

# Learn OS

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## A framework for effective learning

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## 1.0 Background

The eLearning industry has shown high growth rates and predictions about its future have been very optimistic. At the same time, serious concern has been voiced about the effectiveness of the medium. High dropout rates, amongst other factors, have suggested that elearning has not lived up to its expectations.

What are the possible answers to this paradox? Research has shown us that the current wave of elearning has been powered by a high focus on technology driven learning solutions per se. Technology solutions have profited from the emergence of standards like SCORM that lays down guidelines for the creation and classification of reusable learning objects. Uptil now, these solutions have provided disparate services (learning functionalities) in disparate ways, so much so, that choosing the right platform for elearning deployment has become a matter of compromise not choice. Ironically, not enough attention has been given to the role profiles of the learner.

Research into learning behavior has also shown that many different factors affect learning. There are well researched methodologies and theories of learning behaviors notably Dr. Howard Gardner's Multiple Intelligences, the 4MAT model, Personality Types (MBTI) , Learning Styles (Kolb) etc. The effect of these methodologies on learning effectiveness has been established to some degree.

Another possible answer has been the low level of motivation and commitment of the learner in the elearning process and the overall enjoyability of technology based learning. In a bid to attract and retain interest in elearning courses, we have also seen the emergence of movements from the gaming industry to the elearning industry and vice versa thus creating a middle ground that combines the best of both media for learning. This has given rise to the use of simulations and other tools that help approximate reality and provide the learners with experiential as well as exploratory learning opportunities.

At this point, therefore, a lot of work is underway to incorporate the learning from the past experiences. Some of the work done has stressed on creation of learner knowledge models (Intelligent Tutors) and creating learning systems that are responsive to some learner needs. A lot of work still needs to be done in these areas but the overall perception is that unless the learner is placed at the core of the learning process, elearning will neither be effective nor enjoyable.

We are attempting to create a solution that incorporates the above learning and that provides the learner with an effective and enjoyable learning experience.

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## 2.0 LearnOS – defined

LearnOS is to the learner what a traditional OS is to the PC user.

### 2.1 Scope

The LearnOS comes in two forms – Desktop and Server.

#### 2.1.1 Desktop Edition

The desktop edition is for use by the individual learner. The system provides all learning tools and resources required for the learning activity. At its core is the personalization framework or the Effective Learning Framework (ELF) that provides an approximation of the learner profile and identifies the elements of an effective learning experience. It resides on a pre-existing operating system like Linux or Windows operating systems and therefore leverages existing capabilities.

#### 2.1.2 Server Edition

The server edition is for use of the Learning Administrator. This edition has the tools and applications required to manage groups of learners. At the core of this system lies the Learning Administration Framework (LAF) that helps the administrator to manage and monitor learner competencies.

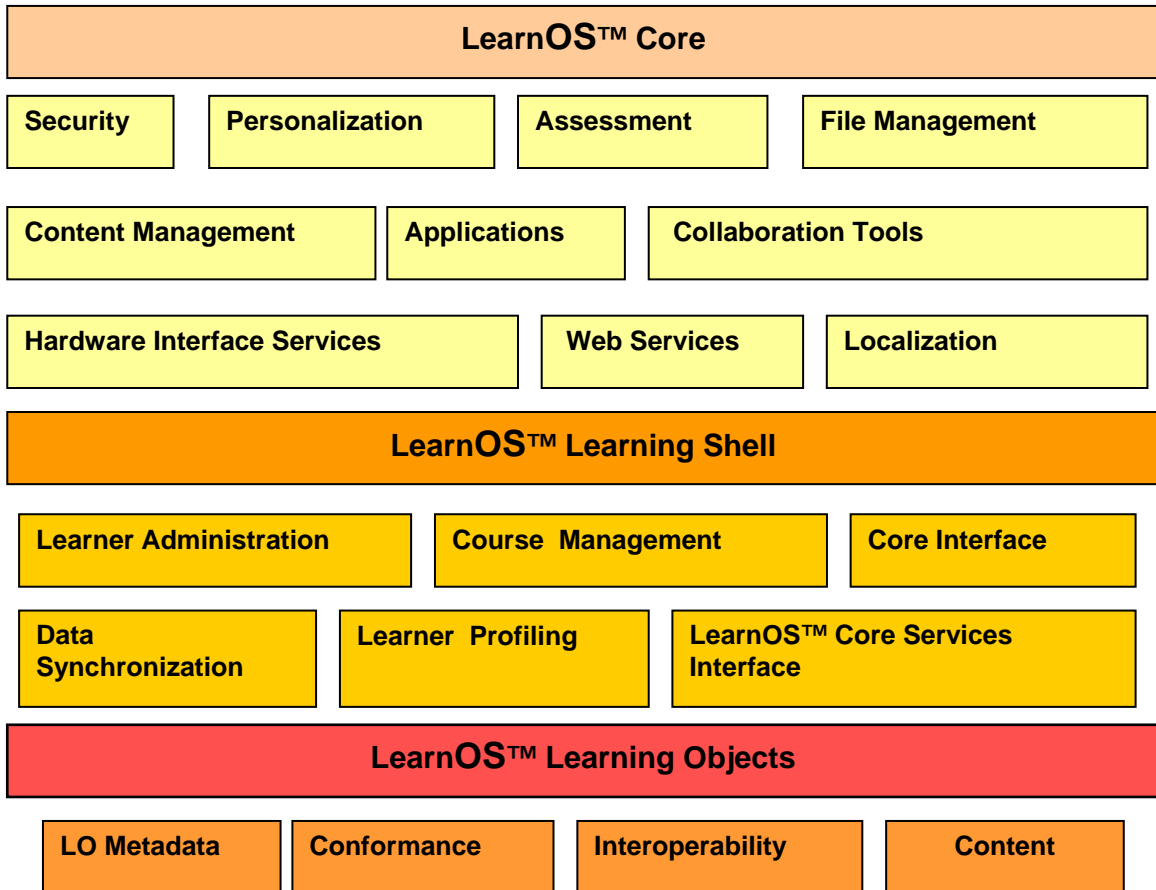
## 2.2 The Architecture

The LearnOS desktop edition has three layers – The Core, the Learning Shell and the Learning Objects.

- **Core** - features services and tools that are common for all learners (like Access Control to Learning Objects, File Management, Content Authoring and Management, Assessments, Collaboration tools and Personalization)
- **Learning Shell** - operates as a layer between the learning object and the LearnOS Core and has learning management functionalities
- **Learning Objects** - self-contained educational resources that conform to the LearnOS personalization rules and content structure specifications

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## 2.2.1 LearnOS CORE

The Core features services and tools that are common for all learners. The various constituents are:

- Security/Access Control
- File Management
- Content Management System
- Content Authoring System
- Assessment Management System
- Personalization Engine
- Applications like Word Processors, Schedulers and Graphics programs
- Collaboration Tools like Whiteboards, Email, Chat, Collaboration and Discussions
- Web, FTP and News Services
- Hardware/Device Services
- Localization

## 2.2.2 LearnOS Learning Shell

The shell operates as a layer between the learning object and the LearnOS Core. The main constituents of this are:

- Student Management and Reporting
- Learning Object Manager (that manages LOs and defines rules for them. This also provides the interface between the LO and the LearnOS™ Shell
- High level Interface to LearnOS™ Core layer functionality
- LearnOS™ Help Manager

## 2.2.3 LearnOS Learning Objects

Learning Objects are self-contained educational resources that conform to the LearnOS personalization rules and content structure specifications. Conforming to the specifications means that the content and tools contained within the LO can be personalized to the needs of the learner. It is envisaged that this set of specifications will be one that becomes a de facto standard for personalizable content.

They have access to all the functions of the LearnOS™ Core through the LearnOS™ Shell interface. Therefore each module can avail of all the functionality provided by the LearnOS™ the moment the LearnOS Learning Shell adds them to the LearnOS.

## 2.3 Learning and Administration

The two critical components in the LearnOS architecture are the Effective Learning Framework (ELF) and the Learner Administration Framework (LAF). The architecture itself is designed to be open and seeks to integrate and interoperate with existing content management and learning management systems and standards.

### 2.3.1 The Personalization Framework – ELF

The ELF stems from the theory that learning is affected by 4 groups of factors. These groups of factors are as follows:

- **Learner Key Characteristics:** these include the cognitive, affective and psychomotor components of the learners personality as well as his/her preferred learning style, multiple intelligences etc.all of these have a combined impact on the learning effectiveness.
- **Learning Key Characteristics:** this includes the learning methodology, the availability of resources like mentor, facilitator, chat etc which in turn impact the learning effectiveness.
- **Content Factors:** this includes the availability and adequacy of content, its delivery and presentation which too have a significant impact on the learning effectiveness.
- **Organization Factors:** this includes factors like aims, mission, vision, policy, research etc. objectives of the organization, the culture and ethos in the work environment etc.

Each of these factors and the learner's individual preferences or ability in them affect the learning experience. On the other hand, the learning experience itself is composed of a basket of learning experience elements or manifestations like types of text, audio, collaboration tools etc. Some of the factors are:

- **Raw Media Elements:** these include text, audio, video, images etc
- **Collaboration Elements:** these include collaboration and interpersonal collaboration and sharing learning experience elements like Chat, Discussions, Mentoring, Expert Advice etc.
- **Learning Control Elements:** these include the tools to manage learning like schedulers and reminders, controlling content flow etc.

We analyze the learner's factors (gathered through specially constructed questionnaires) versus the elements in a **Learning Weights Matrix (LWM)**. The summary analysis of LWM provides us with a Personalization profile of the learner.

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This analysis is then statistically profiled leading to a learning profile characteristics curve. This curve provides a statistical approximation to the learner's profile. It is a dynamic curve that changes dimensions to more accurately reflect the learner profile as the learning experience progresses.

The analysis of the LWM also provides another output – that of creating a personalization profile document for the learner. The personalization system provides this document to the content management system that is part of the LearnOS Core and the personalized course is syndicated for the learner. In this way, content and presentation is personalized to the learner profile leading to an effective learning experience.

## 2.3.2 The Learning Administration Framework – LAF

The LAF is a server side framework for managing competencies and tracking learning. In particular, the LAF provides facilities for the Learning Administrator to –

- **Define and Manage competencies**

Competencies are defined in terms of attitude, skill and knowledge (ASK) of the learner. The personalized profile of the learner along with assessments of ASK are instrumental in the defining, managing and tracking of competencies.

- **Create and Manage Courses**

The Learner Administrator is also able to focus or direct on competency gaps of the learner and able to suggest remedial course measures.

- **Manage Learners and Groups**

The Learning Administrator is also able to group learners together and manage the progressions of these groups in the competency hierarchy.

- **Track Learners (profiles, performance and activities)**

An important component of the LearnOS LAF is the ability to track learner activity. This includes the performance in tests, course progress and important pieces of information about the learner.

- **Provide Training Needs Identification and Developmental Plans**

The LAF also will be capable to providing analyses of learner skill-gap, thereby creating Training Needs Identification documents. These juxtaposed with the learner profile and course content availability and specifications, will translate into a learner Developmental Plan.

## 2.3.3 Validation of Techniques

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A large amount of time will be devoted in creating standards based techniques and processes. The quality of each of the facets – whether it be identification of the Learning Weights Matrix, the statistical techniques for the learner profile creation, the content syndication techniques shall conform to the available standards. We will also be testing and validating the effectiveness of the solution from the point of view of actual learners and provide prototype models for followers of the LearnOS standards.

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## 3.0 Key Applications of the LearnOS

The LearnOS can be used in a variety of forms. Let us look at some common applications/usage.

### 3.1 Scenario One: Content Creation

The LearnOS core offers a content authoring and management system for content authors and instructional designers. Authors use a special language for defining and creating LearnOS compliant courses (titled Learning markup Language). This language has built-in support for structuring the content into personalizable chunks, for identifying such chunks and for aggregating these chunks into learning objects. The courses can be fitted to one or more learning experience designs and transformed into web-based courses. This can offer content developers the freedom to transform content into other industry formats.

### 3.2 Scenario Two: Courseware Publishers

Publishers of educational courses, including the gaming and educational software, can package their content into LearnOS compatible LOs and distribute them with the LearnOS software. The advantage that they would have in this context would be the power to re-use core functionalities from the LearnOS Core itself, thereby increasing productivities in and efforts towards creating sound content.

### 3.3 Scenario Three: Online Learning

Online e-learning portals can offer the LearnOS and offer their learners personalized and effective learning experiences. They also benefit from the integrated capabilities of the LearnOS platform. Online learners, in turn, can learn from courses that are geared towards their learning style.

### 3.4 Scenario Four: The Corporate HR

Corporate HR departments use the LearnOS Server to manage and track employee competencies. The LAF allows them to manage learner groups and create & monitor employee developmental plans. The LAF also allows secure access to content.

## 4.0 Implementation

### 4.1 Effective Learning Framework – ELF

The following implementation steps are envisaged in the creation of the ELF.

1. Factors Identification
2. Learning Experience Elements Identification
3. Assessment Tools for Creation of Learning Weights Matrix
4. Statistical Analysis and Learner Classification
5. Learner static and dynamic information Model
6. Dynamic Statistical (Learning) Tools
7. Content Model Design (LML) w.r.t. Personalization
8. Services Model Design w.r.t. Personalization
9. Personalization to Content Syndication Link Model
10. Personalization Output Directives to Content Designers and LMS supporting Personalization
11. Models Validation Exercises
12. Bridging the Gap - between commercial frameworks and Personalization
13. Certification and Standards

By far the most critical component of the implementation of the framework would be the research and development involved in creating the Learning Weights Matrix (LWM). This would involve isolating the factors affecting learning and devising learner friendly assessment mechanisms for identifying the personalization key characteristics.

The next most critical component would be the design of the content model that would fit the personalization requirements. In this context, content is envisaged to have been marked up by a special language called the Learning Markup Language (LML). The LML will make it possible for the content author to devise content according to specific personalization parameters and provide criteria for referencing the chunks. The content syndication engine will then require to juxtapose style with the map of content with personalization.

The architecture will rely on an open and scalable framework which allows interoperability with other standards and frameworks.

## 4.2 Learning Administration Framework - LAF

The following implementation steps are envisaged in the creation of the LAF.

1. Learner Management
2. Competency Management
3. Competency Assessment Tools (Import/Create)
4. Training Needs Identification
5. Dynamic Course Administration
6. Data Synchronization Utilities (CMS, LAF data)
7. Tracking Competencies
8. Reporting

The core component of the LAF lies in the capability to identify attitudes, skills and knowledge of learners within an overall competency framework. Learning Administrators need to be provided with tools to define competencies and their hierarchies. They need to be able to map roles and competencies as well as provide identification of existing gaps.

The notion of competencies is typically used in Corporate HR parlance but we are looking at it's relevance in an educational setting viz. a school or college, as well. In this overall framework, administrators use tools to identify existing skill gaps through Training Need Identification tools and create developmental plans for each learner.

A lot of research needs to happen on applications of this model in varied settings. Also links with performance management or student appraisal systems need to be worked out as well.

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## 5.0 Business/Deployment Models

Let us look at the models for deployment of the LearnOS

### 5.1 Corporate HR/Educational Institution

This deployment model will focus on formal learning environments like schools, colleges, corporates etc. Instead of applying individual, difficult to track learning solutions, the formal learning administrator could deploy the LearnOS and integrate content sources using the LML. It would also be able to model learners much more accurately for both competency as well as training requirements.

### 5.2 eLearning Vendors and Publishers

Vendors and publishers of elearning material would use the LearnOS for deploying their courses over the Internet. Elearning providers such as NetG and Skillssoft would immediately be able to standardize and personalize their course offerings by using the core functionalities of the LearnOS.

### 5.3 OEMs

Original Equipment Manufacturers would be able to add-on the LearnOS to the existing operating system. Software e-content publishers could package LearnOS compatible learning material with the OEM bundle, reducing the cost of acquisition by individual learners.

### 5.4 System Integrators

SIs could use individual components of the LearnOS as components that they would want to integrate into a final solution. For example, the Authoring and Content Management System could be separately incorporated into a target environment etc.

### 5.5 Retail Consumer

The retail consumer could avail of the LearnOS facilities through subscriptions over the Internet. This could involve learning based on usage of services such as personalization, collaboration resources etc.