

Predicting Impact of E-Learning on Students' Performance

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ABSTRACT:

The study aims to predict the performance of the students by giving e-learning as a support in addition to the traditional teaching method. Thirty one students studying in an engineering college are selected based on their attendance. The students are taught by using three different methods: (1) Traditional method (2) Traditional method with additional study material (3) Traditional method with the support of e-learning. The marks obtained by the students in the three different tests conducted after each method is tabulated. By using ANNOVA it is predicted that the performance of the students is enhanced in the third method.

KEY WORDS:

Prediction , e-learning , students grades , ANNOVA.

INTRODUCTION:

In many engineering institutions blackboard and chalk are still remain as the primary teaching technology even though the merits of the e-learning to improve efficiency and quality of teaching are widely accepted by the engineering colleges and researchers. Many engineering colleges experience increased competitive pressure in maintaining student's numbers.

Teaching quality, technology becomes an area that educational institutions should explore in order to improve educational environments and qualities. The use of e-learning in educational systems has grown exponentially in the last few years, spurred by the fact that neither students nor teachers are bound to a specific location. Furthermore, collaborative and communication tools are also becoming widely used in e-learning.

As a result, virtual learning environments are installed more and more by universities, colleges, businesses, and even individual instructors in order to add e-learning to their courses and to supplement traditional face-to-face teaching. Such e-learning systems are also sometimes called as learning management systems (LMSs) or course management systems (CMSs).

These e-learning systems offer a many varieties of channels to facilitate information sharing and communication between students in a course, to let teachers distribute information to students, produce content material, prepare assignments and tests, engage in discussions, and enable collaborative learning with forums, chats, file storage areas, etc. Some examples of such systems are Black-board], WebCT, TopClass, Moodle, Ilias, Claroline], etc.

Nowadays, one of the most commonly used is Moodle (Modular Object Oriented Developmental Learning Environment), which is a free learning management system that enables the creation of powerful, flexible and engaging online courses and experiences. These e-learning systems accumulate a vast amount of information, which is very valuable for analyzing students behavior and could create a info-mine of educational data. e-learning systems accumulate a great deal of log data about students activities.

They can record whatever student activities are involved, such as reading, writing, taking tests, performing various tasks, and even communicating with peers. They also provide a database that stores all the system's information: personal information about the users (profile), academic results, user's interaction data, etc. However, it is very difficult to manage manually and to extract useful information from these systems due to the vast quantities of data they store.

Universities and Colleges struggle to define the impact e-learning have on learning, the delivery of educational systems, and on student performance. Many open on-line courses, online classes, mobile devices, and many web technologies have emerged in the field of e-learning. Higher education administrators, policy makers, teachers, students and their parents continue to push for Access to education, the ability to deliver high-quality outcomes, and optimizing student success by increased learning rates while continue to value classroom teaching. Simultaneously, universities strive to raise completion rates while offering improved course enrollment, schedule flexibility, and hire and retain top-tier faculty. All of these forces converge to make intelligent investments in e-learning with a justifiable return on investment. The ability to innovate and lead among this education environment requires finding approaches that improve assessments, feedback and student success. It is possible through e-learning which addresses the challenges of an increasingly dynamic student population.

In the last few years, researchers have begun to investigate various data analytics to help teachers improve e-learning systems. Data analytics have also been applied to explore visualize and analyze e-learning data in order to identify useful patterns, and to evaluate web activity to get more objective feedback for teachers' instruction and to find out more about how the students learn. These methods allow us to discover new, interesting and useful knowledge based on students usage data. Furthermore, universities started applying data mining and predictive analytics to data to identify various measures of performance.

METHODOLOGY:

The objective of the study is to predict if the performance of the students can be enhanced by giving e-learning as a support in addition to the traditional teaching method. The study is conducted on students studying in Chilkur Balaji Institute of Technology. 31 students studying in CSE I year are selected for the study. The students are taught by using three different methods (i) Unit-I is taught using traditional method (ii) Unit-II is taught using traditional method with additional study material (iii) Unit-III is taught using traditional method with the support of e-learning. The topic that is chosen is "Engineering mathematics-1". A brief explanation of the three methods is given below

(i) Traditional method:

In traditional method the topics were taught to the students in the usual traditional manner and the test was conducted and the marks are recorded.

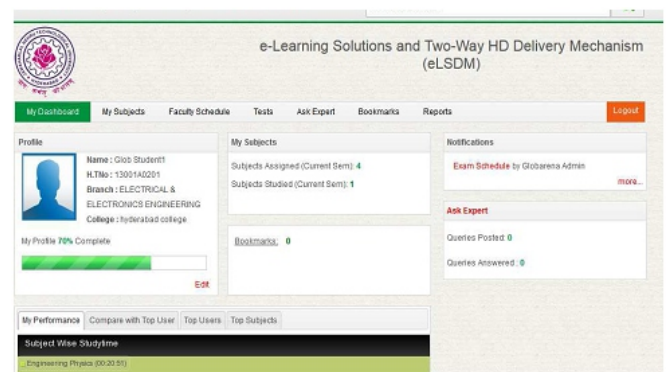
(ii) Traditional method with additional study material:

In this method in addition to the traditional teaching method additional study material was provided to the students. Afterwards the test was conducted and the marks are recorded.

(iii) Traditional method with the support of e-learning :

In this method e-learning was given as a support in addition to the traditional teaching method. The Globarena e-Learning Solution which is adopted by JNTU, Hyderabad is suggested to students. The e-Learning package has provided the students the facility to log into the network.

When students log in the e-Learning package the following screen will be displayed:



In my dash board tab, a student can edit his profile and view subjects assigned, book-marks (favorites), notifications, queries posted performance, peer performance analytics etc. Click on the subject to view the learning resources available for the subject.

In my subjects you can view the list of subjects assigned as shown below. For the subjects selected you can view the available learning resources like lecture notes (faculty module), student module (learning module), image gallery, animation gallery and quiz.

My Dashboard My Subjects Faculty Schedule Tests Reports Ask Expert Bookmarks Logout	
My Subjects	
1 year I Semesters 1 year I Semesters 1 year I Semesters 1 year I Semesters 1 year I Semesters 1 year I Semesters 1 year I Semesters 1 year I Semesters	
List of Subjects	Time Spent
Engineering Chemistry	00:12:43
Engineering Subject1	00:00:32
Engineering Subject2	00:01:00
Engineering Subject3	00:01:46
Engineering Subject4	00:00:32
Engineering Subject5	00:00:51
Engineering Subject6	00:01:08
Engineering Subject7	00:01:22
Engineering Subject8	00:00:51

In faculty schedule tab student can view what is scheduled by the faculty. On clicking the tick mark student can view the subject, topic, and time -slot details including learning resources.

My Dashboard

My Subjects

Faculty Schedule

Tests

Reports

Ask Expert

Bookmarks

Logout

View Faculty Schedule

<<

October 2013

>>

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01	02	03	04	05
06	07	08	09	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26

Reports – Study Report, Test Score, Login Report, etc. In Reports tab, Student can view his Study time, Login and Test Score reports, including attempts history (no. of test attempts). Ask Expert – Ask a Query, View Answered/Unanswered Queries In “Ask Experts”, you can post a new query, view pending queries and the queries answered.

Similarly logins are created for faculty also. When they login the following content table will be displayed.

e-Learning Solutions and Two-Way HD Delivery Mechanism (eLSDM)

[Dashboard](#)

[Subjects](#)

[Schedule](#)

[Upload](#)

[Tests](#)

[Expert Zone](#)

[Reports](#)

[Logout](#)

Profile

Name: Glob Faculty1
HTNo: 001_EEE
College: Hyderabad college

My Profile 71.43% Complete

[Edit](#)

Today's Schedule

Notification

[Exam Schedule](#) by Globarens Admin

[more...](#)

Top Students [Select Subject](#)


S.No	User	Subject	Time Spent
1	10001A0201	Power System Operation And Control	00:05:05
2	11001A0201	Control Systems	00:00:07

Expert Zone

Pending Queries : 0

Queries Answered : 0

In subjects tab faculty can select the subject from the drop down list, and view “Master Content”, i.e. what is available by default in the subject OR select “Custom Content” to view the content he /she uploaded to the server.

Welcome Glob Faculty2 (Faculty), Your Last Login Time: 12-10-2013 19:52:21	
<div>  <p>JNTU Hyderabad</p> </div> <p>e-Learning Solutions and Two-Way HD Delivery Mechanism (eLSDM)</p>	
Dashboard Subjects Schedule Syllabus Upload Tests Expert Zone Reports Logout	
Select Subject	Design Of Machine Members
<input checked="" type="radio"/> Master content <input type="radio"/> Custom content	
Submit	
S.No	UNIT(S)
1	Unit-1
2	Unit-2
3	Unit-3
4	Unit-4
5	Unit-5
6	Unit-6
7	Unit-7

In “Schedule”, a Faculty can schedule to deliver a particular session at a particular time. Schedule can be set/ viewed Month/Week/Day wise. If you have already set the schedule it displays a “Tick” mark. You can view the already set schedule by clicking on the “Tick” mark. To set schedule, click on any date. It displays the details as shown, where you have to select Course, Subject, Topic, Resource Type, Date, Slot(Time), Master Content OR the content you have uploaded . Once you schedule, it displays the list of scheduled sessions as shown. You can view, add, edit, and delete the scheduled

Upload Own Content – Single File Upload / Bulk Upload:

In Upload, upload your content. Select Subject Name, Topic Name, Resource Type, Description, and Name and Browse the file to upload. To upload multiple files at once for a subject, you can use this option. Select the files you would like to upload, zip them as a single file. Select Subject Name, Topic Name, Resource Type, Description, and Name and Browse the “zip” file you would like to upload.

Test Module – Create Question Bank, Create Test :

In Tests, Faculty can Create Question Bank, Create a test, Select questions and assign them to the test. Preview your test before publishing. You can also upload multiple questions at once using “Add Bulk Questions” option.

My Dashboard My Subjects Faculty Schedule Tests Reports Ask Expert Bookmarks Logout	
Tests	
Select Subject	Engineering Chemistry
Select Test	Test_1
Total number of questions	17
Test Name	Test_1
Start	

Result : 0 Out of 17

Question No.	Correct	Incorrect	Not Attempted	Reviews
1	—	—	NOT ATTEMPTED	Review
2	—	—	NOT ATTEMPTED	Review
3	—	—	NOT ATTEMPTED	Review
4	—	—	NOT ATTEMPTED	Review
5	—	—	NOT ATTEMPTED	Review
6	—	—	NOT ATTEMPTED	Review
7	—	—	NOT ATTEMPTED	Review
8	—	—	NOT ATTEMPTED	Review
9	—	—	NOT ATTEMPTED	Review
10	—	—	NOT ATTEMPTED	Review
11	—	—	NOT ATTEMPTED	Review
12	—	—	NOT ATTEMPTED	Review
13	—	—	NOT ATTEMPTED	Review

View Student Queries and Respond

To Add Questions, select subject, type the question, set options, provide correct answer and explanation. You can preview the question before publishing. Follow the same procedure to add more questions. In Expert Zone, you can view the questions/queries posted on the subject(s), and send your answer/response. You can also view the queries that are answered.

My Dashboard My Subjects Faculty Schedule Tests **Reports** Ask Expert Bookmarks Logout

Reports

Test Score Study Time Login

Copy Print Save Show 10 entries

S No	Subject	Topic	Timespent
1	Chemistry	T2-Breaker Troubles	00:00:39
2	Engineering Chemistry	Water Introduction	00:12:43
3	Engineering Subject1	Water Introduction	00:00:32
4	Engineering Subject2	Water Introduction	00:01:00
5	Engineering Subject3	Water Introduction	00:01:46
6	Engineering Subject4	Water Introduction	00:00:32
7	Engineering Subject5	Water Introduction	00:00:51
8	Engineering Subject6	Water Introduction	00:01:08
9	Engineering Subject7	Water Introduction	00:01:22
10	Engineering Subject8	Water Introduction	00:00:51

S No Subject Topic Timespent

Showing 1 to 10 of 22 entries

First Previous 1 2 3 Next Last

My Dashboard My Subjects Faculty Schedule Tests **Reports** Ask Expert Bookmarks Logout

Reports

Test Score Study Time Login

Mathematics-I

Test Name	No. Of Attempts	Max. Score	Attempts History
Test1	12	3 Out of 7	View
Test2	10	3 Out of 7	View
Test3	5	3 Out of 7	View
Sampletest1	5	5 Out of 14	View

Physics

Engineering Subject4

Engineering Subject5

My Dashboard My Subjects Faculty Schedule Tests **Reports** Ask Expert Bookmarks Logout

Reports

Test Score Study Time Login

Copy Print Save Show 10 entries

S No	Date	Timespent
1	2013-10-06	00:01:56
2	2013-10-06	00:03:06
3	2013-10-06	00:00:47
4	2013-10-06	00:00:58
5	2013-10-06	00:03:20
6	2013-10-06	00:00:41
7	2013-10-06	00:03:23
8	2013-10-06	00:27:30
9	2013-10-04	00:00:25
10	2013-10-04	00:00:30

S No Date Timespent

Showing 1 to 10 of 202 entries (Filtered from 11,398 total entries)

First Previous 1 2 3 Next Last

Ask Expert – Ask a Query, View Answered/Un-answered Queries

My Dashboard My Subjects Faculty Schedule Tests Reports **Ask Expert** Bookmarks Logout

Post New Queries Pending Queries Answered

Select Subject : Engineering Chemistry

Query :

Submit

Anova:

SingleFactor
SUMMARY

Groups	Count	Sum	Average	Variance
A	31	491	15.83870968	14.13978495
B	31	520	16.77419355	7.980645161
C	31	584	18.83870968	6.87311828

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	146.0860215	2	73.04301075	7.557854918	0.000924421	3.097698035
Within Groups	869.8064516	90	9.664516129			
Total	1015.892473	92				

ANALYSIS:

The marks obtained by the students using three different methods are taken as three samples. The analysis is done by using ANNOVA single factor. In excel sheet under data if you click data analysis you will be prompted with analysis tools box .choose the option ANOVA single factor. Type the input and output range and click the option "OK". The excel output is as given below

Let us analyse the result. The marks of for students selected at random are given below:

A	B	C
14	15	18
21	20	22
18	19	20
19	20	21

The principle involved in ANNOVA is sum of the squared principle XIJ is the data point, X_1, X_2, X_3 are the means of the three samples respectively and X is the grand mean then $TSS = SSE + SST$ (total sum of squares =sum of squares due to error + sum of squares due to treatment) That is $(X_{IJ} - X)^2 = (X_I - X)^2 + (X_{IJ} - X_I)^2$

If you divide the sum of squares by degrees of freedom we will get mean sum of squares. F ratio is the ratio between MST and MSE We set up the null hypothesis that the means of all the samples are equal and the null hypothesis as the means are not equal.

From the above ANNOVA table the calculated value is less than the tabulated value therefore we reject the null hypothesis and conclude that the means of the three samples are not equal When the null hypothesis is rejected we precede further to find which pair of treatment means differ significantly. For this we find the critical difference (CD) or the least significant difference(LSD) between any two means to be significant.

Standard error between any two treatment means X_I and X_J is given by $SE(X_I - X_J) =$ and From the above table

$LSD = 1.5634$

Here $n = n_1 + n_2 + n_3 = 31 + 31 + 31 = 93$ and $k = 3$ (samples) and $\alpha = 5\%$ Also mean sum of the squares due to error = $MSSE = 9.664516129$

Treatment (methods)	Sample mean	difference	Comparison with LSD
A method 1	15.83870968	$X_1 - X_2 = 0.9354$	<1.5634 NOT SIG
B method 2	16.77419355	$X_1 - X_3 = 3$	>1.5634 SIG
c method 3	18.83870968	$X_2 - X_3 = 2.0645$	>1.5634 SIG

Since $X_1 - X_3$ and $X_2 - X_3$ are significant that is there is significant difference between method 1 and methods 3 and also between method 2 and method 3 also if we observe the mean method 3 is having the highest mean .Therefore we conclude that the marks obtained by the students using method 3 is greatest.

CONCLUSION:

It is predicted that of the three methods employed for teaching in the present study. The performance of the students is enhanced in the third method.It is predicted that if e- learning is given as a support in addition to the traditional teaching method the performance of the students can be enhanced.

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