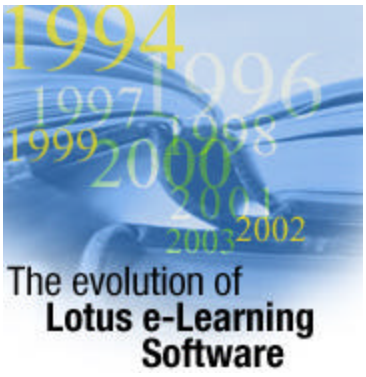

Level: All
Works with: LearningSpace, Learning Management System
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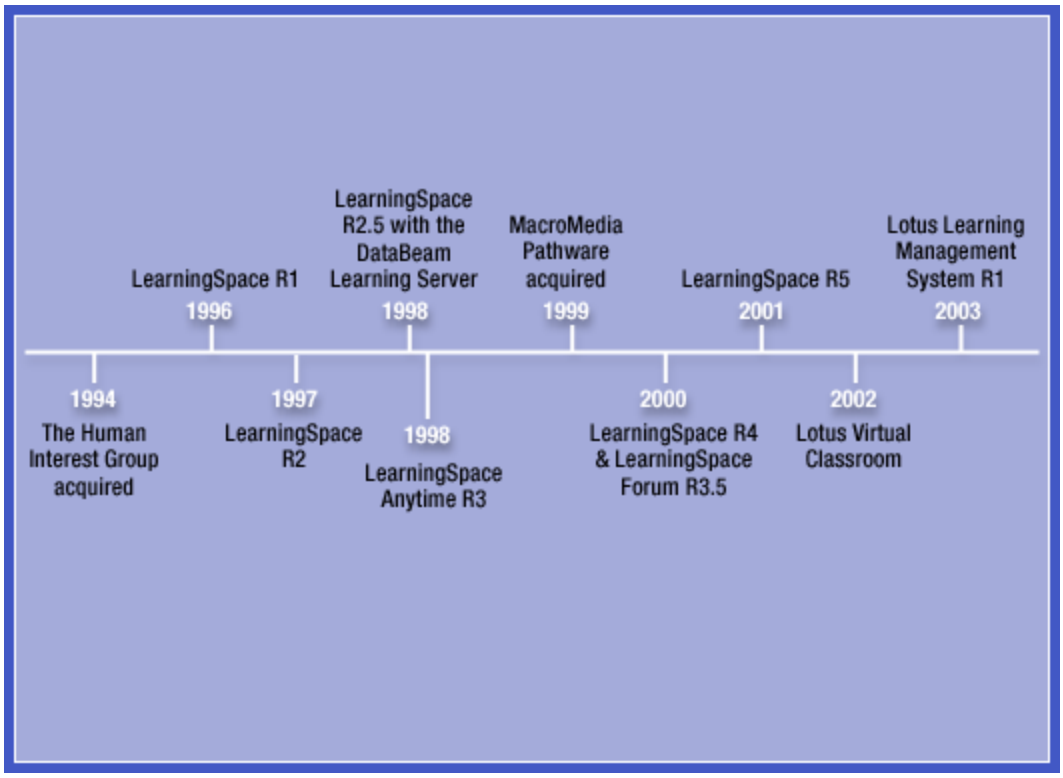
by
Elizabeth
Bowling

When you think of e-learning, you probably think of it as a recent development. In fact, Lotus has been producing e-learning software for years. Beginning with the acquisition of The Human Interest Group in 1994, Lotus has been defining—and refining—how we learn online.

This article looks at the past, examining the different forms that Lotus e-learning software has taken over the years, and following its evolution up to the newest members of the family: Lotus Virtual Classroom (LVC) and the Lotus Learning Management System (LMS). If you've never seen Lotus e-learning products before, this article provides an unusual introduction, showing you how e-learning at Lotus has evolved over the years. And if you're familiar with any of the Lotus e-learning products, you'll find it interesting to see where they fit in on the Lotus e-learning timeline.

The Lotus e-learning timeline

Let's take a look at the e-learning timeline for a bird's eye view of e-learning product evolution at Lotus. Although most of these e-learning products released interim versions (point releases) between major releases, the timeline includes only those point releases that represented new directions for e-learning. The rest of this article discusses how the products and events noted in the timeline affected the direction of e-learning in Lotus.



Once upon a time...

It began in 1994 when Lotus acquired a company called The Human Interest Group, renaming it the Lotus Institute. This team of people investigated the idea of online education, described as distributed learning, and developed a prototype product that they referred to as the Distributed Learning Network. This product was further refined and eventually released under the name LearningSpace.

LearningSpace R1: Distributed learning arrives

The first release of LearningSpace appeared in 1996. The application was hosted on Lotus Domino R4.1, which provided mechanisms for data storage, user management, and asynchronous collaboration through the use of Notes databases. Hosting LearningSpace on Domino allowed it to take advantage of features such as:

- A client-server architecture that supported users in varied geographical locations
- A set of highly adaptable database designs that supported different types of information and allowed it to be organized for easy access
- A built-in email system that allowed users to send messages back and forth
- A collaborative environment where participants could learn together in many of the same ways used in a face-to-face classroom

Course content was stored as documents in Notes databases. Course developers could create and maintain the documents, and students could read them at any time. Administrators controlled user access with the Domino Name and Address Book, which allowed them to assign different levels of access to different groups of users; for example, a student could submit an assignment online, and only the instructor had access to view it. Because Domino includes a sophisticated email feature, LearningSpace users could contact one another by sending mail as well as have course notifications automatically routed.

LearningSpace was essentially a set of Notes databases that provided the framework for online courses. Each online course required a complete set of the LearningSpace databases and distributed materials among them:

Database	Container for
Schedule	General outline of the course (think

	"syllabus"), including requirements, activities, assignments, quizzes, surveys, and exams
MediaCenter	Additional content to be used in the course; for example, reading assignments
CourseRoom	Topics for discussion, with responses posted by the course instructor and students
Profiles	Directory of class members and teaching staff for the course
Assessment Manager	Tools for creating, grading, and tracking student progress through the use of exams, quizzes, and surveys

LearningSpace R2: Introducing the Learning Server

Release 2 of LearningSpace in 1997 refined the product design, improved performance, and added an additional Notes database called LearningSpace Central to function as a course catalog (to simplify creating and managing courses). Using Domino R4, LearningSpace R2 databases could be made available on the Web, where users could access courses with browsers—a major benefit for companies that didn't want to distribute the Notes client to large numbers of users. This release also added support of Lotus Passport products, but did not introduce any major changes to product direction. In 1998, however, R2.5 incorporated the DataBeam Learning Server, which supported synchronous collaboration through the use of online, real-time class sessions.

DataBeam Corporation was a Kentucky-based company that was also at work in the e-learning arena. Their Learning Server product provided a virtual classroom as a venue for the real-time exchange of information and included a number of features for presenting and sharing data, as well as audio and video support so participants could hear and see each other. In creating the Learning Server, DataBeam provided the virtual classroom technology, additionally incorporating chat and instant messaging technologies provided by the Israel-based company, Ubique Ltd.

In the Learning Server, a course was treated as a container for classes: You defined the course and then added individual classes to it. Different types of users accessed the course through different centers designed to streamline the user's tasks:

Center	Used by	Typical user tasks
Student Center	Students	• View lists of courses • Register for courses • View course materials • Attend online classes
Instructor Center	Instructors	• Create courses • Create classes • Add materials to classes
Registrar Center	Registrars	• Create accounts for students and instructors • Register students in courses
Conference Center	All users	• Conduct breakout sessions during a class • Conduct small group conferences

Classroom materials

For each class within a course, you could store materials and schedule a session in the Online Learning Server Classroom. Materials for an online class session could consist of the following:

- *Course files*
  Course content files containing information related to the course; formats include text, images,

spreadsheets, slide shows, and so on.

- *Course links*
  A list of suggested links to Web sites students can visit on their own with descriptions of each.
- *Browser Follow Me lists*
  A list of URLs to be visited during the class; all participants direct their browsers to each URL under the instructor's guidance.
- *Question & Answer sets*
  A list of questions to be presented, one at a time, during the session; students respond to each question as it appears.
- *Presentation Whiteboard files*
  Course content files intended for display during the online session; supports a variety of application files provided each file is converted to the format required by the Presentation Whiteboard.

Once in the Learning Server Classroom, you could use a variety of tools to conduct the online session and work with the materials you provided:

Tool	Allows users to
AppShare	Run an application hosted on the instructor's workstation and allow students to view it on their own workstations. With the instructor's permission, students can control the application from their workstations.
Presentation Whiteboard	Draw, type, or display files from other applications on the instructor's workstation and allow students to view on their own workstations. With the instructor' s permission, students can control the Presentation Whiteboard.
Browser Follow Me	Visit one or more Web sites while students follow along in their browsers.
Chat	Exchange instant messages with the instructor or among students.
Quiz	Present a set of questions to students and view their responses.
Hand Raise	Click a button that indicates to the instructor that a student desires individual attention.
Audio/Video	Enable students and instructors to hear and see each other (requires appropriate software and hardware to be installed on each participant's workstation).

This was an important step for e-learning at Lotus, as LearningSpace R2.5 incorporated both synchronous and asynchronous collaboration technologies in a single product. In 1998, Lotus acquired DataBeam Corporation and Ubique Ltd., renamed the Learning Server to Sametime, and incorporated a version of it into LearningSpace as the "Live" server.

LearningSpace R3: Anytime

When LearningSpace R3 was released in 1999, the name Anytime was added to the product to reflect the inclusion of both synchronous and asynchronous learning technologies in the product. The two major components in LearningSpace Anytime received their own names: Forum (the Domino-based LearningSpace application) and Live (the Learning Server acquired from DataBeam).

LearningSpace Forum represented an upgrade to the previous LearningSpace products and remained hosted on Domino (R4.6, to be specific). Like the earlier versions of LearningSpace, Forum used the Domino Name and Address Book to maintain its user base and Notes databases to store its course data. In addition, this Forum release introduced the Course Builder, a tool designed to simplify the creation of online courses, and the Digital Library, a DB2-based tool that enabled users to search media objects such as videos. LearningSpace Live was the Learning Server technology, integrated into the LearningSpace product, but retaining pretty much

the same set of features as in LearningSpace R2.5.

Meanwhile...
While Lotus was refining LearningSpace, a California-based company called Macromedia, Inc. was developing their own e-learning software. Macromedia, known to many for their DreamWeaver and Director products, developed a self-paced e-learning product called Pathware. This product, which ran on a Microsoft Windows server, presented users with a course tree in which each course expanded to show a list of topics and activities. Course developers could create their course outlines right in Pathware and link activities to course content files stored on the same, or other, servers. Students could browse the course tree to see the course outline and follow its sequence of activities to complete a course. Student progress was tracked, and this data was stored in a back-end relational database; instructors and administrators could run predefined reports summarizing this data. Administrators could additionally maintain user records in the same back-end database.

In 1999, Lotus acquired the Pathware product set from Macromedia with the intention of merging it into the next major release of LearningSpace.

A fork in the road
At this point, the LearningSpace product branched into two products: LearningSpace Forum R3.5 and LearningSpace R4. The Forum component of LearningSpace moved on to become a stand-alone product for companies that preferred to continue hosting the product on Domino, while the Live component was incorporated into LearningSpace R4. Both products were released in 2000.

LearningSpace Forum R3.5

LearningSpace Forum continued to be hosted on Domino, moving to Domino R5 and taking advantage of that product's Secure Socket Layer (SSL) technology to provide enhanced security. As before, Forum used a series of Notes databases to store course information and a central database to serve as a course catalog and to streamline the creation and management of courses.

LearningSpace R4: Changing the paradigm

LearningSpace R4 moved away from the completely Domino-based architecture. Now, companies unwilling to invest in a Domino infrastructure could still use LearningSpace. This version of LearningSpace incorporated three major features from previous products: Macromedia Pathware, LearningSpace Live, and Notes databases.

The Windows-based Pathware product became the new foundation for LearningSpace, removing the dependency on Domino and allowing Lotus to market LearningSpace to a broader audience. The set of features formerly known as Pathware became the new Core component in LearningSpace R4. A second major component, called Collaboration, still used Domino as a host. This optional component provided a stand-alone Domino engine (Domino DNA) that hosted Notes databases used as discussion forums and supported Live sessions hosted in Sametime. Depending on their needs, customers could purchase just LearningSpace Core or the full product consisting of LearningSpace Core and LearningSpace Collaboration.

In addition to removing the dependency on Domino as the hosting platform, LearningSpace R4 offered easy integration with third-party applications that could be used as components in the overall e-learning framework. This architecture offered customers the flexibility of incorporating applications of their choice into LearningSpace and of hosting LearningSpace components in a variety of configurations, each of which could be expanded as needed. Rather than providing the customer with a limited, closed installation, LearningSpace R4 created a scalable framework that offered an extensive array of e-learning features. The following table describes the components of LearningSpace R4.

Component	Purpose
Relational database management system (RDBMS)	Maintains one or more relational databases dedicated to LearningSpace; may additionally contain other databases not used by LearningSpace.
LearningSpace Core	Incorporates features from Pathware, providing a user interface for managing and delivering courses, as well as

	the underlying technology needed to connect with the RDBMS, Web clients, and course materials.
Content server	Provides access to course content files—the materials for use within an online course, such as related readings and assessments. Content may be stored on a single server or distributed across a series of servers as needed.
Web browsers	Used by all clients to view LearningSpace user interfaces.
LearningSpace Collaboration	Incorporates Live Server and CourseRoom Discussions features from earlier versions of LearningSpace to provide mechanisms for synchronous and asynchronous collaboration during a course. Live sessions and Notes databases can be hosted on a single Collaboration server or distributed across a series of Collaboration servers.

Unlike previous releases of LearningSpace, which stored all data in Notes databases, LearningSpace R4 Core used a relational database management system to store its data. Although the RDBMS was a required component, it was not packaged in the product. Instead, the customer was free to choose from several popular RDBMS products, possibly leveraging one that was already used in-house. Course content was generally hosted on one or more HTTP servers, but could also be stored on LAN-based file servers and even CD. Because users accessed LearningSpace R4 using Web browsers, they no longer needed to install the Notes client software on their workstations.

LearningSpace modules
LearningSpace R4 combined popular features from previous products into a single, well-rounded learning application. The following table describes the modules and other components that comprised LearningSpace R4.

Feature	Ancestry	Typical user tasks
Home module	Pathware	• Post announcements • Control Core and Collaboration server settings
Planner module	Pathware	• Create course outlines • Create questions and build assessments • Add activities linking to content and assessments
Users module	Pathware	• Add users to LearningSpace • Assign permissions to access specific feature sets • Maintain user accounts
Courses module	Pathware	• Browse the list of available courses • Enroll in courses • Withdraw from courses
Enrollment module	Pathware	• Enroll one or more students in a course • Assign course responsibilities to instructors
Results module	Pathware	• Display progress data for students sorted by student or by course • View your own progress data
Reports module	Pathware	• Run predefined reports summarizing data on enrollments, student progress, and system statistics
Database Utility	Pathware	• Create, copy, and maintain database tables

		• Update database schema • Define basic system and user settings
Discussion databases	LearningSpace Forum	• Asynchronously read and post responses to discussions related to specific courses
Live sessions	LearningSpace Live	• Participate in real-time class sessions hosted via Sametime, using virtual classroom such as Whiteboard files, Application Sharing, and Follow Me sets

In LearningSpace R5, this combination of products was streamlined and the interface tightened, providing a cleaner integration among system components and a simpler interface for users.

LearningSpace R5: Smoothing the rough edges

LearningSpace R5, released in 2001, improved on the model introduced with LearningSpace R4. While the product framework remained basically the same, LearningSpace R5 added several important features that increased the flexibility of LearningSpace and streamlined user tasks:

- *Automatic notifications and system-level email*
  By incorporating a third-party SMTP server into the LearningSpace framework, customers could add email functionality to the application. This allowed LearningSpace users to send messages to one another and enabled the use of system-generated notices to inform users of certain events, such as course enrollments and upcoming activity deadlines.
- *Support for materials*
  In LearningSpace R4, customers stored the materials associated with a Live session on the Collaboration server in a special Notes database. LearningSpace R5 added a Materials module to the Core component that simplified the creation of Live sessions by allowing users to associate materials with Live sessions as they defined each session and by removing the need to complete this task on the Collaboration server.
- *Domino user import*
  Many LearningSpace customers already had a Domino infrastructure in place with a list of users stored in the Domino Directory. LearningSpace R5 provided a tool that enabled these customers to import users from the Domino Directory into the LearningSpace database, removing the need to add those users to LearningSpace manually.
- *Improved user interface*
  LearningSpace R5 incorporated the use of style sheets in the user interface, increasing consistency among pages, improving speed, and simplifying the customization task for those companies wishing to modify the product's appearance.

While LearningSpace releases 4 and 5 provided a highly configurable framework for e-learning, they lacked support for working with stored versions of courses and compiling sets of courses into larger learning offerings, such as certificates and curriculums. At the same time, it became clear that the Live sessions feature of the LearningSpace Collaboration component was popular enough to stand on its own as an e-learning product.

So once again, Lotus reworked the e-learning paradigm to better meet customer needs, introducing the Lotus Learning Management System and the Lotus Virtual Classroom products.

Lotus Virtual Classroom R1: On its own

The Lotus Virtual Classroom product is a descendent of the Live Server that shipped with LearningSpace R3. Today, this component is robust enough to stand alone as a learning product, running on the Microsoft family of server platforms. Originally released as the LearningSpace - Virtual Classroom, this product has since removed the "LearningSpace" component from its name, as it is not actually dependent on any version of the LearningSpace product. Now we refer to it as the Lotus Virtual Classroom.

The Lotus Virtual Classroom boasts a variety of features designed to enhance learning in the online classroom, some harking back to the Lotus Learning Server and some introduced in this newest generation of the product. Features include:

Feature	Typical user tasks
Learning Home	• Students: Register in the system and enroll in courses • Instructors: Develop and schedule courses • Administrators: Manage users, courses, and system settings
My Sessions tab	• View the list of sessions for courses in which you are currently enrolled or are teaching
Course Catalog tab	• View and manage the list of courses currently available in the system
Course Builder tab	• Develop a course outline and associate content and activities with it
Library tab	• Browse a library of stored questions, question pools, and assessments, selecting those you want to use in the course you are now developing
Administration tab	• Perform administrative tasks such as assigning feature permissions to users and modifying system settings

Class sessions take place in the virtual classroom, where instructors and students view and mark-up the online whiteboard and use a variety of course tools and materials to enhance the learning experience:

- *Outline*
  Lists the topics and activities to be covered during the online session; the instructor uses the outline to control the flow of the session.
- *Presentation Whiteboard files*
  Stores course content files intended for display during the online session; the Presentation Whiteboard supports a variety of application files.
- *Web Pages*
  Presents a stored list of URLs that students can visit during the session; all participants direct their browsers to each URL under the instructor's guidance.
- *Screen Sharing*
  Enables the instructor to host an application on his or her workstation and allows students to view, and even use, the application from their own workstations during the session.
- *Questions*
  Allows the instructor to present different formats of questions (True/False, multiple choice, short answer) to students either within a stored assessment or as impromptu queries during the session.
- *Assessments*
  Presents tests (stored sets of questions) to students during the session and stores their answers.
- *Participant List*
  Displays a list of participants in the online class session.
- *Chat*
  Conducts one-on-one or group discussions (based on instant messaging) during the online session.
- *Raise Hand button*
  Indicates to the instructor that a student has a question.
- *Breakout Sessions*
  Allows subgroups of session participants to conduct additional sessions where they meet to discuss specific topics, and then return to the main session.

To learn more about the Lotus Virtual Classroom, see the *LDD Today* articles, "**A quick course in LearningSpace - Virtual Classroom**" and "**Learn something new: LearningSpace - Virtual Classroom**."

Lotus Learning Management System R1: A new beginning

In the newest release, Lotus changed the name of its LearningSpace product to Lotus Learning Management System (LMS) to indicate its rebirth. Rather than a typical upgrade to existing software, the Lotus Learning Management System is effectively a new product with a new architecture and a host of new features. In addition

to the self-paced and collaborative elements of e-learning seen in previous e-learning products, the Lotus Learning Management System provides capabilities for creating and maintaining the e-learning infrastructure. Using the Lotus Learning Management System, customers can define and store the definitions of entire programs of study, along with individual course offerings.

Where previous versions of Lotus e-learning software focused on the Microsoft platform, the Lotus Learning Management System takes an enterprise approach by supporting a variety of platforms: IBM AIX, RedHat and Suse versions of Linux, Microsoft Windows, and Sun Solaris.

As did LearningSpace, the Lotus Learning Management System uses a modular architecture, providing a highly configurable set of components that comprise the learning framework:

Component	Purpose
LDAP directory	Maintains the centralized user accounts for an organization; may be used for authentication by multiple applications. An existing LDAP directory can be leveraged or a new LDAP directory established.
Relational DBMS	Maintains three databases dedicated to the LMS; may additionally contain other databases not used by the LMS.
LMS Server	Acts as the focal point of the Lotus Learning Management System; users access the LMS and its data through the LMS server.
Delivery Server	Displays course structures where students can navigate among activities, displays course content for each activity, and tracks progress data and transmits it to the LMS Server.
Content server	Stores course content files for use with the LMS; files are accessed from course outlines using URLs.
SMTP server	Transfers Help Desk requests and all LMS-generated email.
Web browsers	Displays the LMS user interface on a client workstation.
FTP server	Stores uploaded courses prior to importing them into the LMS.
Authoring Tool	Runs on a client workstation and enables course developers to create course outlines and content, including assessments. The Authoring Tool can also be used to import third-party courses into the LMS.
Offline Learning Client	Runs on a client workstation and enables a student to work on a course while disconnected from the network.
Collaboration servers	Extend LMS with other IBM Lotus products to add collaborative features: • Domino: discussion forums • Sametime: instant messaging. • Discovery Server: knowledge-search portlet • Lotus Virtual Classroom: online class sessions held in real time

The Lotus Learning Management System offers many of the features available in previous LearningSpace releases, as well as some innovations:

Feature	Typical user tasks
Authoring Tool	• Create and modify course structures and content for use in the LMS • Import third-party courses and send to the LMS
Home module	• View announcements • View lists of recommended courses • View summaries of current programs • View calendar of scheduled activities
Users module	• Set users to Active or Inactive status

	• Assign permissions so users can access specific feature sets
Course Catalog module	• Register course masters • Create specific course offerings from stored masters
Course Management module	• Enroll students in courses • View course results for students • Manage interest profiles • Define auto-enrollment rules for courses
Resources module	• Manage class rooms and equipment • Manage instructor assignments • Track vendor information
Reports module	• Run predefined reports summarizing data on enrollments, student progress, and system statistics
Settings module	• Post announcements • Add and configure system servers • Deploy product customizations
Offline Learning Client	• Download courses to a workstation and work offline
Discussions	• Participate in online discussion forums hosted on Lotus Domino servers
Live sessions	• Participate in real-time, online class sessions hosted on Lotus Virtual Classroom servers
Search portal	• Link to Lotus Discovery Servers and search for information relevant to a course

To learn more about the Lotus Learning Management System, see the *LDD Today* articles, "**A preview of the Lotus Learning Management System**" and "**Understanding the architecture of the Lotus Learning Management System**."

You've come a long way, baby!

Starting from a bright idea, growing into a Domino database application, and eventually evolving into enterprise-level software, e-learning at Lotus has never stood still. Early e-learning offerings presented users with a limited set of features and required fairly standardized configurations. Through the years, Lotus has improved not only the tools and materials that make up e-learning, but also the manner in which e-learning is delivered. The future starts here: The Lotus Learning Management System and the Lotus Virtual Classroom form the basis for a highly flexible e-learning framework that can be scaled and configured to meet a variety of needs. Customers can start small and grow or immediately implement a large-scale training system with customized interfaces and extensive offerings.

ABOUT THE AUTHOR

Elizabeth Bowling has been writing scintillating technical documentation for Lotus products since 1989. With degrees in Computer Science, Technical Writing, and Training & Development, she has an all-around good time documenting such Lotus products as Notes, LotusScript, LearningSpace, and most recently, the Learning Management System. When she can drag herself away from the keyboard, Elizabeth enjoys reading, sewing, scuba diving, and sleeping.

