Adaptive Learning: Technology that Personalizes and Expands the Training Experience

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Introduction

The purpose of this paper is to present a case history about new method of training, Adaptive Learning. This new technology enables individual trainees to create a learning experience that is relevant and meaningful by providing information on a topic they have not mastered, rather than training them on information they already know. The result is better acceptance, higher knowledge retention rates, lower training costs and greater productivity.

This paper will describe the solution to the challenge of training a dispersed workforce on content that has been trained repeatedly over time. We will describe the business issues and the new training solution.

The problems with traditional “Safety Training”

Safety training is many times thought of as an automatic process. Send out notices, put people in the classroom, show a video, have a discussion and hand out a quiz. Sign the training record and the training is done. Sounds simple, right? With this “one size fits all” approach, trainers assume that the information on the topic is transferred to the student and that the student will be a safer employee upon training completion. Unfortunately, this just isn’t the case.

This often happens with compliance training. Because the law requires it, but doesn’t in many cases stipulate what the trainee must be able to do upon completion, trainers often hand out materials, show a video or sit employees down in front of a computer. Without measurable outcomes or demonstrable behaviors to be evaluated, the trainee leaves the session no better than when they started the class.
A good example of this is Hazard Communication training. OSHA regularly cites for failure to train, but often bases this on training attendance records and employee interviews. Poor record keeping is one problem, but imagine a discussion between an OSHA Compliance Officer and an employee who attended training. The employee’s name may have been inadvertently left off the written training record, or the employee failed to listen to the information about where the MSDS files are kept or who to contact if there is a question. The Compliance Officer likely assumes the training either did not occur or was insufficient and a citation is issued for failure to train.

Worse yet, safety training is often a “going through the motions” exercise. For example, if you’ve identified a safety issue that needs to be addressed with training. Only when the employees truly understand the content or process will the potential risk be controlled. If “butts in seats” is the only measure of success, rather than a definitive measurement of understanding, then the time and money is wasted and the hazard to the employees continues.

Although the situation may sound dire and perhaps all too familiar, there is an alternative: Adaptive Learning.

**What is Adaptive Learning?**

The concept of a teaching or learning system that adapts to the needs of the individual learner is not new. The term “Adaptive Learning” was originally coined in the early 1970’s as it was being applied to children with learning disabilities. The thought was that these individuals learned at different paces and through various means and that the teaching methods should adapt based on the needs of the learner. For our purposes here, the Health Partners, Inc. case study application we will be discussing is starts out with the student evaluation and tailoring the course content and post tests to the needs demonstrated by the student.

It is common that when online training is developed, content is created in the form of text, narration and media that illustrates the information to be presented to the student. The content is incorporated into a course using authoring software and the course is loaded onto a web server. Although convenient to deploy, this type of course design results in a course that all learners need to go through from start to finish regardless of their pre-existing level of understanding on the topic. If the course resides within a learning management system (LMS), the system will keep track of the course assignments and student data coming from the course completions.

Adaptive Learning technology is the next generation of database driven learning and testing that goes beyond traditional classroom or even computer or web-based training. With an Adaptive Learning system, each person is given a pre-test to determine their level of content mastery. Following the pre-test, the Adaptive Learning system dynamically builds the course from the content based on the needs of the learner as
defined in the pre-test. The content is then presented to the student and a post test is
given. The student data for the pre- and post tests are then recorded and can be analyzed.

Case History: HealthPartners, Inc.

HealthPartners, Inc. owns and operates a network of 45 medical and dental clinics and a
hospital in the upper Midwest. With 9500 employees, conducting the required annual
health and safety training is a major undertaking.

Beginning with the Minnesota Employee Right to Know Act (HazCom) in 1984 and the
Bloodborne pathogen standard in 1991, the primary training method was instructor-led
training. As the number of employees and sites increased this method became an
inefficient and costly method of training. Approximately 3500 clinical employees need
to be trained each and every year, making the training cycle continuous.

During an evaluation of the instructor-led training since 1984, several issues became
apparent. First, the training was time consuming and expensive. It is estimated that one
hour of training costs over $135,000 in employee wages! Second, due to the flexible
shifts, the mobile workforce who works in multiple buildings, scheduling of classroom
training became a constant challenge.

In 1998, HealthPartners, converted from the classroom training to computer based
training. The workforce was spread out geographically, there was no IT support for
managing a central learning management or testing system and there was insufficient
bandwidth to support on-line training using video. Therefore, the course was distributed
to each site on a CD-ROM and installed on local computers throughout the
HealthPartners system. There were limited numbers of PC’s at that time, so dedicated
training computers were purchased and installed at each site. Due to the limitations of
the network, training records and proof of training certificates were forwarded via
interoffice mail and recorded at a central office.

In 2000 the CD-ROM was updated, to address changes in regulations and internal
operating procedures. While the CD improved the ability to provide training in an
efficient manner, the difficulty with updates, record keeping and maintaining compliance
with training continued to created problems. Since much of the information was
presented year after year, employees often asked if they could take a test to opt out of the
training.

Health Partners approached CLMI to discuss their situation and to brainstorm solutions.
From this, it was decided that a web based training system would be designed so that it
was easy to update, adapted to the needs of the student and verified that learning took
place. Among the design requirements the following features needed to be addressed:

- Learners would be allowed to self-register, but the system would also incorporate
  a pre-registration capability where needed. Courses would be composed of small
  changeable modules that would be linked together to create customized training
based on the employees job. When new information becomes available the system needed to be included in the training, a quick change to a file with new information could be authored and uploaded to the system. Instantly, the course would be changed for all future employees viewing the content.

- The system needed to be self sustaining. Upon completion of one year’s training requirements, the system would automatically assign the next year’s requirements. Individuals would receive pre-programmed e-mail notification of current and future training assignments.

- The training content would be designed and presented so that it would be specific to the various departments and their hazards. No longer would the Dental employee need to view Radiology information. Everything would be based on their job and hazards.

- A pre-testing system would identify knowledge mastery and knowledge gaps. The courses themselves would provide only the information the learner had not mastered.

**Project Assumptions**

At the onset of the project, we assumed a number of things that drove the development:

- We believed that after many years of hearing the same content, employees would have a working understanding of the OSHA standards on Bloodborne Pathogens and Hazard Communication.
- We believed that if presented with a “show what you know and you are free to go” opportunity, employees would for the most part be able to test out of a significant amount of the material and thus, save a significant amount of class time.
- We assumed that employees had a reasonable level of computer savvy and that since the content was delivered via CD-ROM over the past 3 years, the transition to a web-based course design would be seamless.
- We assumed that employees would read instructions, recognize when they had speakers and know if they had a sound card in their computer.

Oh, the things that we learned! Although our assumptions were at times woefully incorrect, the Adaptive Learning solution revealed some startling results that will set the stage for a vastly improved level of employee knowledge.

**The Adaptive Learning Solution**

The adaptive learning system that was developed to meet the pressing business need is now being used by HealthPartners throughout its clinic network. The system was first rolled out in January of 2005 and by March, 2005 several hundred employees have completed the course and successfully passed the post test.
The content that the student needed was organized into modules. Each module contained learning content, pre-test questions to assess understanding of the module’s content, and a post-test to verify full comprehension of the material. Macromedia Flash was utilized not only for bandwidth issues, but also to take advantage of its engaging animation capabilities. The questions were weighted so that knowledge of the most important information needed to be demonstrated to successfully test out of a course module.

Employees receive an email notifying them of the need to complete training and direct them to the training site. A pretest is given, and if successful, a brief overview of the standards is presented. In this scenario training time is approximately 20-25 minutes. If unsuccessful the system will design a training course on the items the employee did not master and then test them on this material only, again cutting down the time in the course, while improving the knowledge of the employee.

Imagine that you are a doctor, required by OSHA to take Bloodborne Pathogen training. Because you have had this training every year for the past decade, you are not relishing the idea of sitting through a session to hear the same information you heard last year and could probably teach yourself. This is exactly the situation the Adaptive Learning system was designed.

Now the doctor goes to a sound card equipped computer in their facility, signs into the system, and clicks to the course and takes the pre-test. Then, based on the pretest results that represent the doctor’s level of knowledge, the Adaptive Learning system dynamically designs the course that contains only the information the doctor has not mastered. At the end of the content presentation, a post-test is administered on the course content that was delivered by the system.

The end result is a doctor who is much happier with the experience, it has taken him/her about half the time it used to take and records are retained automatically. These efficiencies minimize the total cost of training while improving the training quality.

The administrator can view reports that tell them not only the status of the course assignments, but also what questions have been presented, and the results of the questions. It is helpful to see what questions were asked and how they were answered so that the administrator can see what questions are being missed. This identifies what content needs to be modified so that the concept can be presented in a more understandable manner or illustrated differently.

**What have we learned so far?**

As the course delivery software was developed at the same time as the content, there were a number of typical software development bugs and pitfalls; however, the project is proving to be very successful. Some of our findings include the following:
• Like the home projects, we underestimated the amount of time required to complete the process and roll out the new system. Our initial timeline was 8 months; we were up and running at 12 months.

• The number of employees that passed the pretest was lower than expected. We were surprised by how few employees were able to successfully complete the pretest. Out of approx. 400 employees that have completed the training by March, 2005, only 6 have passed the pretest. Bear in mind that the pretest was not intended to be easy. 80% passing on the pretest was the minimum level. We believed that if someone was going to be able to “test out” of the system, then they would have to demonstrate competency at a grade of “B” or better. The low pre-test passing rates to date seemed to show how little knowledge the employee population retained or how ineffective the previous training programs were.

• The LMS and tracking system is worth its weight in gold. For the first time we can provide immediate feedback to our employees and supervisors on their training. Being able to provide information on employees that are non compliant has been well received by the supervisory staff. Areas that show common levels of knowledge gaps can be addressed through additional one-on-one training or the modification of the content in the system.

• Employee response has been basically positive. Employees that have not passed the test find it a challenge to successfully complete the programs as soon as they can. Others find some frustration, and even embarrassment in not being able to successfully complete the program.

Overall this has been a positive step in training programs and HealthPartners will continue to add more courses over time.

**Conclusion**

Employee training on a variety of subjects has to take into consideration the needs of the students and deliver the information in an efficient manner to minimize training cost and maximize information transfer. The adaptive learning system addresses this through careful analysis of the students’ knowledge and the presentation of exactly what they need to attain the desired competency. The added benefit of test analysis and ease of updating content and questions sets the stage for continued training improvement in a demanding work environment.