

Informational architectures of asynchronous and synchronous learning models

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1. Introduction

The aim of this research is to determine suitable learning model at university campus. Both Asynchronous and Synchronous models have advantages and disadvantages with respect to implementation at the university campus. This comparison was done paying attention to course administration, collaboration, assessment capabilities tracking and reporting.

2. Learning models

Asynchronous and Synchronous models comparison was done using Lotus corporation software LearningSpace forum (as Asynchronous model) [4] and LearningSpace 4.0 (as Synchronous model) [4].

LearningSpace 4.0 features provide not only the most flexible learning experience for students, but the broadest support for curriculum planners, instructors and administrators, as well as the management controls, flexibility and scalability to meet the needs of the enterprise.

Multiple learning models

The two LearningSpace modules – LearningSpace Core and LearningSpace Collaboration – provide support for the three delivery modes for online learning experiences. LearningSpace Core supports self-directed study. LearningSpace Collaboration includes the collaborative elements of the award-winning Lotus products Domino and Sometime to support asynchronous collaboration through online discussions and access to shared materials, as well as real-time “virtual classroom” sessions:

- **Self-directed.** The LearningSpace Core module provides robust functionality for delivering self-directed courses with tracking and assessment. These courses can easily incorporate content from any Web-based source or CD-ROM. LearningSpace Core can deliver and track any AICC-compatible off-the-shelf courseware as well. Self-directed courses can be highly structured with controlled paths and prerequisite assessments, or provide flexible learner access to suit individual learning needs.

Learning models [1]

Synchronous	Asynchronous	Self-directed
Learning that provides real-time, simultaneous access to content, instructors, and other students. People from throughout the enterprise come together at a specific time, but without leaving their offices or homes.	Learning that takes place online, but on the learner's own schedule. Collaboration with others takes place via online threaded discussions freed from the barriers of time and place.	Learning that empowers people to control the speed of their own learning. A single learner proceeds through the course material interactively on an ad hoc, individual basis, without collaboration with other learners or an instructor.

• **Asynchronous.** The asynchronous collaboration functionality in LearningSpace Collaboration provides support for discussions and project teams, with access to class materials, exercises, and assessments. It is especially useful for problem-solving exercises, a forum for questions and discussions initiated by learners, and for reinforcing learning done through self-directed study and real-time classes.

• **Virtual classroom.** LearningSpace 4.0 creates a rich virtual classroom environment for real-time sessions with audio and video, shared whiteboards, shared applications, electronic hand-raising, a participant list, private messages, and chat functionality. In LearningSpace 4.0, real-time sessions become activities in the curriculum that can be integrated with the AICC-compatible tracking and assessment functionality

LearningSpace Collaboration allows organizations to enhance self-directed and asynchronous courses by creating opportunities for communication between students and teachers. A discussion can be created to augment any course. Instructors can use the chat functionality to maintain online office hours. These collaborative capabilities allow learners to work with each other to learn from their colleagues and instructors.

Asynchronously, learners can add comments and ask questions in the discussion area. Synchronously, learners can have real-time awareness and instant messaging, as well as participate in real-time virtual sessions with an instructor and other learners.

The combination of all three modes of learning in a single platform provides the utmost in flexibility. LearningSpace 4.0 supports the existing courses in use in the enterprise. And it supports the creation of new courses using two or three of the modes to provide the richest e-learning experience [3].

There is a Distance Learning classroom in VGTU that has all necessary equipment for videoconferences and asynchronous learning. That is why we had to choose software to satisfy Distance Learning classroom's needs. For this purpose we have done LearningSpace technologies analysis and put the results in Table 1.

Learning Space 4.0 is an independent product and like other learning software for synchronous model as compatible with other technologies. There are a lot of requirements for hardware and software to install his product. That is why we have chosen Learning Space Forum in the process of foundation of Vilnius Gediminas Technical University (VGTU) Distance Learning information system.

Learning Space can be deployed across one or more servers in configurations that allow for easy scaling. Learning Space works across intranets and the Internet, and has

Table 1
LearningSpace Forum compared to LearningSpace 4.0

LEARNINGSPACE FORUM compared to LEARNINGPACE 4.0	LSForum	LS 4.0
General		
Browser Support for Students	Yes	Yes
Browser Support for Admin/Creation/Instructor	No	Yes
Automatic completion of modules based on a pre-test using trigger scores.	No	Yes
Supports Template development	Yes	Yes
Hyperlinks to other sites	Yes	Yes
Supports Java	Yes	Yes
Supports mail interaction, using users' native mail, between students and instructors	Partial	No
Registration/Catalog		
Course Prerequisites	No	Yes
Enrollment by Instructor/Administrator	Yes	Yes
Enrollment by Student	No	Yes
Create registration rules.	No	Yes
Supports curriculum paths for individuals, positions or curriculum paths	No	Yes
Supports reusable course modules in more than one curriculum	No	Yes
Collaboration		
Asynchronous collaboration	Yes	Yes
Threaded discussions last after end of class	No	Yes
Hand-raising to ask questions	No	Yes
Ability to have discussions with instructors	Yes	Yes
Chat facility between students and instructors	No	Yes
Classroom group coursework	Yes	No
Online question and answers	No	Yes
Tracking, Reporting & Management		
Tracking and Reporting including course completion	No	Yes
Provides standard reports	Minimal - 1	Yes - 17
Supports additional reports	No	Yes
Wizard style interface prompts users to enter report parameters such as courses and students	No	Yes
Provides Graphical Reporting Capabilities	No	Yes
Assessment Capabilities		
Ability to track client assessments	Yes	Yes
Includes test logic (Go/No Go; If/then	No	Yes
Stored Bank of reusable Question	Yes	Yes
Auto Grading and Auto Records	Yes	Yes
Questions: T/F, Y/N, Matching, Fill in the Blank, Multiple Choice (1 or many correct answers).	Yes	Yes
Graphical choice and 'drag and drop'	No	Yes
Supports Timed Tests	No	Yes
Supports Weighted Questions	Yes	Yes
Infrastructure		
Uses Notes NSF file to store contents	Yes	Optional
Domino Name & Address Book	Yes	Partial
Domino Infrastructure	Yes	No
Multiplatform Support	Yes	Future
Utilizes RDBMS to store system and (optionally) course data objects	No	Yes
Native Notes Client Accessible	Yes	No
Disconnected User	Yes	No
Database schema open for modification	Yes	Yes

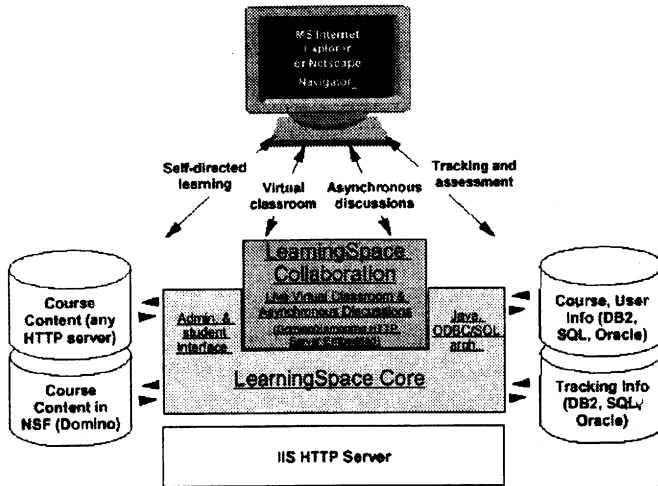


Fig. 1. Diagram of the basic architecture.

complete support for corporate firewalls. Below is a diagram of the basic architecture (Fig. 1).

The entire system may be installed on one physical server, or spread across several servers. (Separating the content and management databases to different servers is recommended for performance.) Course content may be served from any server on the intranet or Internet the student can access. For high-volume applications multiple servers can be used behind load balancers.

VGTU Information Technology Department is "IBM Certified for e-business University Initiative" [5] and has an opportunity to use IBM providing software for creating an interactive learning environment. The material of synchronous learning is difficult to place in data basis or warehouse. That is why we prefer asynchronous learning while creating VGTU Distance Learning informational system. Fig. 2 shows how is organized the structure and what products are used to create network computing architecture [2].

The scheme shows that Learning Space Forum is quite an independent course creation technology and it can hardly be integrated into the common VGTU Distance Learning information system.

3. Conclusion

Synchronous learning model delivers a flexible, standard-based platform for the delivery of all types of e-learning, makes it possible to administer course catalogs and learner populations, support for the creation, management and delivery of all modes of online learning. On the other hand asynchronous learning model is more suitable for distance education needs due to flexible classroom group course work and possibilities to use mail interaction while using user's native mail.

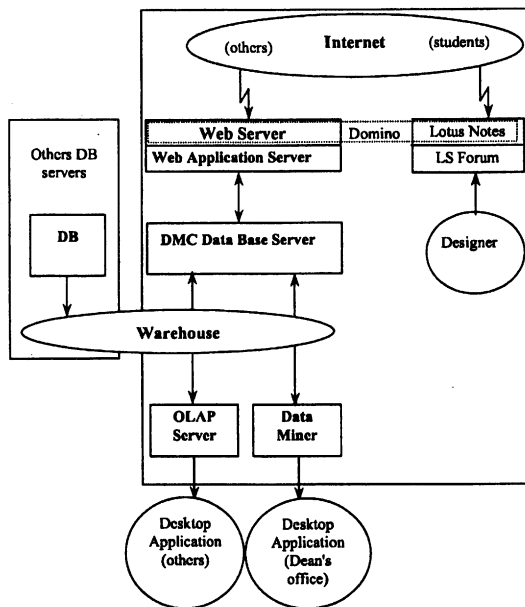


Fig. 2. Network computing architecture at VGTU.

From the point of view of infrastructure asynchronous learning model is an independent platform, which could be implemented, in an expensive mode. Because of the difficulties occurring while placing synchronous learning material in to the university information system, we have chosen to use asynchronous learning model.

References

- [1] A. Targamadze, E. Normantas, D. Rutkauskienė, A. Vidžiūnas, *Naujos distancinio švietimo galimybės*, Vilnius. Standartų spaustuvė (1999).
- [2] R. Kulvietienė, G. Kulvietis, Open classroom for informatics studies, *Proc. 19th World Conference on Open Learning and Distance Education*, Viena (1999).
- [3] G. Kulvietis, J. Šerytė, Business intelligence technology in VGTU Distance Education Center, *Liet. matem. rink.*, **40**, spec. nr., 200–204 (2000).
- [4] LearningSpace Forum 4.0 Release, *Instructor's Guide*, IBM (2000).
- [5] IBM Learning Village, www.ibm.com/solutions/education/schools/learningvillage

Asinchroninio ir sinchroninio mokymosi modelių informacinės architektūros

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Analizuojami bei lyginami asinchroninis ir sinchroninis mokymosi modeliai, naudojami nuotolinėse studijose. Pristatytos juos realizuojančios informacinės technologijos ir jų architektūra. Pateikta VGTU asinchroninio mokymosi modelio informacinė architektūra.