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# **E-learning Assessment & Tutoring System**

## **Product Description**

**Version 3.0**

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# 1. Introduction

## 1.1 Purpose

This document describes the B&W Inc. (BWI) ELATS product strategy. Further, it outlines the pedagogical approach that Critical Thinking Labs (CTL, BWI's operational arm) has developed to employ ELATS objects in corporate and institutional venues.

## 1.2 Terminology and Document Conventions

The ***E-learning Assessment & Tutoring System (ELATS)*** is a *class library* of objects that are used to develop learning solutions for corporate training and education. ELATS *objects* are generally referred to as ***learning objects***. The objects are deployed on a server-based e-learning ***framework***. ELATS Web objects, when snapped together in various configurations (think of Lego blocks), provide tutored e-learning solutions.

The ***framework*** refers to an Ms SQL Server-based ***learning management system*** (LMS). Unlike most LMS products in the industry, BWI's ELATS LMS is THE ONLY learner-facing LMS currently available. It is designed to be used by the learner in an on-demand setting. The framework is designed to intergrate with other educational management products, such as the CampusCE Educational Management System to provide administration.

The term ***ELATS solution*** is the equivalent of a course. A *solution* is comprised of a collection of ***lessons***. Each *lesson* prescribes a set of ***tasks*** for the learner to complete to achieve the lesson's objectives. *Task* pages are the focus of the learning experience and therefore contain a variety of ***embedded pedagogical objects***.

The cornerstone *pedagogical object* is the ***Tickler™ assessment engine***. E-learning assessments are refer to as ***Ticklers***. Ticklers are comprised of ***question*** objects. *Questions* are encapsulated into ***clusters*** and administered under specific rules (selected at random, asked in sequenced, or linked in trees or pools.) Each *question* contains ***feedback and hints*** for the learner. *Clusters* prescribe how feedback is presented (hints are allowed, feedback is provided immediately or at the end, or no feedback is provided at all.) Question types include standard ***fixed answer*** varieties, ***multiple response***, ***short answer***, ***fill in the blank*** and ***drag and drop*** (graphical) formats. The Tickler engine can evaluate answers using single correct answers, lists of correct answers or regular expressions.

Learning Instruments® objects are developed by and are the sole property of Briand & Wirsching Inc. (BWI). Critical Thinking Labs maintains a license to build e-learning solutions using the ELATS platform.

## 1.3 Intended Audience and Reading Suggestions

Internal only

## 1.4 References

National Council for Continuing Education and Training Presentation: Converting Your Intellectual Property into Corporate-Quality E-Learning (NCCET\_ELRN\_101007)

## 2. Industry Perspective

The ELATS platform is designed to serve the needs of the training industry with a unique, learner-centric feature set. It is called an e-learning system because each object provides a pedagogical function that can be employed to meet the needs of a learner.

Industry Trends	Learning Instruments® Objects
<p><b>Want cheaper courses faster</b></p>	<p>ELATS objects are designed to provide <b>rapid development</b> of e-learning in corporate and institutional settings, through:</p> <ul style="list-style-type: none"> <li>• Reuse of existing content (as is)</li> <li>• Use of semantic structures to guide subject matter experts and teachers</li> <li>• Simple deployment</li> <li>• Easy branding and customization</li> </ul>
<p><b>Increase retention and efficiency</b></p>	<p>BWI-designed ELATS <i>objects</i> as a <b>learner-facing technology</b>. The product feature set is geared toward increasing retention, decreasing the amount of time training takes, and generally placing the learner in control of their own learning.</p>
<p><b>Flexible yet simple</b></p>	<p>The ELATS approach is not unlike “<b>Learning Lego’s</b>.” Each ELATS object provides a particular pedagogical function and has a semantic structure that helps an author organize content to create the experience.</p>
<p><b>Low barrier to entry</b></p>	<p>The ELATS <b>object framework</b> is a departure from the industry trend toward large, monolithic enterprise environments. The framework is a light-weight learning management system geared toward supporting a few hundred e-learning solutions in an on-demand atmosphere.</p>
<p><b>Maximize the value of existing IP</b></p>	<p>ELATS objects can be deployed with existing content to enhance learning effectiveness, packaged into SCORM CA’s, or configured as automated tutoring solutions. The platform is particularly effective at migrating classroom courses to distance learning programs.</p>
<p><b>Integrate with other systems</b></p>	<p>The ELATS <b>object framework</b> is designed to be integrated with other systems, such as the CampusCE Educational Management System.</p>

## 3. The ELATS Pedagogical Model

ELATS objects are designed for Web-based *asynchronous* learning.

Obviously, it's delivered over the Internet, which means it is consumed using a browser. That used to mean a personal computer; now it includes smartphones and pads.

Asynchronous means self-paced: college *distance learning* or other institutional programs, corporate training at an employee's desktop, at home, or situational learning in the field. An interesting benefit of building training for an asynchronous venue, as it turns out, is that it also works perfectly in a synchronous one—synchronous—think classrooms, Webinars, etc.

First and foremost, ELATS is about learning—or training if you're the one providing it. Training must create change. If it doesn't lead to change, it's not training. ELATS objects are designed to provide experiences that engender change in two "domains:" cognitive and affective. Cognitive changes are internal so you have to test for them. Affective changes are overt behavior—you can see if the learner is doing it.

### 3.1 Biological Model of Learning

These days scientists have determined that when you learn something, you make new neural connections in long-term memory. And while scientists are developing ways to map biological changes to epistemological input, it's not yet practical to wire a learner up to the learning machine. ELATS objects are designed to bridge this gap in practical ways.

To transfer an experience into long-term memory, it must pass through the short term memory. Short-term memory is easily accessed but has space issues—you can't get a lot in there at once. It turns out that you can increase throughput if you take into consideration the mode you are using to load it: visual, auditory, etc. ELATS objects are designed to parse input and shift it across modalities to increase input efficiency.

### 3.2 Behavioral Model of Learning

The behavioral model of learning can be paraphrased as *Stimulus-Organization-Response*. A learner perceives a *stimulus* visually, auditorially, etc. Internally, a learner must elaborate on and organize the stimulus with other things known about the subject. Once this is complete an appropriate response can be formulated.

Once stimuli such as words, pictures, or speech are perceived, they must be encoded using verbal, logical, spatial, or speech and hearing schema or they will fade. The more ways a stimulus is encoded into memory, the more easily it is recalled and re-constituted. Behavior, though a complex mix of cognitive and emotional schema, can be modeled as well. ELATS objects use specific video production techniques to isolate and model behavior.

Interactions with teachers or mentors often bring "ahah" moments. Recording or recreating epiphanal moments so they can be apprehended over the Internet is tricky and expensive. We don't want to abandon attempts to do it but we need simple inexpensive techniques to apply in all cases. Repetition-repetition-repetition! Repetition doesn't mean reading the same sentence or watching the same video over and over. Repetition means engaging with content in multiple ways: reading, watching, listening, speaking, explaining, and writing—applying different encoding-decoding schema—to solidify long-term memory.

## 4. Product Features

ELATS is a collection of object templates that authors assemble, like Lego's, to create powerful learning experiences. ELATS solutions are easily deploy on a Web server with the ELATS lightweight framework, to serve a community of learners.

### 4.1 The ELATS Runtime

The ELATS platform has three main software components: the ELATS framework portal, ELATS solutions, and a learner tracking database. These components are put on a Web server. The portal—like a mini Website—provides access (logon security), administration functions, and branding. ELATS solutions provide the learning experience. The tracking database—a small but sophisticated LMS—monitors learner performance.

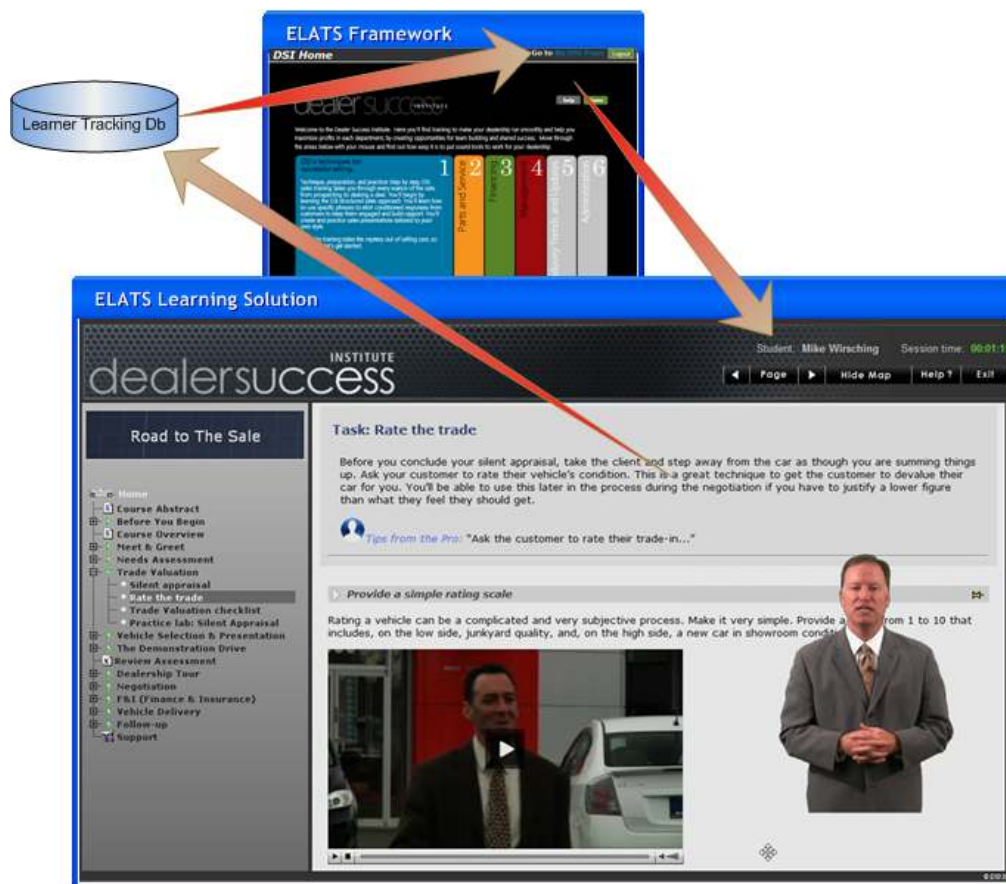


Figure 4.1.1 ELATS Runtime Environment

The ELATS portal is completely configurable. It can be as simple as a logon page or as complex as a corporate Website. Its primary function is to provide a little form with which to logon (username and password). The tracking database is very simple to administrate, though it provides detailed information about how learners are performing. The major component of the runtime environment is the ELATS solution itself. It does a lot more than just display content. The next section covers the ELATS solution's features.

## 4.2 Anatomy of an ELATS Solution

An ELATS solution is presented in the ELATS framework page, which optimized for e-learning. The framework page has a familiar Web configuration with a top banner, left-side navigation pane, and right-side task workspace.

The banner brands the solution's provider. Status information identifies the learner (learner's name, session timer, etc.). A navigation toolbar provides forward and back sequence arrows (top-right), a toggle to show / hide the TOC, a help button and an exit.

The table of contents (left-side) displays the learning resource organization in an expandable tree and provides links to course pages. The TOC facilitates using an ELATS solution for reference.



Figure 4.2.1 ELATS Runtime Environment

In the work area (right), accordion headers parse content into manageable chunks that minimize scrolling and isolate ideas. Pedagogical objects provide information drill-down (refer to the pop-up teacher) and participatory exercises (refer to the lab form). The next section presents a table of all ELATS page objects and their pedagogical function.

With the ELATS platform, authors assemble objects—no-programming-required. Each ELATS object provides a semantic structure to help authors organize content into page displays that are optimized for e-learning.

## 4.3 The ELATS Pedagogical Objects

ELATS objects have two basic flavors: helper objects and page widgets. Helper objects automate the configuration of a solution or structure information so it is more learnable. Page widgets—pedagogical objects—structure the learner’s experience.

ELATS Object	Function
<b>TOC (Manifest)</b>	An ELATS solution assembles itself using a single object called a <b>manifest</b> . The solution’s organization is displayed in a <b>map</b> . Mapping functions automatically generate links that allow a learner to use the map as a dynamic <b>table of contents</b> with <b>links to course pages</b> .
<b>Title Page</b>	The ELATS manifest object also contains a section of <b>solution meta data</b> . The title page displays the curriculum to which a solution belongs, including information about completion and passing requirements.
<b>Aggregator</b>	<b>Aggregators</b> provide a mechanism for organizing and <b>grouping lessons and other learning resources</b> on the TOC. This is valuable in large solutions where a flat list of lessons would be hard to follow.
<b>Lessons</b>	Lesson objects are <b>special aggregators that group tasks</b> . Lessons guide learners and summarize actions for tracking. There are lesson templates for static and dynamic lessons, pre- / post-test pedagogies, and simple static task checklists.
<b>Tasks</b>	Tasks are <b>optimized for learning activities</b> . Tasks break down conceptual knowledge into ideas. A task’s ideas can be numbered so they appear as steps in a sequence. Authors can embed widgets—pedagogical objects—on task pages to provide <b>structured activities</b> for learners.  The rest of the entries in the table describe All of the ELATS pedagogical objects.
<b>Idea Accordions</b>	<b>Idea accordians</b> are the primary organizing object for task completion. An <b>idea</b> is displayed as an <b>expanding header</b> with a <b>title and icons to identify embedded objects</b> . When a learner clicks in idea header it expands, displaying its content and closing other open ideas, thus <b>minimizing the amount of scrolling</b> a learner has to do. A <b>“pin” icon</b> is displayed to the right side of any open idea. Clicking it “pins” the idea open so two ideas can be compared.
<b>More... Blocks</b>	More blocks are embedded into idea text to <b>filter content</b> and provide drill down.
<b>Pop-Up Infoblocks</b>	Info blocks provide <b>more space to view</b> large graphics, high-definition media, tables or long tracts of text.



## Continued . . .

<b>Ticklers</b>	The <b>Tickler assessment engine</b> is the most advanced ELATS pedagogical tool. It can provide <b>secure exams</b> to support certifications. It can be used in <b>pre- and post-test</b> schemes. It provides <b>rich question types</b> and <b>multiple feedback levels</b> . Ticklers can be configured as tasks, <b>pop-ups</b> , or be <b>embedded</b> into ideas. Refer to the next section for a more complete description of the Tickler engine.
<b>Pop-Up Teachers</b>	Teachers are <b>video-based avatars</b> that pop-up over tasks to provide guidance. <b>Pop-up teachers can control a task page</b> by opening and closing ideas, playing video or other media elements embedded into idea text. <b>Teachers provide a toolbar</b> to advance and replay teacher segments and a drag handle to move it around.
<b>Pop-Up Wordtrax</b>	Wordtrax are <b>pop-up script</b> displays so learners can memorize speeches. They organize dialog and provide a reader.
<b>Pop-Up Talkbacks</b>	Talkbacks are exercises in which a <b>learner records a speech</b> . A video prompt provides direction and a script can be shown (like a teleprompter) to help the learner practice.
<b>Lab Forms</b>	Labs are tasks in which the ideas are steps in a sequence. Each step presents <b>forms in which learners must enter information</b> , record observations or construct explanations in their own words.
<b>Sidebars</b>	Sidebars are <b>used within task pages</b> to present related but extraneous information. Sidebars span ideas.
<b>Surveys</b>	Surveys draw upon the power of the Noesis Tickler engine to <b>evaluate the learner's salience</b> toward the program, learning resources or outside issues. Surveys can be provided as part of lessons or standalone.
<b>Glossary / Glossary Terms</b>	The glossary provides <b>pop-up definitions</b> and links to additional information for terms in the text. It also provides an <b>alphabetically sorted glossary page</b> showing all terms.

## 4.4 The ELATS Ticklers

The cornerstone of the ELATS platform is the **Noesis Tickler assessment engine**. The assessment engine supports a wide range of question types, provides multiple levels of feedback, dynamic branching and links to remedial pages (or Web sites). The Tickler engine's dynamic assessment capability provides advanced pedagogical capabilities that supports automated tutoring.



The screenshot displays the ELATS Learning Solution interface. At the top, it says "ELATS Learning Solution" and "INSTITUTE dealersuccess". The user is identified as "Student: Mike Wirsching" with a "Session time: 00:01:46". The main content area is titled "Negotiations - 7" and contains a question: "If your client suggests that they would get a better deal selling their car on their own, you may want to explain the hidden costs. Which of the following statements describe valid hidden costs?". The question has five multiple-choice options, with the first two selected. Below the question, there is a "Continue" button and a "Feedback" checkbox. The feedback section shows "Wrong" and lists the correct answers: "To sell it you'll have to have it detailed.", "It takes us on the average about 3 months to sell a car. That could mean three additional car payments.", and "Don't forget advertising costs; most effective advertising is not free." The feedback also includes a paragraph of instructional text: "The customer might remain unconvinced that you are willing to pay an acceptable amount for the trade. If they think they would get more selling it themselves, you might respond this way: I totally understand. Okay, let's say you sell it on your own. You'd probably ask \$9,000, right? Most".

Ticklers are comprised of **clusters of question objects**. Cluster objects provide test configuration details: Ask questions in **sequence or random order**. Allow **hints** or not; **feedback** immediately, at the end of the test or not at all. Provide **instructional messages**. Draw from **pools of questions** and shift between pools using specific rules. Ask questions based on the evaluation of the last answer, a **binary tree**.

Question objects are **highly reusable**. They can be **embedded** in an idea's text, be **popped up** from a link in an idea's text, or be **part of a test** (which is a task). There are a **full range of question types**: fixed answer (multiple choice, true-false, select from a menu), multiple response, fill in the blank, point and click and drag and drop. There are **sophisticated evaluation** schemes (lists of correct answers, regular expressions). Questions can display trial answers for the learner to modify. Questions can be graded by difficulty, Bloom's taxonomy, college level (100, 200, 300, etc.) or weighted. Each question comes with feedback about its answer, hints, and links into course materials where the answer can be found. Questions can also have links to follow-up questions.

## 5. Technology-Based Learning

Over the last two decades, the personal computer has evolved into a great media delivery system and so it has become just that in the eyes of the training industry. E-learning is in danger of becoming about rich media—entertaining sound bites. Terms such as “edutainment” have crept into our vocabulary. Learning experiences are judged by how entertaining they are, which is different that how engaging they are.

Technology based learning that automatically plays videos and then switches to the next one are in the words of Marshal McLuhan, cold media. “Cold” meaning it doesn’t stimulate your imagination or your thought. Learning requires effort. The learner must move the learning experience along, action-by-action. Not only should the user engage with the learning system every step of the way, there should be a lot of room for deep thinking. A learning system that just spits out information and then gives multiple choice questions to test recall is not living up to the potential of the personal computer.

The personal computer is really about processing power. ELATS objects turn the computer’s processing power toward the learner, not the administrator. The ELATS tracker collects and timestamps every click. It builds a stochastic model of every learning solution and then compares each learner’s performance and engagement level with the population at large. But that’s only the half of it. ELATS solutions dynamically configure themselves to personalize learning. ELATS objects increase retention and decrease time to completion for specific performance levels. The ELATS platform is not about media playback, it’s about engagement. It’s about learning.

The purpose of the ELATS platform is to help the personal computer achieve its first, best destiny—to become your own personal thinking cap!