloud vendor whose platform empowers non-experts to manage even some of the most technical aspects of virtual labs. A vendor should have tools that make it simple to create and update not just individual VMs, but complete environments made of of multiple VMs, networks, etc.

### Remote Access

Students can access cloud-based labs from almost anywhere, so providing an easy method for students to quickly gain lab access is essential. Remote access to virtual labs may be provided within a web browser or through traditional protocols such as RDP and SSH. Regardless of the base technology, however, access to labs must be simple and reliable.

Just as flexible student access provides many benefits, it also requires research and planning in order for students to have a world-class experience. For example, offering a class for students in Sydney using labs based in a US data center will, most likely, result in a very poor student experience. This is simply due to the high network latency that's caused by distance between Australia and the United States. Students should always be provided labs located in a data center as close to their location as possible. This requires careful planning.

### Flexible APIs

Flexible APIs will allow training managers to tightly integrate hands-on labs with other systems. For example, when a LMS receives a new student registration it may be desirable to automatically generate a lab environment. Similarly, for self-paced learning activities, giving students the ability to request and create labs on-demand from within a LMS or similar system contributes to a seamless student experience while also making efficient use of cloud-based lab resources. APIs make this type of integration and automation possible.

## Conclusion

The technical training industry continues to evolve. Driving this evolution are goals universally shared across training organizations: to reach as many students as possible and to continuously improve their learning experiences. From both an operational, cost, and knowledge perspective, new and emerging technologies determine the effectiveness of training programs and enable training departments to achieve these goals. Training departments must bear the responsibility for educating themselves on, evaluating, and making use of available technologies as they propel their programs forward.


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