SCOPE OF THIS RESEARCH

1.1 What does Moodle offer?

Moodle is an alternative to proprietary commercial online learning solutions. It is an open source course management (and content management) system in which activities are at the heart of the system. Moodle was designed on base of social constructivism. Constructionism asserts that learning is particularly effective when constructing something for others to experience. The students could be considered as actively engaged in making meaning. Teaching with that approach looks for what students can analyze, investigate, collaborate, share, build and generate based on what they already know, rather than what facts, skills, and processes they can parrot.

Moodle has modular design that makes it easy to create new courses, adding content that will engage learners. This modular object-oriented dynamic learning environment possess intuitive interface that makes it easy for teachers to create courses. Teachers and students require only basic early acquired from Internet browser skills to begin learning, which makes last one very simple and user-friendly platform.

1.2 What does PeU e-Learning System offer?

PeU 2.0 has characteristics that make it different from other ELE: presentation of a learning course (based on concepts and relations between them), description of the learning materials (via different characteristics), etc.

Learning is built on the base of concept approach. Learning concepts can be presented in different points of view, called layers. The examples of different layers in case of presenting one concept are: introduction, definition, example, classification, comparison and application. Each concept, and therefore the learning materials connected with it, has characteristics, called resources. Examples of resources are: knowledge level, time, price, etc. For each concept in a learned subject domain there is a view point (layer) and a list of couples (resource, value of resource).

The structure and content of the learning courses, included in PeU, are modelled with a directed graph, whose nodes are learning materials (lectures and assignments, groups of them) or controlling ones, and the edges – relations of type predecessor_of. A special Graph Editor is used for developing, creation and editing of learning courses. PeU 2.0 is comparable to the best European samples for ELE. The system satisfies many of the criteria for assessment and also possesses a number of unique functional characteristics such as modelling the learned subject domain as a set of concepts, description of learning materials (through lists of learning concepts, layers and used resources) and modelling the learning course and logic relations between the concepts used in it with means of the visual programming.

1.3 What does LAMS and PeU offer?

LAMS and PeU (versions 1.0 […] and 2.0 […]]) are early representatives of a new generation of ‘learning design’ educational software having an underlying ‘work-flow’ structure. It attends to the process of e-Learning rather than content, in the manner of an ‘online lesson planning tool’. The uncluttered interface may tend to mask their power and unique qualities, the more so since many other software solutions offer separately many of the elements of its functionality. It is in its capability to orchestrate a range of functionality to serve the pedagogical inclinations of lecturers that LAMS and PeU offer a unique contribution
to e-learning developments. Lecturers tended to compare similarities and differences between above mentioned systems and VLEs, with some finding that systems offer ‘something nothing else can offer’, namely – a structure for learning activities, e.g. a structured chat room (in LAMS) or control test (in PeU) embedded into a particular learning sequence (in LAMS) or control structure (in PeU).

1.4 We have three complementary e-Learning systems.

Moodle is a Course Management System for managing flexible communities of learners through a dynamic website. LAMS is a Learning Design system for creating and running structured sequences of collaborative learning activities. Learning in PeU 2.0 is built on the base of concept approach. Learning concepts can be presented in different points of view, called layers. The structure and content of the learning courses, included in PeU, are modelled with a directed graph, whose nodes are learning materials or controlling points, and the edges – relations of type predecessor.

Moodle, PeU and LAMS are complementary e-learning systems. It is natural in our mind to arise the question: “Is it possible a system which possess best characteristics of the environments described above, to be created?”.

1.5 What are the implication of BEST?

This paper describes the design and implementation of a new learning design system called the Bulgarian Educational Site (BEST). BEST includes environments for user administration, learner run-time delivery of sequences, teacher run-time monitoring of learner sequences, control points, and description and thematically search of sequences, sequence templates and, most importantly, teacher authoring/adaptation of sequences.

BEST is expected to be SCORM/IMS Learning Design conformant. The system can produce, manage and play SCORM/IMS packages and have own learning objects repository. One of the powerful features of the learning activity approach is that the content of a course structure can be easily changed to suit a different discipline, while leaving the activity structure unchanged. The focus on easy re-use with means that these changes can be implemented and ready to run with a new learner group in few minutes.

1.6 Best is one innovative platform

Development of BEST started as Moodle 1.6 development based platform.

LAMS is to be integrated with BEST, with LAMS acting as either a course format or an activity within BEST. The integration have been done using BEST and LAMS Version 1.0.2. This paper describes the overall design of the integration and implementation of this new platform that combines itself two important qualities: social constructionist principles in course management and learning design that capturing the “process” of education.
1.7  **LAMS as a BEST component rather than a total solution**

Lecturers saw LAMS as one tool within a package of tools available to lecturers; they felt that it would never replace other ways of teaching, or would never become the only e-Learning tool in their classroom. The key to successful teaching and learning was employing a variety of tools and approaches such as Moodle based platforms and social constructivism pedagogy.

1.8  **Content Management in e-Learning vs. Learning Design in e-Learning**

e-Learning has a well developed approach to the creation and sequencing of content-based, single learner, self-paced learning objects. However, there is little understanding of how to create sequences of learning activities which involve groups of learners interacting within a structured set of collaborative environments, or how teachers can make these sequences easily re-usable (making national fund of re-usable learning sequences).

Given that a key dimension of Bulgarian higher education is learning which arises from interacting with teachers and peers (rather than simply interacting with content), the lack of a mature approach to sequencing of multi-learner activities is a significant blind spot in e-Learning today. This is surprising given that “lesson planning” – the process of determining the sequence of activities to be followed by a lecturer and learners when studying a topic – is well understood in education, but is mainly absent from e-Learning.

However, there is a growing body of work addressing this topic, based on the concept of “Learning Design”. Learning Design provides a first glimpse at the ways of describing multilearner activity sequences and the tools required to support these.

Learning Design has the potential to revolutionize e-Learning by capturing the “process” of education, rather than simply content management as it in Moodle. By describing sequences of collaborative learning processes in Bulgarian universities, Learning Design offers new pedagogical approaches to re-use in e-Learning. This article describes our joint Learning Design approach, a detailed example, and its implementation.

1.9  **What have been designed**

LAMS and BEST integration is about BEST being able to call LAMS. This is the opposite approach to wrapping a third party tool up for use with LAMS.

The following areas have been addressed by the integration:

**User Authentication**

LAMS should not require users to log in – it should carry over the user and their privileges from BEST. There are two aspects to this:

? setting up of users and session classes to support the BEST users;
? single sign-on.

**Creation/Authoring of Sequences**

The teacher must be able to create LAMS learning designs, or sequences from within BEST. This will require the integration of the LAMS authoring module into BEST.

A teacher must also be able to select an existing design for using in a BEST course. This involves LAMS functionality, which is currently made available via monitoring.
Lesson Management

The LAMS BEST activity will need to trigger the automatic set up of a lesson, along with the appropriate session class, based on a design previously selected in BEST.

The LAMS BEST will also need to inform BEST of certain basic information, such as what the user is doing. This will be kept as limited as possible.

Learner

Last but certainly not least, the integration supports a BEST’s learner being able to participate in a LAMS sequence. This will involve the LAMS BEST Activity calling the LAMS Learner module.

The integration of LAMS and BEST not supports LAMS accessing BEST tools. For example, if a teacher wants to run a forum within a LAMS sequence, they must use the LAMS forum, not the BEST forum. If the teacher wishes the students to use the BEST forum, they should put in a Noticeboard activity, which tells the students to go to the BEST forum.

1.10 Constraints

BEST is an experimental system, written in PHP and runs on Apache. LAMS is written in Java and requires a J2EE engine to run, including (in case of this research of LAMS 1.0.2) EJB support. Current LAMS runs on JBOSS 3.2.4.

JBOSS can be run with Apache, using the mod_jk2 module, so it should be possible to run BEST and LAMS on the same server (as it is in the case of this research). Some more investigation may be needed here – most examples given for JBOSS use Apache2, but PHP needs a prefork MPM version of Apache 2, or Apache 1.x to run reliably.

However some institutions may wish to run with LAMS and BEST on separate servers. So an integration that is capable of working across servers would be ideal.

1.11 During initial BEST LAMS integration process we ran into the following difficulties.

These are the issues which have been identified as difficult to resolve for the integration.

Session Class Management: In BEST users can join a course and leave a course on the fly.

Look and Feel: The LAMS look and feel is very different to BEST, and cannot be easily reskinned in 1.0.2. Even if we did reskin it to suit standard BEST, Moodle itself can be skinned! BEST could be reskinned to suit LAMS 1.0.2, but that is probably a backward step.

In later versions of BEST this will be less of a problem, as there will be more opportunity for skinning in LAMS 1.1.