

Correlation Between Class Room and Online Learning In Engineering Education – A Comparative Study

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Abstract : Self directed learning gives control and responsibility to a learner for learning, though there are three important conditions. These conditions are that the learner must at least be prepared to accept the degree of autonomy given to them. They must have the skills and attitudes required for developing and managing this autonomy. This paper throws light on Traditional and Internet learning and affirms that understudy execution as measured by assessment is self-governing. 21st century guideline structure is advancing the internet usage to accomplish consideration of extra time-and place-bound students. Engineering students incline towards this to get the degree from top rank Universities or to learn particular course or surpass desires in a specific branch of knowledge. How many online understudies are compelling when stood out from their classroom accomplices is essential for demonstrating workforce and others blamed for evaluation. Eagerness in an online circumstance may be more trying in examination system classes than in other open association classes. In addition, backing may be less frightening, and the quality and measure of affiliation may be extended in online classes.

The remote correspondence permits learner to get the taking in materials and addresses from any place the length of they are associated with the web. In this paper we likewise talk about the benefits and negative marks of both the strategies with the assistance of factual information examination by considering a group of Students from an engineering college. We also discuss the merits and demerits of both the methods with the help of statistical data analysis.

Keywords: learning effectiveness, online teaching, online interaction, self learning

1. Introduction

The test for immense quantities of not most instructors, particularly in creating nations is changing their routine of training in ways that oblige the use of development. Blending how they have standard chipped away at teaching with the usage of advancement is to make e learning courses of action. In e-learning, innovation is basically a device. Instructors may use in various courses within the new environment that can affect understudy learning and results. As a result, these far reaching premiums and weights push educators to report learning adequacy and also to keep up their endeavors at ceaseless change of learning results.

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The advancement of these two patterns converging in the contemporary training setting gives up an idea about the viability of e learning courses, especially when contrasted with conventional classroom learning and in connection to individual understudy needs, observations, and learning results. This exploration investigates the important issues of on the internet, when considered with classroom learning and looks at the significant measurements of learning viability of the two cases. This study concentrates on the multi section experience of one educator in an exploration of courses in an open university/organization program. In the accompanying pages, the article surveys the concepts which tend to effect the learning environment and examines past studies on online learning viability. The creator then depicts the examination setting and system. At last, after taking the examination, the results and discussions are elaborated. Extracting inferences regarding basic issues and displaying scholarly headings for future exploration is suggested. Learning can be broadly categorized into two different parts considering the way how they are being pursued. They are Traditional and Distance learning. Traditional learning is based on physical interaction between learner and teacher, whereas distance learning eliminates the necessity of physical presence of a teacher through some alternatives. These two techniques are recursively modified after invention of new techniques.

Since the past decade, the new developments in Information Communication Technology (ICT) changed the way people acquire knowledge. Boom in the use of ICT for education and training across the world developed the term "E-learning" and it was viewed as the technology, which has the potential to revolutionize the way we teach and how we learn in college/universities (Department for Education and Skills, 2003).

It is essential for teachers to see how technology digital learning and instruction can work together to enable students to become active, independent critical thinkers in 21st century learning environment. Distance Learning is defined as learning process where learners and experts are not physically present at the same time in a same place. E-learning is a best adopted economical method and which consumes less time as compared to the traditional learning. In this paper we are considering E-learning as an example of distance learning. The word E-learning has come from a combination of "E" and learning where "E" is the abbreviation for the word electronic. E-learning

can be defined as "pedagogy empowered by digital technology" (Nichols, 2008) with ICT supported learning where the medium of instruction is through computer-based technologies and it is user friendly. According to Waits & Lewis (2003), E-learning can be defined as the process of extending learning or delivering instructional materials to remote sites via the Internet, intranet/extranet, audio, video, satellite broadcast, interactive TV, and CD-ROM.

The success of E-learning in western countries is closely tied to the availability of ICT service to the learner. According to the survey conducted by European Union to 20000 school heads from European countries, at least 90% of the schools have access to internet (Korte and Hüsing, 2007) while all schools have internet access in US.

Environmental impact: E-learning allows us to learn from home in paperless environment. This new environment leads us to reduction in carbon emission and paper production; thus, E-learning can be considered as environmentally friendly approach.

Economical impact: In E-learning processes, the highest caliber lecturers get the opportunity to share their knowledge to learners across the world. Barriers of knowledge acquiring in traditional learning such as physical, political, and economic boundaries become irrelevant in E-learning. The valuable knowledge can be transferred to anyone interested with cheaper cost and this will lead to the higher education more affordable.

Social impact: The E-learning materials are available all the time and the students have total freedom to choose when they want to learn. The learning rate of students can also be adjusted to their convenience in E-learning. Therefore, the flexibility of E-learning has positive impact on our social life.

Although the benefits of E-learning are impressive, a big investment is needed for ICT equipments and networking infrastructure development. This can be considered as a major drawback for a small size learning center which is with limited profit to run the center. That is why it is difficult to introduce E-learning straight away into the educational institutes (no matter in what form) in the developing world where educational system is nurtured through the traditional way of teaching for centuries and producing most talented educationalists or teachers coming from this part of the world to serve

the whole world.

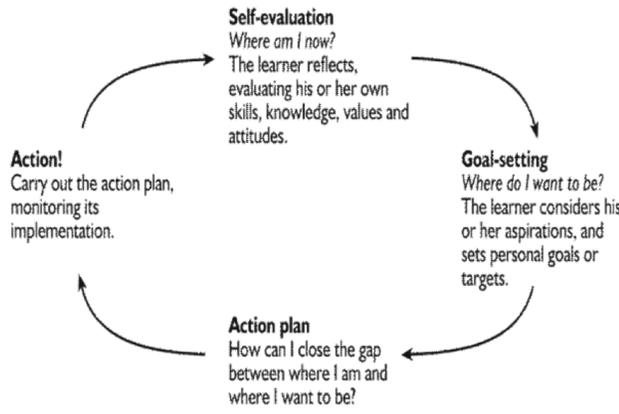


Fig 1

2. Activities to encourage students to learn from the Internet and other ILT resources:

- Set a task to prepare for a quiz on a given topic with the help of useful sites
- Ask learners to browse some sites, then complete an interactive worksheet and e-mail to the teacher.
- Encourage students to give power point presentation
- Ask some thought provoking questions in the class room.
- Encourage students for group discussions by gathering material from internet.
- Encourage them to develop web pages or apps if possible
- Ask them to do survey on a specified topic.
- Put a target to finish a project.
- Advice them to compare reviews on a topic authored by different authors.
- Ignite students to learn in collaboration with their friends.

Table 1 Comparison of Interaction Between Online and Face-to-Face Interaction

	Online	Classroom
Mode	Discussions through text only.	Verbal discussions
Sense of instructor control	Less sense of instructor control. Easier for participants to ignore instructor.	More sense of leadership from instructor; Not so easy to ignore instructor
Interaction	Group contact continuously maintained. Depth of analysis often increased. Discussion often stops for periods of time, then is picked up and restarted. Level of reflection is high.	Little group contact between meetings. Analysis varies, dependent on time available. Discussions occur within a set of time frame. Often little time for reflection during meetings. Conversations are less likely being shaped during meeting.
Group Dynamics	Less sense of anxiety. Limited group discussions. Dynamism is traceable but not visible. Active learners but not active participants. Less scope of learning from peer groups.	Anxiety will be more due to the peer groups. Active learning and active participation . More group discussions. Learning will be from peer groups.
Rejoining	More psychological stress to rejoin	Stress of rejoining is less
Time management	Depends on student attitude and interest	Due to the monitoring of teachers time management learning will be high

Table 2

S.No	Category	E learning	Face to face interaction
1.	Reading other than text book	Online	Teachers interaction with peer group
2.	Lectures	Narrative Power point. Based on the student interest performance will be decided.	Based on the instructor
3.	Discussions	Discussion board	Classroom interaction
4.	Group Projects	Online Group setting	Face-to-face groups
5.	Recorded Lectures	Available in web site Any time available online or copied document. Extra monitoring is not possible.	Direct Lectures. Any time is not available. More attention will be paid by the students
6.	Quizzes	Online	Classroom
7.	Feedback to student work	Online	Online

3. Case Study

A. Case 1: A sample of 20 students is considered and for three different subjects exclusive classroom training and exclusive online training was conducted. Performance test was conducted and results in grade points are given. Failing rate is also calculated in both the cases. The following table describes the results of the examination conducted in terms of grade points and grades.

Table 3

S. N o.	Grade	Value	MI(O nline) (20)	Eng (On lin e)	CP(Onl ine)	MI (Classro om)	Eng(Cla ssroom)	CP(Clas sroom)
1.	O(outstanding)	10	2	0	4	4	4	2
2.	A ⁺ (Excellent)	9	1	5	2	3	7	10
3.	A (Very Good)	8	3	1	4	4	3	4
4.	B ⁺ (Good)	7	2	2	1	3	2	2
5.	B (Above Average)	6	8	3	6	1	1	2
6.	C (Average)	5	1	5	2	1	0	0
7.	P (Poor)	4	1	1	1	2	0	0
8.	F (Fail)	0	1	1	0	1	3	1
9.	AB(Absent)	0	1	2	0	1	0	0
10.	Failing Rate		5%	10%	0	5%	0%	0%

B. Case 2: A special case is considered by considering a sample of 10 students. Performance of a sample of 10 students from a CSE section is considered before giving online training and after giving online training in two different subjects (Engineering Mathemaitcs I and Computer Programming I). An examination was conducted in both the cases .Sample paired t- test is performed to identify whether any significant difference is there due to the online training.

4. Sample Paired t-Test:

A. Engineering Mathematics I

1).Null Hypothesis: (H0) There is no significant difference among the performance in the examination before giving the online training and after the online training. $d = 0$

2).Alternate Hypothesis: (H1) There is a significant difference among the performance in the examination before giving the online training and after the online training. $d \neq 0$

3).Level of Significance: 5% level of significance

4).Test Statistic:

Table 4

S.no.	Roll No of the Student	Before online training 2016-17 (MI marks for 20	After online training 2016-17 (MI)	Differen ce (d _i)	d _i - d̄	(d _i - d̄) ²
1.	16911A0 501	15	14	-1	-0.8	0.64
2.	16911A0 502	12	14	2	1.8	3.24
3.	16911A0 503	20	18	-2	-1.8	3.24
4.	16911A0 504	18	20	2	1.8	3.24
5.	16911A0 505	14	15	1	1.2	1.44
6.	16911A0 506	18	19	1	1.2	1.44
7.	16911A0 507	10	9	-1	-0.8	0.64
8.	16911A0 508	8	10	2	1.8	3.24
9.	16911A0 509	9	6	-3	-2.8	7.84
10	16911A0 510	4	1	-3	-2.8	7.84

$$\sigma_x^2 = \frac{\sum(d_i - \bar{d})^2}{n-1} = \frac{32.8}{9} = 4.1$$

$$\bar{X}_{\text{diff}} = -2/10 = -0.2$$

$$\sigma_x = 2.024$$

$$t_{\text{cal}} = \frac{\bar{d} - 0}{\sigma_x / \sqrt{n}} = \frac{-0.2}{2.024 / \sqrt{10}} = -0.312478$$

$$t_{\text{tab}} = 1.86 \text{ for } 9 \text{ (n-1) degrees of freedom}$$

5) Conclusion: As $t_{\text{cal}} < t_{\text{tab}}$ the null hypothesis is accepted. Hence we conclude that there is no significant difference between the training methodologies for the subject Engineering Mathematics I.

B. Computer Programming I

1).Null Hypothesis: (H0) There is no significant difference among the performance in the examination before giving the online training and after the online training. $d = 0$

2).Alternate Hypothesis: (H1) There is a significant difference among the performance in the examination before giving the online training and after the online training. $d \neq 0$

3).Level of Significance: 5% level of significance

4).Test Statistic:

Table 5

S.no	Roll No of the Student	Before online training 2016-17 (CP I marks for 20	After online training 2016-17 (CP I)	Difference (d)	di - d □	$(d_i - \bar{d})^2$
1.	16911A0 501	12	14	2	-1.2	1.44
2.	16911A0 502	12	18	6	2.8	7.84
3.	16911A0 503	15	18	3	-0.2	0.04
4.	16911A0 504	16	20	4	0.8	0.64
5.	16911A0 505	14	15	1	-2.2	4.84
6.	16911A0 506	18	19	1	-2.2	4.84
7.	16911A0 507	10	9	-1	-4.2	17.64
8.	16911A0 508	8	10	2	-1.2	1.44
9.	16911A0 509	10	16	6	2.8	7.84
10	16911A0 510	4	12	8	4.8	23.04
		$\bar{X}_{\text{before}} = 119$	$\bar{X}_{\text{after}} = 151$	32		$\sum (d_i - \bar{d})^2 = 69.6$

$$\sigma_x^2 = \frac{\sum(d_i - \bar{d})^2}{n-1} = \frac{69.6}{9} = 7.73$$

$$\bar{d}_{\text{diff}} = 32/10 = 3.2$$

$$\sigma_x = 2.78$$

$$t_{\text{cal}} = \frac{\bar{d} - 0}{\sigma_x / \sqrt{n}} = \frac{3.2}{2.78 / \sqrt{10}} = 3.64003$$

$$t_{\text{tab}} = 1.86 \text{ for } 9 \text{ (n-1) degrees of freedom}$$

5).Conclusion: As $t_{\text{cal}} > t_{\text{tab}}$

Therefore the null hypothesis is rejected. Hence we conclude that there is a significant difference between the teaching methodologies for the subject Computer Programming I.

5. Conclusions

Based on the above case study the following conclusions are made.

The grades/ grade points does not depend on mode of teaching methodologies.

Flip mode of education can be encouraged for some courses where the shortage of trained faculty is there.

Based on the course teaching methodology must be explored.

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