

An eLearning System for Agricultural Education

Shashi Dahiya¹, Seema Jaggi², K.K. Chaturvedi³, Anshu Bhardwaj⁴, R.C Goyal⁵ and Cini Varghese⁶

1,3 & 4. Scientist, 2 & 6. Sr.Scientist, 5. Principal Scientist, IASRI (ICAR), New Delhi

Corresponding author e-mail: Ishashi@iasri.res.in

ABSTRACT

With the development in ICT, eLearning which is the new paradigm of learning and teaching has become the part and parcel of education programmes in all sectors of life. With the development in Agricultural Science and technology, the need for improved agricultural education throughout the world has also been realized. Quality Education in Agriculture is a service that contributes to national development, integration and regional cohesion. But compared to other business and management fields, eLearning in the field of agriculture is still in the early phases of development and adoption. In this direction, an eLearning system "eLearnAgriculture" was designed and developed at IASRI, New Delhi, which is available online at <http://elearnagri.iasri.res.in/home>. The system has been tested and validated by deploying the sample courses from Agricultural Statistics and Computer Applications. Each course has been distributed into well defined topics with each topic having the online features of glossary, interactive lessons, multimedia enabled presentations, quiz and assignments. The features of this system includes the separate modules for teachers, learners, evaluators and administrator with the facility of an equation editor for mathematical equations and Sharable Content Object Reference Model (SCORM) for multimedia enabled course contents. The open source Learning Management System, MOODLE has been used for creating the eLearning documents, management of contents and users. The modular nature of MOODLE has been used in this system to add the new features such as an equation editor, frequently required mathematical symbols and a new user interface. The system provides an opportunity to the agricultural educationists to create and link their course contents online. This paper presents the technology behind this system along with the content standardization scheme and the common template followed for creating the courses.

Keywords: ICT; Agricultural Education; eLearning; eLesson; Content creation;

eLearning is the use of Information and Communication technology to enable people to learn anytime and anywhere. Being online, the eLearning systems provide an opportunity to learn any subject from any part of the world at any time. It may be helpful in resource saving in terms of time, money, paper, etc. The eLearning methodology has been started with the need to learn independently, comfortably and at the desired pace at any time anywhere. Primarily the traditional methods of learning have been in use in the education. But research has shown that Electronic communication, Information Imaging technologies offer methods for delivery of education, training and learning much more convenient than traditional methods (Fritz *et al.* 2002). With the advances in internet technology, web based eLearning systems are gaining popularity. Being online, these systems provide an opportunity to

learn any course/subject from any part of the world at anytime. It may be helpful in resource saving in terms of time, money, paper, etc. that will improve the accessibility to the course instructors as well as students. In consideration with the changing trends in ICT and scarcity of time, the role of e-learning has increased. Once the course contents are digitized using some Content Management System (CMS) and the same are made available on the web, they can be effectively used by the researchers, instructors and students. Although teachers also need to know a students strengths and limitations in learning, their goal should be to empower their students to become self aware of these differences (Zimmerman *et.al.* 2002).

The earlier initiatives taken in this direction are: eGyankosh, A National Digital Repository (www.egyankosh.ac.in) by Indira Gandhi National Open University's

(IGNOU), NPTEL, National Programme on Technology Enhanced Learning (www.nptel.iitm.ac.in) by a group of Indian Institute of Technology and Indian Institute of Science, Bangalore, UNESCO-SALIS eLearning Portal (<http://salisonline.org>) for Awareness Raising on Information Literacy for Southern Asia, Massachusetts Institute of Technology (MIT)'s Open Courseware (<http://www.Web.mit.edu>) is a major successful project that provides free access to around two thousand courses. eLearning supports increased communications between teacher and students, and among students. It encourages students to take responsibility for their own learning and creating an environment that promotes an active approach to learning. Students can take quizzes or read course material during their free time. It is a boon to the working students and professionals who need flexible access to courses, and an eLearning system is a powerful way to give them what they need.

The services and format of eLearning allow many additional benefits, some of these are: eLearning allows any user to learn online at any time of his own convenience. Audio - Video presentations makes learning more interesting. An eLearning course has a global student audience. The format allows students to learn easily for the standardized tests by downloading the study material they want. It also allows the students to improve their scores in the standardized tests, by taking as many tests as they want. The eLearning format

allows students to speed up and slow down as they deem necessary. There is more flexibility in terms of time limit or age barrier. In other words, the online environment allows for a learning environment where there is a better focus on study due to the effect of saved efforts, time lesser hassles. eLearning opens up a new world of studying comfortably and with better results. Technology advances and especially web-based training, also provide new opportunities for teachers professional development (*Gray et.al. 2004*). Teachers design, develop, and evaluate the authentic learning experiences and assessments incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge skills (*Cennamo et.al. 2010*).

METHODOLOGY

Modular Object Oriented Development Learning Environment, MOODLE, has been used as the Learning Management System (LMS). It is a web based LMS and is based on the client-server architecture (Fig.1). The Scripting language PHP has been used as the application development language. Its database at the backend is a relational database built in MySQL. MOODLE works best and there is more support, when running on the Apache web server with a MySQL database. These requirements, Apache, PHP, and MySQL are common to almost all commercial web hosts, even the low-cost ones (<http://www.moodle.org>).

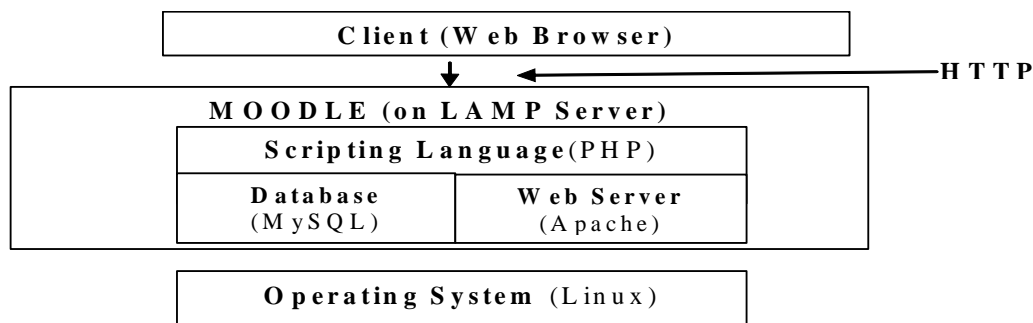


Fig. 1: MOODLE Client-Server Architecture

The architecture of MOODLE is modular in nature (Fig.2). This means that, Moodle has a number of features that are modular, including themes, activities, interface languages, database schemas and course formats. This allows anyone to add features to the main code base or to even distribute them separately.

Content Standardization: Content development encompasses authoring, maintaining and storing the learning content (*Ellis.et.al.2009*). Content

standardization is an integral activity of an eLearning system. The course teachers remain involved in this activity during the whole stages of course building and implementation. But before actually starting the course creation, the course content has to be standardized for common modules, common standardized text format and common look and feel of the courses.

The first step towards standardization is designing of a common course framework which includes:

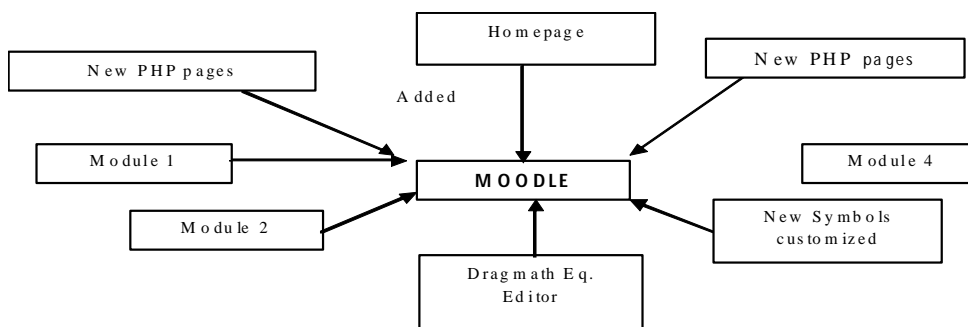


Fig. 2: Modular Architecture of MOODLE

Design of a Course Map / Flowchart : The course map is designed in such a way so that it becomes the basic skeleton for each course. The courses are then developed on the top of it. The Flowchart followed for eLearnAgriculture is depicted in Fig. 3.

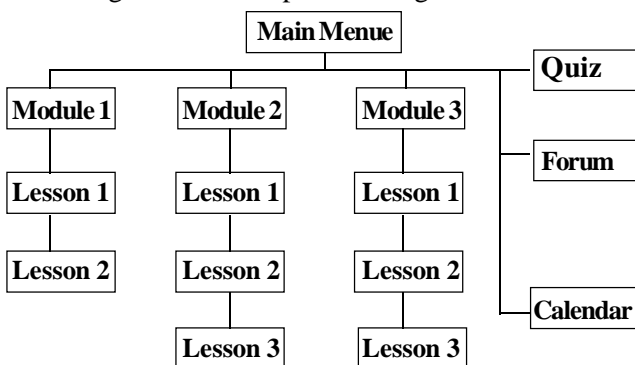


Fig. 3. Course Map/Flowchart

Design of a uniform course structure : A course is subdivided into various lessons based on the main topics underlined in the syllabus. Each lesson had the common structure and format within a course.

Course Material Collection and digitization: The course material is collected for each lesson on all common entities depicted under the uniform course structure. The content of each page of a lesson is collected under the following attributes: Text, Question (if any at the end of the page), Tables, Graphs, Equations and images.

Creation of the course content in MOODLE: A Learning Management System (LMS) is used to cater to the educational, administrative, and deployment requirements. MOODLE (abbreviation for Modular Object-Oriented Dynamic Learning Environment), has been used as an LMS for the creation, management and deployment of the eLearning system. It is a free and open-source eLearning software platform. It has features that allow it to scale to very large deployments and hundreds of thousands of students. The course content has been finally created using the tools available under the MOODLE editor.

Common Template for eLessons : The system presently contains some basic courses under the disciplines of Agricultural Statistics and Computer Applications. The course material has been designed and developed by the course instructors actually teaching these courses. The courses are offered online, so the students have the flexibility to enrol themselves in the courses of their choice, can study and evaluate themselves at their preferable time. Each course has been divided and arranged into several lessons. Each lesson has the common format for text, figures and presentations etc. Also a common representation scheme/ Template has been followed for all the eLessons under a course. This template includes the following:

Goals and Summary : The goals of each topic have been given in a precise language so that the learners of a particular course can get to know the purpose behind the topic and a general insight into the content they will be going to learn under that topic. The summary of each topic gives a summarized view of the topic. All the content that has been included in the lesson content is depicted briefly in the summary.

Interactive Lesson : The lesson content under a topic is divided into various pages and the Text, Tables, Equations and Images to be included in that page were identified. Some real life solved examples have been added in most of the lesson pages. These solved examples enhance the clarity and practical useability of the content. It was also tried to add a test question after each lesson page so that the user is tested for the content he read in that page. A feedback is provided for each answer that the user selects. If the answer was correct then only he can move on to the next page in sequence, otherwise he has to attempt it again. The equations were added using the Dragmath equation editor integrated with MOODLE.

Glossary : A glossary has been developed for each topic of the course. It contains the definitions of all important keywords used in the lessons. The keywords have been alphabetically arranged in the form of a

dictionary. The glossary has the auto-link feature through which the keywords get auto-linked to their definitions wherever they appear in the courses.

Audible presentation : Each topic has been enriched with multimedia enabled presentations. The presentations depict the whole lesson content in a brief and interactive way. With some presentations audio has been recorded in the voice of the teacher and uploaded in the system as SCORM (Sharable Content Object Reference Model) (<http://www.scorm.com/>). These presentations are very beneficial to the students in understanding the concepts very easily through graphics, animation and voice embedded with these presentations.

Quiz : A quiz containing a series of questions was created for each topic. The type of questions that have been included in the quiz were-

- Multiple choice
- Matching choice questions
- True False
- Short answer questions.

The student can retake the quiz after submission.

Grading: The students are evaluated and graded on the basis of grade system chosen by the teacher. For each correct answer in the Quiz, the teacher can give appropriate grades in the range of -1 to +1 along with a feedback. After submission of the Quiz by the student, an overall percentage grade is provided by the system. Based on the grading and feedback the student can opt to retake the quiz and perform better.

News Forum : In every course of the system, a forum has been created for general announcements and distribution of assignments by the teacher. The students can discuss any topic with other students and teachers through this forum. Every subscribed user of the forum are sent email copies of every post in that forum. The teacher can force the subscription on all the students so that everyone in the class will get email copies.

MOODLE Application Customization: While developing the eLearnAgriculture, some new tools were required and some already existing tools needed customization. As MOODLE is open source in nature, so addition and customization was possible. Also, MOODLE is modular in nature; these tools were easily integrated with core MOODLE code.

Integration of Equation Editor (DragMath): Dragmath equation editor (<http://www.dragmath.bham.ac.uk/>) was successfully integrated with MOODLE. After inserting the equation through DragMath equation editor, the equations get transformed in the latex format. But when these equations are seen on the browser, they are viewed as any normal equation.

Addition of new characters and symbols : Various characters and symbols required while generating the mathematical equations were added in the MOODLE's respective files and are now available in the character collection of MOODLE editor in eLearnAgriculture. Some of the symbols that have been added were: Alfa, Sigma, Theta, Mu, Chi, X bar, Y bar and many others.

Multimedia enabled Course Content: Adobe Presenter was used as a plug-in for the Multimedia course content creation. It provides rich experiences complete with voice-over narration and multimedia content, including video, animations, and product simulations. The presentations with each eLesson were prepared using audio and animation effects. These presentations were uploaded into the MOODLE editor using the Sharable Content Object Reference Model (SCORM). Presenter converts the presentation to the Adobe Flashformat and publishes it online for the audience to view at their convenience.

CONCLUSION

The scheme used for standardization and creation of course content in eLearnAgriculture has been discussed in this paper. This scheme was finalized and was presented and distributed amongst the faculty members so that they could also design and create their course content in the same manner. The common template for eLesson development is very helpful for the faculty and students, as it gives the complete format and instructions to be followed by the teacher and it doesn't complicate the system for students by adopting different representation schemes for the lessons, Quiz, Glossary and presentations. The system is being extensively used by the students and faculty members of the Post Graduate School, IARI, New Delhi, India.

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