

FYDP Management System with a Novel Pedagogical Strategy for Study of Science at Bachelor's & Master's Level

Subhradeep Pal, Bharat Gaikwad, Aman Sharma

Abstract: Learning management systems have become a revolution in the field of education. Privatisation of education has paved the way for such technology. Nowadays even government institutions have started incorporating virtual learning environment in their systems. Learning management system is a broad domain. It has a diverse range of features which address variety of problems that were earlier faced by academic circles. One of the features that attend the needs of final year students in bachelor and master's level is a Final Year Degree Project (FYDP) handler system. But not much has been done to improve the system. The existing FYDP management system covers very few fields like computer science engineering, IT, and few other engineering departments. Science departments hardly benefit out of it. In this draft I have proposed a new pedagogical strategy that will take care of FYDPs of microbiology, biotechnology and some other science departments. The strategy is conceptualised following Learning Collaboratory Framework (LUCIDIFY). Based on the pedagogy I have built a FYDP management system application. I have developed a Model Driven Architecture (MDA) for the purpose of building the application.

Keywords: LUCIDIFY, FYDP, Pedagogy, Process specification, MDA, Application Development

I. INTRODUCTION

Virtual learning environment is a boon to the education world. It has narrowed down the distance between student and educators. A decade back, lack of communication between the two entities of education world was a serious cause of concern for the researchers. This led to the development of few of the most interactive learning management system like MOODLE, Webct, Claroline, ATutor etc. Though they have made lot of things easy and reliable still some areas are lacking and have fallen behind. One example is handling of final year projects of science departments at the bachelor and master's level. Generally the final year projects of science departments entail lab based task. The most popular among the virtual learning environment MOODLE lacks in managing the lab based task.

Generally MOODLE deals with the computer science and IT engineering fields better than other, but when it comes to science department it fails to deliver. This draft will clearly address the issues related to final year degree projects and their management.

II. LITERATURE SURVEY

From the study of project management module of MOODLE a learning management system it is apparent that computer science and IT departments have been emphasised more over other fields. There is hardly any effort to manage the projects in the final year of science departments like microbiology, biotechnology etc using MOODLE pms module. The final year project module of MOODLE [1] is plain interactive module with a general pedagogical strategy and MOODLE's very own application framework. There are other different modules in different learning management system, but not a single one can deal with all the intricacies of a final year degree project of microbiology and some other similar department. As MOODLE application framework presents some difficulties in formulating a flexible pedagogy, a learning collaboratory framework (LUCIDIFY) [2] can best serve the purpose. The learning collaboratory framework presents some other flexibility apart from formulation of pedagogical strategy. Based on the framework a better model driven architecture (MDA) [6] could be designed for the development of the project management system which is a web based application. Beside a comparative study of different LMS [1][2] along with MOODLE shows that all have more or less usability and implementation issues. Issues regarding to usability are because of faulty strategies whereas implementation issues are acceptable for ensuring better security. So to speak an efficient, user friendly strategy for improving the overall usability is indeed a need.

III. PROPOSED WORK

The proposed work can be divided into two parts as follows:

- A novel pedagogical strategy following LUCIDIFY framework and a new process specification structure.
- A new Model Driven Architecture (MDA) based on the pedagogical strategy.

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1. Pedagogical Strategy

Pedagogical strategy depends largely on the LUCIDIFY framework [1][2]. Before defining the pedagogy we shall know what is LUCIDIFY framework.

1.1. LUCIDIFY

This is a general framework for designing learning collaboratory. It has four levels of guidelines which are domain specification, characterisation of expertise, pedagogical strategies & collaboration support. We have followed this framework for our problem based virtual learning environment [2].

1.1.1. Domain Knowledge

To present a lucid idea about the proposal we must understand the field clearly. For that purpose we have chosen Microbiology as the science department which will help readers understand the proposed work in a better way. So a survey on microbiology department showed the earnest need for laboratory and proper planning, execution of experiments. Generally microbiology is laboratory centric department. Success of final year project depends on the work done in laboratory. Unlike engineering departments there are some intricacies in handling a final year project. Those are as follows:-

- A single project can have multitude of experiments
- A thorough project plan must be in place before commencement of the project
- Each experiment must be conducted in a proper sequential order as all experiments are interdependent
- Duration of experiments may range between hours to days
- Experiment details shall be reported back to the guide after execution as approval has to be acquired for proceeding to the next experiment

1.1.2. Characterization of Expertise

Students can be classified based on the academic performances. More emphasis can be given on students with lower performances. In this draft we did not put much importance on characterization of expertise.

1.1.3. Pedagogy

Pedagogy is one of the essential elements of LMS. Proper pedagogy can make interaction between tutors and students easy and friendly. In this draft we have proposed a novel pedagogical strategy for managing degree projects in

microbiology, biotechnology and other similar departments at the bachelor and master's level. Pedagogical strategies can have its place between tutor – students, experts-students and students-students. Here we have come up with a fresh pedagogy for tutor and students. The pedagogical strategy is explained in the following flowchart:-

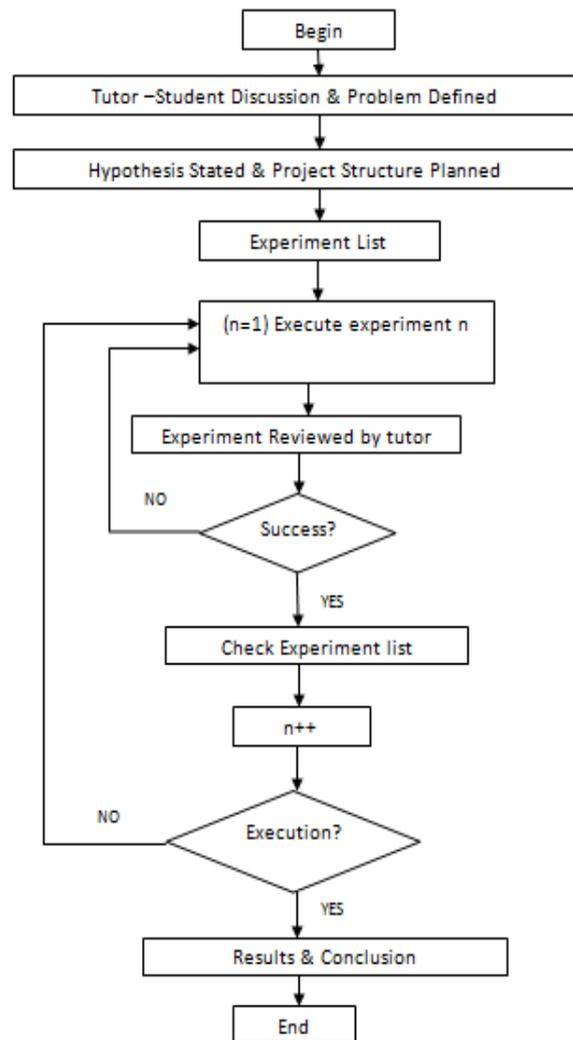
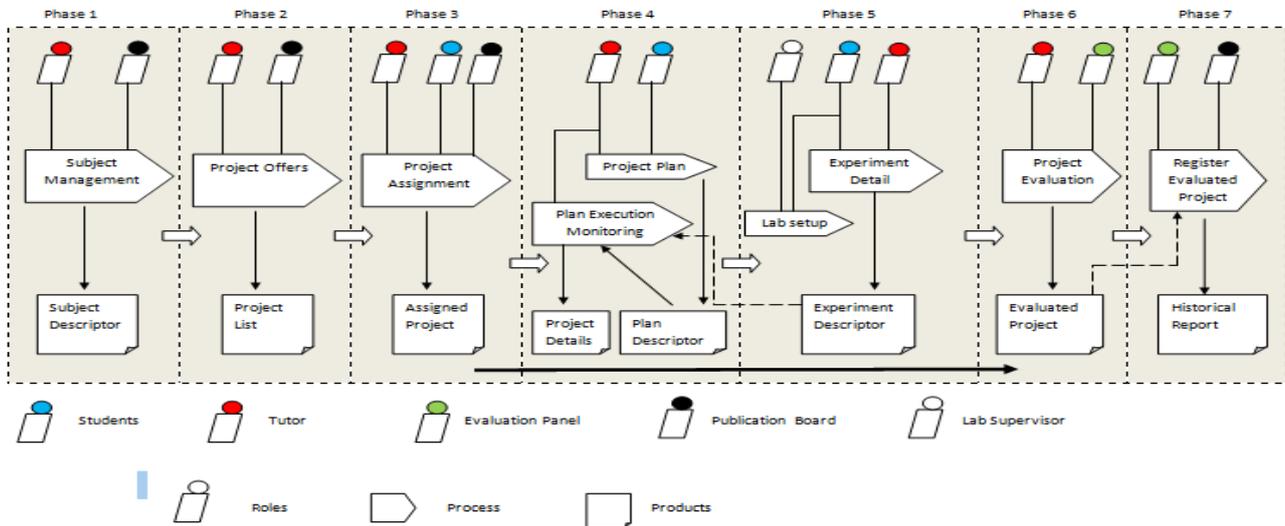


Fig: Pedagogical Strategy

1.1.4. Collaboration Support

Collaboration can be done synchronously (chat room) as well as asynchronously (forums).

1.2. Process Specification



1.2.1. Phases

Phase-1 [Roles-Tutor, Publication Board]

- List of tutors
- Panel Declaration
- Review Calendar
- Documents to be furnished at the time of review

Phase-2 [Roles-Tutor, Publication Board]

- Each tutor will propose a set of projects (title, brief description)
- Each set will contain, number of projects=No. Of Students/No. Of faculties
- Total number of projects proposed must be equal or greater than the number of students
- The details of all the projects and tutors are sent to publication board for publishing.

Phase-3 [Roles- Tutor, Student, Publication Board]

- Students will be classified according to their expertness and achievements in the academia
- Students with different level of expertise will be assisted in different ways
- Students can propose their own topic after thorough discussion with the tutor. Tutor will assign the topic after verifying the complexity level of the project and academic achievements of the student
- Finally tutor accepts a project in interviews with the student. The assignment of students to a final degree project is sent to publication board

Phase-4 [Roles-Tutor, Student]

- Tutor and student plan a structure of the project after the student is done with the literature survey
- Sequential execution of project plan must be ensured by the tutor
- In case the project plan becomes difficult to follow , the same can be modified to match the demands of the project

Phase-5 [Roles- Tutor, Student, Lab Supervisor]

- Student requests for free slots in the lab in advance.
- Lab supervisor possess the authority to assign slots
- Lab tutor gives an overview of the experiment to be conducted
- Experiments should be conducted according to the project plan

- At the end of each experiment the student must write down the description of the experiment
- The description will be submitted to the tutor.

Phase-6 [Roles-Tutor, Evaluation Panel]

- On review dates the amount of work done is evaluated by the tutors in the evaluation panel
- The work of the student is evaluated in terms of the evaluation parameters
- The results should be verified against the standards available
- Experiment procedure should be evaluated with respect to standard experiment protocol
- The evaluated project is passed on to the publication board

Phase-7 [Role- Publication Board]

- The project will be approved or disapproved with the consent of the evaluation panel

Once approved, will be published in the web portal

2. Model Driven Architecture (MDA)

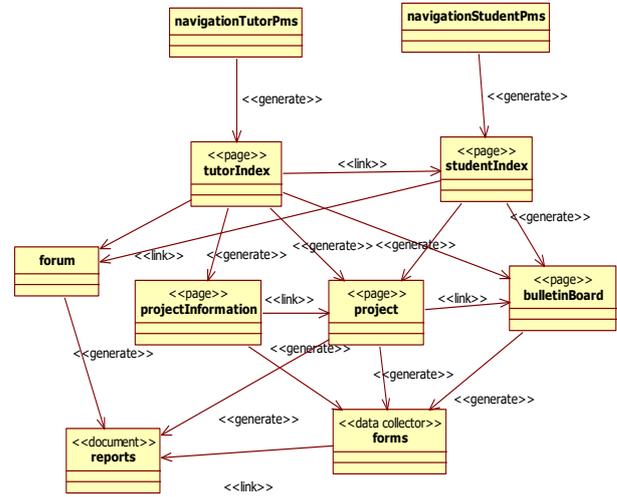
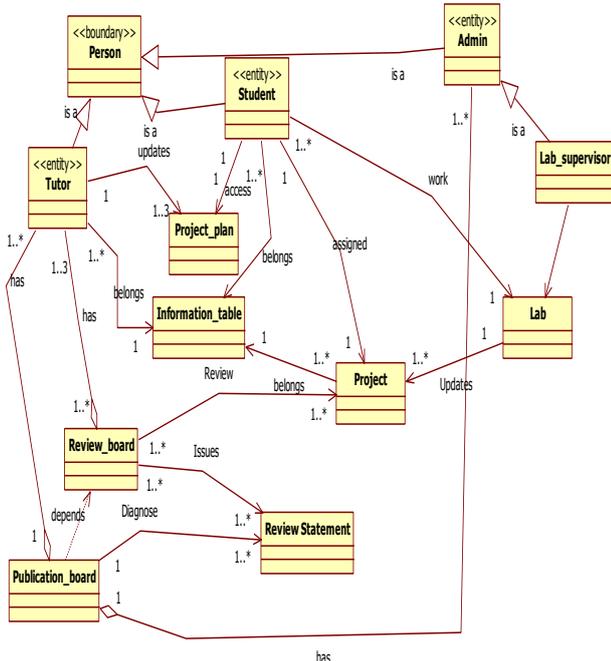
Model driven architecture is an architecture design methodology driven by models shaped using UML. MDA introduced by OMG is an effective approach for designing web based applications. In this paper we have designed Platform Independent Model (PIM) which is a model driven architecture design approach for final year degree project management system for bachelor's and master's science department. Each and every web based application is composed of four primary stratum which are Business layer, Hypertext layer, Presentation layer and Implementation layer. For each of the primary stratum we have designed PIMs. By PIM we mean application details independent of web platforms which are application server, database server and different programming languages.

2.1. Platform Independent Model (PIM)

The models that comprise PIM are **business model, hypertext model & Implementation model**. All the models have distinct roles to play in the development of the web based final year project management system. Business model aim at the strategies behind the application whereas hypertext model points out the navigation path.

On the other hand implementation model presents a picture of the relationship that exists between the pages. As there are many attributes in the classes it's difficult to showcase in the diagram. To fit in the page we have excluded attributes from the classes in the class diagram.

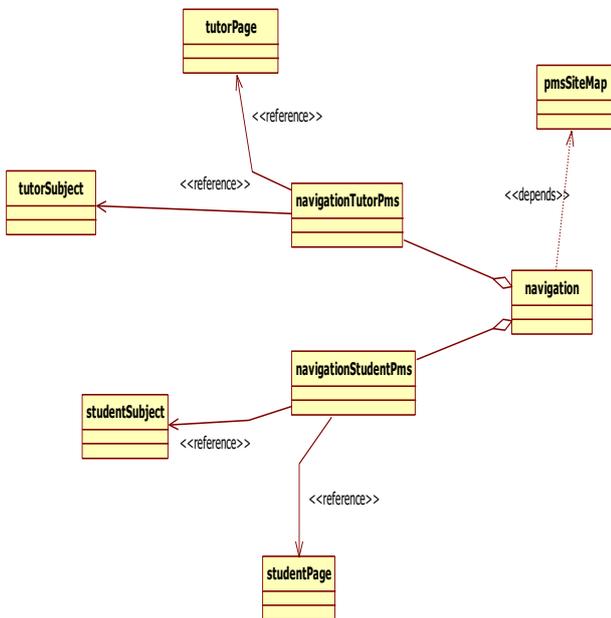
2.1.1. Business Model



IV. APPLICATION DEVELOPMENT

The implementation is done with utmost care so that there is no slippage in satisfying the user's needs. Our implementation is done using WAMP a PHP based software bundle and an IDE named Komodo edit. The WAMP stands for Windows, Apache, MYSQL and PHP. PHP is a server side scripting language used to write the business logic. MYSQL is the backend. Html, CSS and Java Scripts are used for the frontend. The system is generally a database based web application.

2.1.2. Hypertext Model



2.1.3. Implementation Model

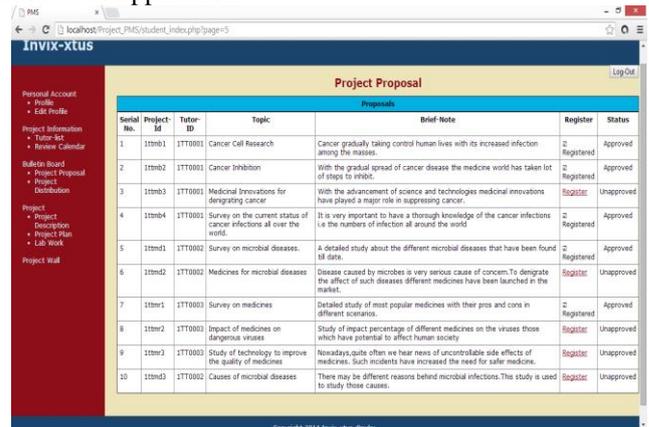


Fig: Project Proposal

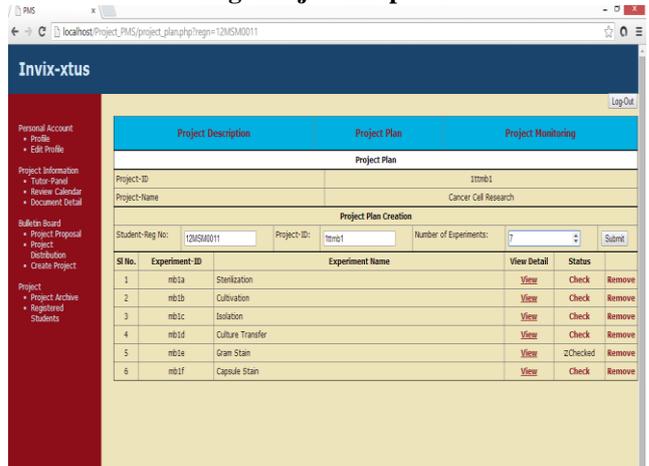


Fig: Project Plan



Fig: Experiment Plan
Fig: Experiment Details

V. CONCLUSION

The paper gives a comprehensive idea on what strategies a learning management system commonly thrives. Besides this the manuscript presents a new pedagogy and architecture. In this draft we considered only few science departments. The proposed work will best serve the purpose for those departments only. Though the management system can be used for handling projects of few other science departments but won't provide efficiency as pedagogy differs with subject. So lots of work still untouched for future research. In this system we could manage to put only few necessary features. But there are numerous application features that can be added to the system to make it universal i.e. a final year degree project management system for all engineering and science departments.

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