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# Brihaspati: An opensource, freeware e-Learning Platform

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## Abstract

In this paper, Brihaspati, an elearning platform developed as opensource freeware has been presented. This platform started to enable the faculty and students at Indian Institute of Technology Kanpur to use the web based infrastructure to share the lecture notes. Many features have been added since the project started. Currently, it is being used at many places in India. In the first phase of development, many design flaws were found and it resulted in development of Brihaspati-2, the second version. Also, due to need of the day, Brihaspati\_synch has also been developed. There is lot of work still to be done to make the system more efficient and user friendly.

## Keywords

e-Learning, Brihaspati, opensource

## 1. Introduction

The evolution of internet and world wide web (WWW) has affected all part of life dramatically. One of the important functions in a society i.e., education is also affected. Previously, student used to spend their time in library searching for information in books and journals. Now a days, they use search engine and figure out the web sites containing information needed. The information sharing has become a very easy task due to internet.

Before delving any further into the impact of internet on education, let us try to understand the terms teaching, education and learning. In order to understand these, one need to find how a person acquires the knowledge. An immediate observation is that teaching, education and learning all have a common purpose, i.e., to impart knowledge to their subjects to enable her to do certain tasks. Elaborating further, the

learning is done by subject. Teaching is the effort done by teacher (instructor). The system where teaching and learning both happens in a harmonious fashion is education. Consequently, education is a paradigm. Let us also see how learning happens. The learning process involves cognitive abilities of subjects, which leads to learning via the experience from all the senses.

Teaching in essence produces an environment which leads to learning experience for the student. The ability of teacher lies in the fact that he can produce an environment which leads to a certain desired experience for the student. In the conventional scenario, the teacher takes the feedback from students by evaluating the examination given to the student or by the question asked by the students. On the basis of this feedback, the environment is modified to enable the student to learn.

The mechanism by which teaching and learning take place constitutes education. In conventional scenario, the education system consists of teacher, black board, chalk, books, students, classroom and laboratory and interaction between them. The teacher uses this environment to create problems for student and then guides them through to experiences leading to desired learning.

Here one important point is that all the components except teacher and students of an education system are dependent on technology and has evolved over the development of civilization. With the evolution of internet and proliferation of computing devices all over with the progression of time, the tools are going to change. But their basic essence is going to remain same. One can classify the tools of an education system as follows

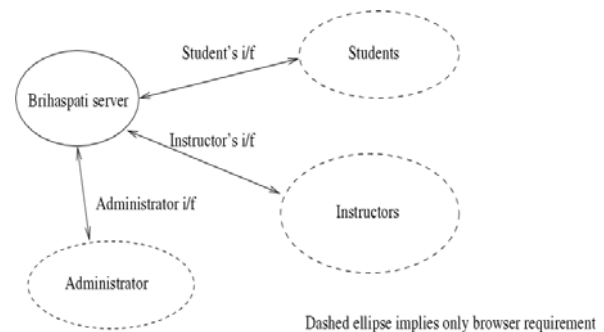
- study material - can be in form of book, can be delivered online, web pages etc..
- Interactivity tools - Black board, white board with writing tool (chalk etc.)
- Space - classroom and associated facility - Infrastructure for operation of educational system.

In this paper, elearning platform in opensource freeware domain being

developed at IIT Kanpur has been presented. It is expected to provide IT based system for teacher and learner interaction.

## 2. Infrastructure for E-education

The basic setup for the E-education in IIT Kanpur needed the creation of facilities which can be used by student with ordinary x-terminals or Windows machines. Since, web browsers can be assumed omnipresent, the system should be such that at student end web browser should suffice. The basic system schematic is shown in Fig.1.



**Figure** Schematic of the basic infrastructure for Elearning in an organisation

In order to implement such a system in IIT Kanpur, we decided to go for opensource platform due to obvious flexibility provided with opensource nature of system. We had the capability to tweak with the opensource platform available and hence surveyed to pick up one. We chose Manhattan [1], but it showed performance problem as the cgi script were loaded each time a request used to come to server. As the cgi scripts were written in C, it has portability problems. Consequently, we decided to work for our own platform.

In order to build a reliable and effective system, we decided to make it opensource freeware. The project was codenamed Brihaspati [2]. We kept on releasing the code as it was being developed. We also used the latest build in IIT Kanpur, to get the initial feel of whatever we were developing. Now, there are many institute and organization who have adopted it. Consequently, the platform got tested while

we were developing. Important feedback kept us focused on important things during development and we save lot of our time, which might have got wasted on features which are not much used. We also got many student projects done for implementation of many features in it. Trained manpower was a useful byproduct of this effort.

### A. Brihaspati

In the most basic system, Brihaspati [2] is used. The Brihaspati allows the creation of separate webspace for each of the courses. For each course, there are two types of users, a) Instructor, and c) students. Instructor is given permission to maintain student database and make changes to it. Both the types of users need to use only web browser with javascript and java support. In this mechanism instructor creates the course notes in MS-word, Powerpoint, LaTeX, html, pdf, ps or any other electronic format. All the material is uploaded to the course area by the instructor.

The students after logging into the course area can browse through the published course material. The student should use appropriate plugin or viewing specific files. Since viewer for commonly used file formats are freely available, it is safe to assume that all the student will have it on their machines. The students are provided appropriate access permissions in various course areas.

In order to interact with classmates and instructor individually or in groups, email and newsgroup facilities provided in communication tools can be used. For real time interaction, chatting tool and whiteboard is also there. These can be used to hold live discussions. This will be very useful when components of the class i.e., instructor and students are scattered in space.

In essence this basic system provides offline mode material delivery and can be used in addition to conventional class room structure. Limited online interaction is possible via chat and whiteboard.

### B. Brihaspati-2

Existing version of Brihaspati is in use in IIT Kanpur for last three years. We have seen continuous growth of users. The faculty and students have provided valuable feedback which consisted of new feature requests, problems, and bugs. As a result of this feedback we had come up with many innovative solutions. After this experience, we started work on second version called Brihaspati-2. Here content author and course instructor are separated. They were earlier assumed to be same person. This will allow the use of same material in different course, making sharing of same material across many course possible.

As a result, the concept of content repository is implemented. The authors put up their contents in this and set permission for various users. The instructors can publish this content in their courses depending on the permission set of for them.

Next logical step is to build the SCORM content packager and SCORM runtime engine to play such content. For better interaction between students, a collaborative authoring system is being provided as wiki tailored for Brihaspati.

We also got an interesting request which resulted in concept of remote course. Many organizations installed the platform but the next problem they faced the lack of content. We are currently building a feature of remote course based on caching mechanism suited for disconnected operations. An organization 'A' can get in agreement with organization 'B' and both of them can configure the remote course mechanism for a certain course. The server at 'A' can periodically synchronise the content from server at 'B'. The connection between them is desirable but not mandatory all the time. Whenever the connection is possible, the server synchronizes the content.

### C. Online lecture delivery

Alongwith the web based elearning platform, there is requirement for software system

which can be used to conduct liver classroom over communication network. As any such information system will use multiple information types, a data communication network is better suited. Due to scalability and efficiency requirements, the system should use multicast support of the network.

We have been working on such a software system codenamed Brihaspati\_sync. It is synchronous component which can be used alongwith with Brihaspati-2. Both web base and synchronous tool uses same database in backend.

### **3. Acknowledgement**

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### **Bibliography**

[1] <http://manhattan.sourceforge.net>

[2] <http://brihaspati.sourceforge.net>