nStructor

EMG solution for a Learning Management System for e-Learning

nStructor – the e-learning platform

nStructor is a learning management system for e-learning courses powered by *nJinn*, a PHP-based application framework developed by EMG.

Part of the solution described below has been developed within the framework of the INNO-4-AGRIFOOD H2020 project N° 681482, supported by the European Union's Horizon 2020 research and innovation programme. INNO-4-AGRIFOOD employs this solution to host its e-learning modules and manage the e-learning experience of users.

Technical details

The visitor front end is a HTML5 web application using a responsive layout based on Bootstrap 3 framework which guarantees that the application is efficiently scaled and displayed well on every
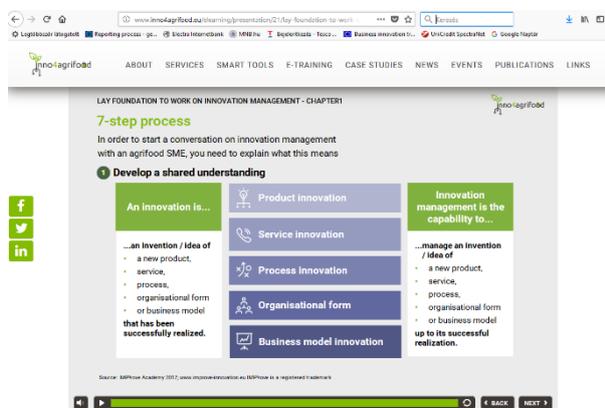
device including tablets and smartphones.

The software uses jQuery on client-side which requires JavaScript to be enabled. The application supports all the major desktop browsers (Chrome, Firefox, Safari 5.1+, IE 10+, Edge, Opera), mobile clients (iOS, Android) and doesn't require any plugins to be installed.

The system manages multiple user roles and allows administrators to invite lecturers who then can set up and manage e-learning courses. The system supports the courses to be publicly available however some functions, like individual progress tracking, are only available for those courses that require registration.

In case of courses that are available after registration the system stores information about the users' course completion status and allow them to suspend and resume watching the content. Results of exercises corresponding to the modules and chapters are also be stored in user accounts. The application has a stateless, RESTful Web API using a cookie-based authentication system. The authentication system relies on a cascade encryption algorithm that ensures high level of security. Personal data of e-learning participants is duly protected.

Content management

nStructor provides an easy-to-use web-based user interface that requires no technical expertise to publish and manage the content of courses. The application is available on desktops as well as on mobile devices (tablets and smartphones).

The system organises the educational material in modules, chapters and presentations.

Presentation

nStructor publishes interactive SCORM-compliant presentations (2004 4th edition) as the primary medium of the curriculum. Presentations can also have additional materials associated in several data formats like Word (docx), Excel (xlsx), PowerPoint (pptx), pdf, video and audio formats.

Custom tags can be added to presentations helping the users to select those content that they are interested in.

Compressed presentations can be uploaded to the system and linked to a chapter by a simple drag-and-drop method.

Chapter

Presentations can be organised under chapters that group content from a thematic perspective. Chapters have their own description and additional supporting material can be attached to them.

Chapters are also the first level of completion status evaluation: completed presentations and quizzes are registered on the chapters' level.

Module

Chapters that belong to larger thematic areas can optionally be represented in modules where progress indicators on chapter level are aggregated.

Exams

Custom quizzes and exams can be added to chapters using multiple question types like single and multiple-choice questions. Optionally exams can be a condition of a chapter's or module's completion.

Exams can also be published as a SCORM-compliant presentation.

Learning paths

Depending on the modules' and chapters' settings learners can master a subject in sequential and non-sequential learning paths. Administrators and lecturers can set up the curriculum in a sequential way, when the courses' presentations and chapters can only be completed in a predefined order or let the user to freely choose the content s/he'd like to access.

Application features

Monitoring

Administrators and lecturers can easily track course progress on the Control Panel and the Lecturer Dashboard respectively. Charts showing statistical information filtered by custom criteria are available for administrators/lecturers and can be exported to Excel. As an example, the data can provide information about the geographical location of the participants, gender, completion status, chapter/module usage etc. Moreover, users' individual progress can also be tracked. Learners can contact the lecturers of the respective modules if they need further clarification on the subject covered by the module.

Evaluation

Learners' progress is continuously evaluated. By satisfying certain criteria users receive personalized certifications in pdf format.

As a motivation, learners, as they progress, get various badges of achievement that are listed on their profile (e.g. when the system recognises excellent performance or strong participation).

Discussions and feedbacks

The system provides a platform for discussions related to modules and chapters allowing learners to contact instructors and other learners completing the same course.

Published presentations and chapters can be rated by the users on a five-point scale. The average score is displayed on the platform informing the learners about the quality of content.

Learners can directly send their feedbacks to instructors without it being published on the platform.

Reporting

Reporting module is available for administrators on the Control Panel where statistical indicators can be tracked and filtered. Scheduled (daily/weekly/monthly) reports can be set up that are sent by email.

Moodle vs nStructor

The next table presents the comparison of the functionalities and features between Moodle and nStructor. The overview is done in several segments: technical flexibility, learning tools and usability.

	Moodle	nStructor
Technical Flexibility		
Hardware and software requirements	Supports any browser although Internet Explorer 4+, Netscape 6+, and Opera 5+ are recommended. My SQL database. The system requires only one database and can coexist with tables from other applications. The software requires PHP, MySQL and web server software such as Apache or Microsoft IIS. It is available for most versions of Linux, Unix and Windows.	Supports any browser although Internet Explorer 4+, Netscape 6+, and Opera 5+ are recommended. My SQL database. The system requires only one database and can coexist with tables from other applications. The software requires PHP, MySQL and web server software such as Apache or Microsoft IIS. It is available for most versions of Linux, Unix and Windows.
Support	Moodle.com is a company launched in 2003 that sponsors Moodle development and provides commercial support, hosting, custom development, and consulting. The Moodle Partners are a network of companies that work with Moodle.com to provide services around the world.	EMG is a company. We provide the technical support. nStructor at the moment is provided as a service, but can be delivered as an installation software package with technical support available. It has been developed with the idea of hosting courses and the platform for a specific client in-house at EMG providing support to set-up, maintenance, updates, additions, etc. But installation is not excluded as an option.
Cost/License	Released under the GNU General Public License, which means that the initial package can be freely downloaded, installed, and distributed without charge.	It is a commercial product. License or cost is to be negotiated upon request.
Authentication	Moodle uses basic username and password authentication. The system can authenticate against a variety of sources, including external databases, LDAP directory servers, IMAP, POP3, secure NNTP and First Class servers, and Unix users through PAM. The system also supports Shibboleth and the Central Authentication Service (CAS).	nStructor uses an own authentication system that supports authentication via OAuth.

User feedback	Moodle has a feedback plugin.	Published presentations and chapters can be rated by the users on a five-point scale. The average score is displayed on the platform informing the learners about the quality of content. Learners can directly send their feedbacks to instructors without it being published on the platform.
Learning tools		
Forum	The discussion tool supports a social constructionist pedagogy model. Discussions can be viewed by date, by thread, by author. Instructors can split discussion branches from the main discussion into a new discussion. Instructors can determine the level of involvement (read, write, or post anonymously) for students. The discussion tool includes a formatting text editor. Posts may be peer reviewed by other students. Students may receive posts to the discussion forums as daily digests of subject lines or whole posts as email. Students can subscribe to forum RSS feeds.	The system provides a platform for discussions related to modules and chapters allowing learners to contact instructors and other learners completing the same course. Posts can include attachments, an image or URL. The discussion tool includes a formatting text editor. Students may receive posts to the discussion forums as daily digests of subject lines or whole posts as email. nStructor can integrate Twitter feeds - so like RSS feed notification, nStructor uses Twitter for that.
Materials	Students and instructors can upload files in most document formats to a shared course library, or to a shared group library. Students can share content from their personal folder with other students, and with an instructor or teaching assistants. Students can submit assignments into a drop box.	Instructors can upload files in most document formats to a shared course library and configure folders where learners can also share their content.
Messenger	There is no internal messenger in Moodle. Users must have an external email address. The teacher can register students in a forum in such a way that they receive messages by email.	There is no internal messenger in nStructor. Users must have an external email address. The teacher can register students in a forum in such a way that they receive messages by email.

Chat	Each course has an active chat room. The teacher can activate and disable the chat transcriptions. Transcriptions are archived and are available to the students. The chat tool supports images in Moodle. The system creates archive logs for all chat rooms. Instructors can view chat logs and share these with students. Instructors can schedule chats using the course calendar. Students can see who else is online within their course and send them an instant message.	The Forum linked to a course provides opportunity to share messages within the whole group. It is not a live chat support, but asynchronous.
Exercises	Instructors can create timed or un-timed self-assessments that students can take multiple times. The system automatically scores multiple choice, true/false, and short answer type questions and can display instructor-created feedback, explanations and links to relevant course material. Instructors can create automatically scored true/false and multiple-choice questions, and randomize questions from a larger pool, with optional required questions that appear on all randomized tests. In Moodle questions can contain images, video, other media files, and detailed feedback on each answer. Instructors can create mathematical equations. Custom question types can also be defined. Instructors can create personal, course specific or system wide test banks from questions can be chosen to create tests for students. Instructors can import questions from existing test banks. The system can randomize the questions in a test and the alternatives for multiple choice questions. Instructors can require a special password and set times for when students can or must access tests. Instructors can set a time limit on a test. Instructors can limit attempts to specific IP addresses. Instructors can differentially weight tests and create grading rules. Instructors can permit multiple attempts, and whether correct results are shown. Instructors can override the automated scoring. Instructors can also create survey questions.	nStructor does not have an integral quizzing type of function. We use specific software solutions to upload exams/exercises/quizzes to the chapters. Such as Articulate Storyline Quiz. Most of the features listed for Moodle exercise feature are available in Articulate Storyline as well.

Group work	Instructors can assign students to groups or the system can randomly create groups. Groups can either be defined at the course level and apply across all activities that support them, or at the individual activity level. In addition, the system supports a workshop module aimed specifically at peer review of student work.	nStructor does not apply these features. Groups can be created by the instructor for the course purposes. It is foreseen to have a possibility to integrate a wiki plug-in for group-works. It is not available at the moment.
Student tracking	Instructors can get reports showing the number of times, time, date, frequency and IP address of each student who accessed course content, discussion forums, course assessments, and assignments. Instructors can get a report that shows number of attempts and time per attempt on each assessment for individual students. Instructors can maintain private notes about each student in a secure area. Instructors can get a report that summarizes individual student performance on assignments. Instructors can set a flag on individual course components to track the frequency with which students access those components. Instructors can monitor students who are currently logged in to the course. Instructors can summarize all discussion posts to date by a student.	Administrators and lecturers can easily track course progress on the Control Panel and the Lecturer Dashboard respectively. Charts showing statistical information filtered by custom criteria are available for administrators/lecturers and can be exported to Excel. As an example, the data can provide information about the geographical location of the participants, gender, completion status, chapter/module usage etc. Moreover, users' individual progress can also be tracked. Learners can contact the lecturers of the respective modules if they need further clarification on the subject covered by the module. Reporting module is available for administrators on the Control Panel where statistical indicators can be tracked and filtered. Scheduled (daily/weekly/monthly) reports can be set up that are sent by email.
Usability		
Technical knowledge/ installation	Installing Moodle is relatively simple. The installation of Moodle is aided by several automated pages, which speeds up the installation process.	nStructor has a simple, Composer based installation process.
Course templates	Moodle provides three default course templates: activities arranged by week, activities arranged by topic, or a discussion-focussed social format. Instructors can create new course or content templates. Instructors can use templates to create discussion forums, links, course content, and resources, and these templates include a WYSIWYG content editor with spell-checking.	nStructor technical assistance includes setting up a course template of the Client's choice, not limited in creativity.

Standards	Moodle can import course content that is SCORM 1.2 or AICC compliant, and can export quiz content in IMS QTI 2.0 format. The system includes tools to facilitate the migration of course content between different versions of the software. The provider company supports migration from the following course management systems: BlackBoard.	nStructor can import course material in the most up-to-date SCORM (SCORM 2004 4th Edition) version. IMS QTI 2.2 support is forseen in the Q3 2018 release.
Languages	In Moodle 73 language translations are available as plug-in packs.	The system is multilingual and translation can be provided on demand. The standard package is English.
Authoring	Moodle's interface featured a very simple to use What You See Is What You Get (WYSIWYG) editor. The use of this editor would remove the need for the consultants to learn any Internet display languages such as Hyper Text Mark-Up Language (HTML), which would significantly reduce the development time required to start creating course content.	nStructor also has a What You See Is What You Get (WYSIWYG) editor that generates Hyper Text Mark-Up Language (HTML) content. nStructor has been set up primarily to host content generated outside the platform, not internally. This way the uploaded content is not only formatted, but already developed as an interactive material.
Front-end design	Moodle customisation has limitations	nStructor is fully set up by EMG experts based on Client's needs - fully customised before launch.
Customisation of the course features (add-ons)	There is a variety of Moodle modules that can be purchased and added to a customised course.	nStructor is fully set up by EMG experts based on Client's needs - fully customised before launch.
Additional features	Moodle companies need to be paid to integrate any new feature.	EMG technical support is flexibly open to work on additions upon Client's request.
Certification	Moodle has external plug-in for automatic certification.	Learners' progress is continuously evaluated. By satisfying certain criteria users receive personalized certifications in pdf format. As a motivation, learners, as they progress, get various badges of achievement that are listed on their profile (e.g. when the system recognises excellent performance or strong participation).