

Developing a Framework of Learning Management System for a University Consortium

Ankita Mitra

Dept. of Information Technology
RCC Institute of Information Technology
Kolkata, India

Tapajyoti Giri

Dept. of Information Technology
RCC Institute of Information Technology
Kolkata, India

Abstract— The present work looks into the essential aspects of consortium learning management and the role and architecture of a suitable learning management system (LMS). The aim of the proposed architecture for the LMS of a university consortium is to provide in it the capability of learning content according to the grade/marks and learning style of the specific learner. Different universities, colleges in geographically dispersed locations, forming the consortium, contribute their learning resources to the consortium. Therefore a LMS is required that serve the purpose of LMS for a university consortium as well as can be used for a standalone institution. The LMS in the university consortium tracks the usage of contents from individual institution/university. There is a need for the consortium to rate contents according to the basis of learners' acceptance. It is possible that the payment would be fixed on the basis of this rating.

Index Terms— LMS, LCMS, University Consortium, E-Learning, SCORM.

I. INTRODUCTION

Distance education or distance learning is a field of education that, through pedagogy, technology, and instructional system, poses a design challenge. The challenge lies in the fact that students are not physically present in a traditional classroom. There are many universities which provide distance courses through some learning management system. Developing quality materials for education is time consuming. For a provider to be ready quickly with such demanding materials is a matter of impossibility in most of the occasions. Many renowned universities in the world, despite of the geographical distances, want to build collaborations among them to complement each other's efforts and brands. University consortium will increase the scope and quality of education and provide a wider choice to the learners and better management by the individual universities. The participating universities in a Consortium can share their learning objects and their teaching experiences to improve the quality of learning provided by the consortium. There are many LMSs in the market that can serve the purpose of providing distance education to the learners but a learning management system that can act in a university consortium is still to emerge. Therefore an LMS is required that serve the purpose of Learning Management System for a University Consortium as well as for a standalone institution.

II. LITERATURE REVIEW

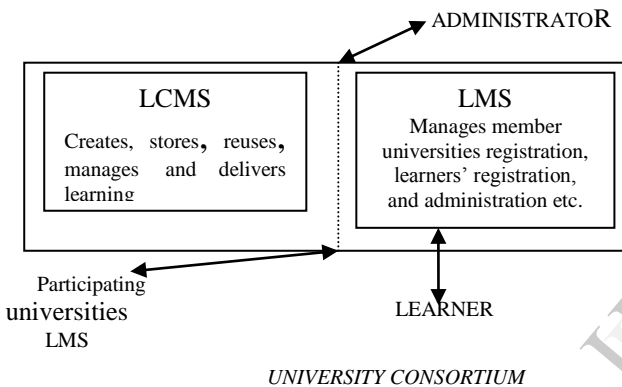
Mechanized help to teaching and learning has been tried by many educationists since long back. With the improvements of computers and invention of internet, LMS has gone through lot of changes and improvements. With the growth of internet and demand for the customized and anytime-anywhere learning, there is a need to develop a formalized academic cooperation between academic institutions or between academic and e-learning content providers. In this situation University Consortium would offer courses by providing common portal. In 2007, Zaman Wasefer et al designed an information system for university consortium [4]. The proposed system has two parts: 'functional model' and 'service architecture. Functional model had been designed according to the e-learning standards and service architecture had been designed using web services. Unfortunately for a university consortium it was difficult to interact with number of heterogeneous legacy systems of respective number of universities. To solve this problem, In 2008 Rahul Ujjainwal et al proposed a "Web Service Oriented Architecture for University Consortium"[5]. This system would interact with the students of the consortium as well as the LMSs of the different member universities. According to the authors, the proposed prototype was a viable solution in terms of technical complexity and cost. In a university consortium there should be some check points for assessment of e-learning system because more than one member institution contributed to this e-learning environment. There was a need to assure participant members that learners were using their e-learning system which was highly rated. Wasefer Zaman et al proposed "A framework to incorporate quality aspects for e-content in a consortium environment" [6]. According to them the Consortium environment should be provided with an automatic process of stamping modification requirements and effective modification of the same. In any learning object if any modification was required, automated suggestions were sent via mail from the proposed framework for the relevant changes to the respective provider. After making relevant changes, the providers republish their contents to University Consortium UDDI registry and experts get mail from the proposed framework for checking the modified content. In this way they wanted to improve the quality of learning objects. In 2013 Wasefer Zaman et al proposed a Learning Management System for

a university consortium information system to track students' activity and LCMS for managing the process of assembling and delivery of learning content and credit calculation and credit transfer [7]. They proposed a functional model of University Consortium Information system which consists of an LMS for tracking students' activity, delivery of learning content, credit calculation and credit transfer.

III. BASIC ARCHITECTURE

The aim of the proposed architecture of learning management system for a university consortium is to provide learning contents to the learners according to their grade/marks and learning style. The LMS of the university consortium also is equipped to give credit to participant members of the consortium on the basis of the feedback of the learners and the experts. The proposed framework of LMS is divided in two main modules. This division makes the system more focused and clear.

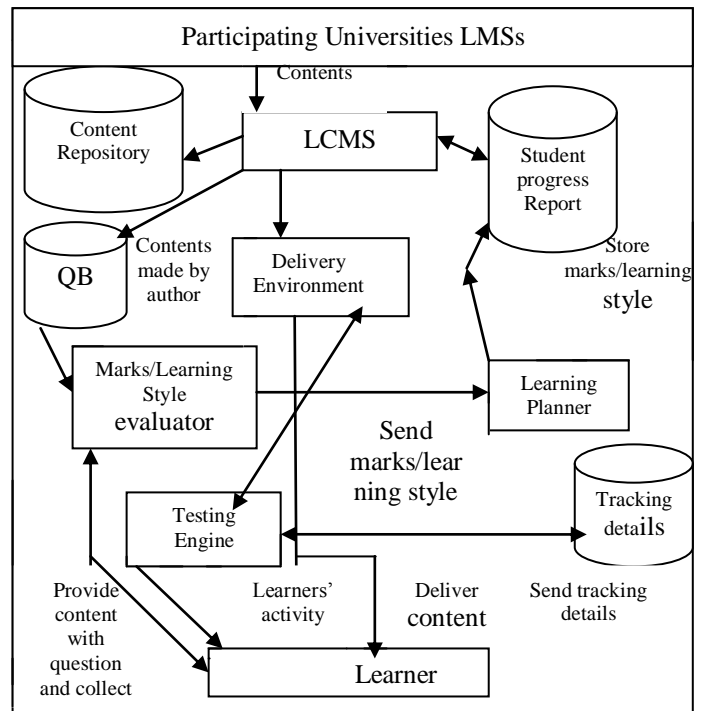
- Learning content management system(LCMS)
- Learning management system(LMS)



- Learning content management system: Universities can create, store, reuse, manage and deliver learning content through this LCMS.
- Learning management system: LMS portion will manage member universities registration, learners' registration, and administration etc. of the university consortium. Here LCMS consists of following modules

Content authoring tool

- Content assembly tool
- Author
- Expert
- Expert review management system
- Content repository
- Question bank
- Review details
- Student progress report
- Marks/learning style evaluator
- Learning planner
- Tracking engine
- Assessment testing engine
- Tracking details
- Delivery environment



LCMS of University Consortium

- Content authoring tool: It is planned that University Consortium would have its own authors and an authoring system to help them. These authors would create some exclusive contents for the learners through this content authoring Tool.
- Content assembly tool: A majority of contents would come from different participating universities. These contents would be assembled by content assembly tool.
- Content repository: The contents created by the consortium authors and the contents coming from different participating universities after careful selection, these are channeled through the LCMS. LCMS keeps contents in Content Repository and it can fetch contents when request comes.
- Author: Educational contents which are made by the consortium authors , consists of two sets of questions(one set for checking learners assessment and another for identifying learning style of the learner) have to be incorporated by the authors. Through these learning style questions, learning style of the learner are assessed.
- Question Bank: The contents which are incorporated with two sets of questions are fetched by LCMS from content repository and sent to another database named, Question Bank.
- Marks/Learning Style Evaluator: This module fetches the contents from question bank and provides same to the learners. Learners give their answers to this module. Marks/Learning style evaluator module calculates the time of response from the contents , how fast they give reply of the question contents : attached with each content and the marks/grade ,which the learners are obtained after giving the answers of the questions.. Author

mainly sets a standard response time for the learners to give reply of the questions after reading the full content. This module checks the responses by the learners for learning style questions. Based on it, this module sets the learning style for the learner (at that instance).

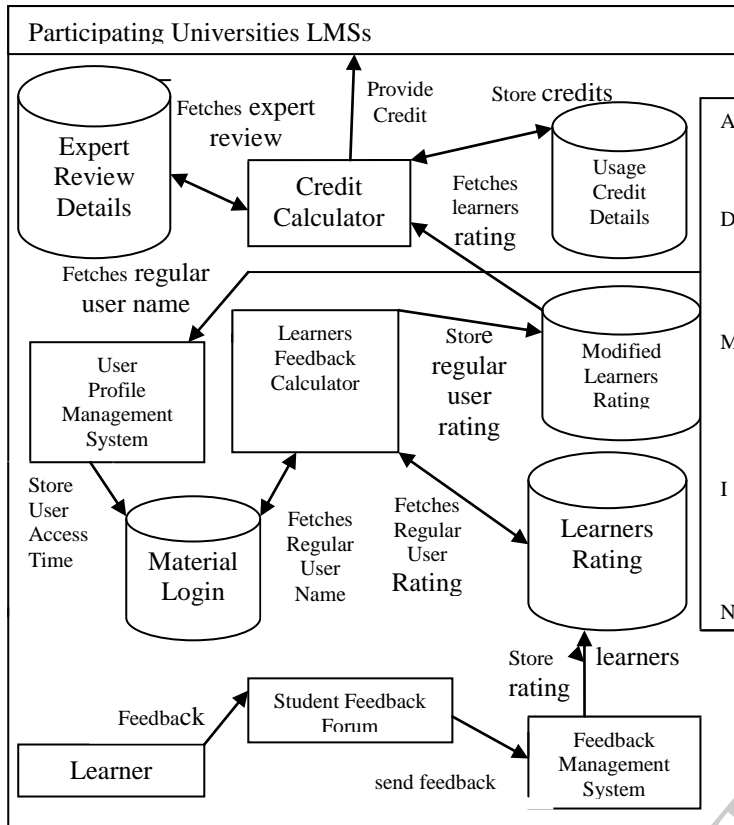
- *Learning Planner*: Marks/Learning style evaluator module sends its evaluation to learning planner. This module decides next content for a specific learner according to his/her learning style and grade/marks. Learner Planner module stores learning style of the learner(at that instance), marks/grade, time of response of the questions by the learners and type of contents being provided to the learners with the time date of delivering contents stamped in a database named , Student progress report. LCMS checks the student progress report database every time before it fetches content from the content repository by enquiring which type of contents are required to be delivered to learners. Always undelivered but scheduled contents will be known to LCMS.
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- *Tracking engine*: Tracking engine module keeps track of the learners' activity to know present situation of individual learner. This eventually helps noting the path travelled by a learner so far. This module stores the path followed by the learners in a database named, Tracking Details. If there is any modification required for a specific learner that he/she does not traverse the ideal path for completing a course, then this module fetches the actual path for completion from Course management system.
- *Assessment/Testing engine*: This module will create an environment where learners can sit for examinations. Question papers for a particular subject/course will be set by course administrating university. Course administrating universities send their questions to the consortium LCMS. Assessment/Testing engine module then fetches these questions from the LCMS and provides the same to the learners at the time of examinations. This module collects these answer scripts from the learners and send these answers to the course administrating

universities through LCMS for checking. Participating universities send the report card/marks/grade of the learners according to their performance in the exam to the LCMS. LCMS then sends this information to assessment/testing engine. Learners get their marks from this module. Assessment/testing engine sends the marks/grade of the learners and the time; learners have taken for giving answers in the exam to tracking engine module. Tracking engine stores this information in a database named, tracking details.

- *Delivery environment*: Delivery environment provides content to the learners according to the information obtained from tracking engine.

Here LMS consists of following modules

- *University consortium management system.*
- *University Registration module*
- *Course Management services*
- *Course catalog*
- *User profile management system*
- *User repository*
- *Learner registration*
- *Learner*
- *Learner feedback forum*
- *Feedback management system*
- *Learners rating*
- *Material login information*
- *Learners feedback calculator*
- *Modified learners rating*
- *Expert review management system*
- *Credit calculator*
- *Usage credit details*
- *University registration module*: Registration of the new participating universities will be done by university registration module.
- *University consortium management system*: This module sets different terms and condition for the purpose of new participant universities registration. New universities can fill up the registration form and send all the details to consortium administration and has to wait for the acknowledgement from the administration. Moreover this module will be responsible for business aspects of the consortium, like financial calculation for participating members, feedback and credit transfer between consortium LMS and participating members.



LMS of University Consortium

- **Course management system:** Participating universities can add courses to university consortium through this module.
- **Course Catalog:** The courses are offered by university consortium will finally displayed by course catalog module. Course catalog provides information about learners need, course requirement for each degree and all these information stores in a database.
- **User profile management system:** This module will be mainly dealing with the storage and sharing of information about learners .IMS Learner Information Package (IMS LIP) specification standardizes learner profile information. IMS LIP specification defines XML packages for the exchange of learner information between systems. IMS enterprise specification XML packages for the exchange of class scheduling and learner registration information between systems. Consortium checks the access time i.e. how long a learner reads the study material/contents through user profile management system. This module sets a standard total access time for a learner to read the learning contents. If the learners' access time is more or equal to standard total access time, then he/she would be considered as a regular user/Learner. User profile management system stores regular learners name with their study material access time in another database named, material login details.

- **User Profile Repository:** This module includes personal data, learning plans, learning history clarifications and degrees, current learning states
- **Learner Feedback Forum:** Learners can give their views/feedbacks about the learning content through learner feedback module. This module stores the learners review on the contents in a database named, Learners Rating.
- **Feedback management system:** Learners after giving their last exam, give their review on the contents, they received by the consortium. Learners rating are calculated by feedback management system through the following procedure which is presented in a tabular form.

Total no. of learners	Percentage of like	credit
X	80 % of X	5
X	79 % to 60% of X	4
X	59% to 40% of X	3
X	39% to 20% of X	2
X	19% to 1% of X	1

The credits are stored by feedback management system in Learners rating.

- **Expert Review Management system:** Expert review management system would be available to the group of experts by the university consortium. Experts give their views or rating on the contents through expert review management system module. This module collects contents from content repository to check the contents/as well as register the view point of all experts about the contents. Experts set some important features/check points for checking contents. This module gives the contents credit 1 to 5 depending on the following features are present or not in the contents.
 1. Content is free of errors.
 2. Content is presented without bias or omissions that could be misleading learners.
 3. Claims are supported by evidence or logical arguments.
 4. Presentation emphasizes key points and significant ideas with an appropriate level of details.
 5. The learning object is sufficient in and of itself to enable learners to achieve the learning goals.
 6. The information design enables the user to learn efficiently.
 7. The user interface design implicitly informs learners how to interact with the object, or there are clear user instructions. The behavior of the user interface is consistent and predictable.

The review /rating about the contents by the experts go to the LCMS through Expert review

management system. LCMS stores the rating /review in a database, named Expert review details.

- *Learners Feedback Calculator*: This module fetches username (regular learners depending upon study material access time) from material login details database and stores into a database named Modified Learners rating.
- *Credit Calculator*: Credit calculator fetches information from a database named Expert review details, where review of experts are stored and also fetches regular learners review/rating from modified learning rating database. Making the average of both rating and it is considered as a credit. This credit is delivered to participating members LMSs by credit calculator module. This module stores this credit in a database named, usage credit details.

IV. CONCLUSION

The present work encompasses a wide range of functionalities for the learners and also for the teachers and administrators. The architecture developed takes care of helping learners by providing study materials according to the learners' performance and fitting to the learning style. Learners can also post their feedback about the study materials. At the same time the system performs most of the task on behalf of the teacher such as tracking the learners' improvements day after day and decides which study materials are required for a specific learner. This system also checks the study materials coming from different universities and colleges. Depending on the

review of the experts and the feedback of the learners the system provides credit, based on which the participating member universities are compensated. This system will help learners to receive learning anytime enjoying the privacy of their home environment. This system also helps the consortium to simplify consortium management.

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