

Facilitate

Dominate



***Benefiting From Learning Objectives***



The National Science Teachers Association (NSTA), the largest professional science education organization in the world, recently launched a learning content management system (LCMS) that will enhance professional development options for K-12 science educators. The LCMS will allow the NSTA to develop learning opportunities on key science content areas that can be accessed by its 55,000 members as well as 2.1 million teachers of science across the United States who need learning experiences to help ground or expand their science content knowledge anywhere, at anytime.

NSTA chose the OutStart Evolution LCMS because of the rigorous assessment capabilities it offered as well as the ability to port content to different mediums for repurposing in CD-ROM, print or Web formats. "Assessment was a real strong component feature for us because we have to show rigor that teachers do show that they're highly qualified in the subject matter that they teach," said Al Byers, director of Professional Programs and E-Learning, National Science Teachers Association. "While teachers progress through our online learning content, we have embedded assessment, formative quizzes at the end of each section and a terminal assessment that shows they are certified in that core content knowledge. Evolutions' assessment tool generates a lot of feedback data for us that shows how much time they spent, what their score was and item analysis difficulty and discrimination levels for every question.

"Right now the biggest hole in the dike is teachers understanding their competency in the core subjects that they teach," Byers said. "They are certified in subjects, but at certain levels they either haven't taught a subject or they're teaching it for the first time based on teacher shortages. NSTA's role is to provide professional development opportunities for them to learn core science content. It's impossible to do that through face-to-face training."

The content or science objects are based on national science education standards and benchmarks from the American Academy for the Advancement of Science and the National Research Council. From those standards, NSTA will develop approximately 40 science objects—five- to 10-hour online learning experiences created via an instructional design method. "We take a science object and distill it down into about five key ideas that are one to two hours in duration. These are the enduring understandings teachers need to know if they understand that science concept," Byers said. "Within each key idea, there are evidences of understandings, which you could call learning outcomes. What is it the teacher will be able to demonstrate that they understand of that enduring key idea within that larger standard? Finally, we have to look at literature and research known pre- or misconceptions in certain science content areas.



Meaning, if you're trying to learn about phases of the moon, there are a lot of misconceptions in that area. We have to draw on all that research and embed those known misconceptions in the assessments because teachers teach how they're taught. We have to help them uncover their own misconceptions before they try and teach those same concepts to their students."

In a self-paced, automated learning environment where there are no options for feedback, the OutStart LCMS allows learners to be directed or redirected to new or existing content based on the selections they make in their assessment.

Before implementation, NSTA's primary learning delivery method was face-to-face training at four annual conventions, one large and three regional three- to four-day events. They also used 40 to 50 NSTA professional development press books. Now there's a blended learning opportunity, because the best-selling books formerly taught via a face-to-face convention opportunities can be followed up afterward with a science object with embedded simulations. The NSTA also hosts Web seminars.

Byers noted significant results in efficiency and cost savings since the e-learning delivery eliminates much of the expense associated with travel, and certain content can be used repeatedly. "While the cost is potentially more significant up front, if we're developing science objects that are tied to the national science education standards, Newton's Law will always be Newton's Law. That's not going to change. We don't see Newton coming back from the grave and changing that law any time soon, so we can allow many teachers to get access to that content over the next 10 years, and that's a much richer experience on demand than if they attend a four-hour institute or face-to-face opportunity at a convention," Byers said.

NSTA has not yet deployed this learning model nationally. The organization plans to do so in the fall of this year, but it has formed partnerships and developed science object prototypes for organizations such as NASA, the Department of Transportation and the National Oceanic and Atmospheric Administration (NOAA).



NSTA also has addressed accessibility issues using challenge transcripts that allow someone with disabilities to enjoy the learning outcomes and the engagement that simulation provides. “Challenge transcripts is a narrative where, through a screen-reader, a user who’s, for example, sight-impaired, can listen to that challenge and questions embedded in the narrative. They can think hypothetically what they’re supposed to take away, even though they can’t interact with the simulation visually. Then they can confirm their hypothesis, guess or prediction,” Byers said.

To ensure the science object content is compelling and engaging, the NSTA employed a five E-inquiry model to: Engage the learner; allow that learner to Explore an environment or certain real-world, authentic scenarios; follow up with an Explain section; allow them to Elaborate or extend that learning; and then be Evaluated. A team of five to seven educators also gives feedback on every key idea in a science object as it’s made. “It slows the process down, but it ensures it’s a better product when you’re done,” Byers said.

In accordance with No Child Left Behind initiatives that require all science educators to show that they’re highly qualified in the subject matter that they teach by 2007, the science objects will be launched via a learning management system. Compliance requirements vary by state. “Teachers will be able to come in, take a personal self-assessment, determine their gaps in their core science content, and once they identify those gaps through a meta-tagging process we’ll be able to recommend products and services,” Byers said. “The linchpin is going to be science objects, and as they complete the science objects they’ll have a set of tools available to them such as a transcript, a portfolio, their library where they can document and upload demonstrable products, which showcase that learning. The science objects are the premier product within a larger system.”

