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ENHANCING THE QUALITY OF BLENDED LEARNING THROUGH SIX SIGMA METHODOLOGIES

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Abstract

In the current scenario quality control became mandatory for all the sectors. This study is intended to examine the impact of internet facilities on students' performance through a Blended Learning as a medium in an academic institution. It was examined, how the Blended Learning encompasses a variety of tools to create flexible, rich learning environments that stimulate learners and maximizes the potential for learning? Another objective is Application of Six Sigma methodology in this study is to improve the medium of learning i.e. internet connectivity through a set of procedures in an effective way. Six Sigma can be again viewed as a discipline or an approach driven by data and methodology for eliminating defects in any process- from manufacturing to transactional and from product to service.

Keeping the aforesaid two objectives in mind, data was collected from a sample of 119 students residing in various hostel blocks using stratified random sampling technique. Questionnaire was developed after an extensive literature review to measure the impact of internet connectivity in Blended Learning of the students. The questionnaire to measure was based on the model developed by Shawn M. Glynn (2011). The scale was developed by referring to previous models developed by various authors to measure the impact of internet connectivity in the Blended Learning of the students. The statistical analysis used was reliability statistics, KMO, Bartlett's test and Factor Analysis. The data was analyzed by SPSS version 20). We observed that application of Six Sigma methodology is useful to improve the medium of learning.

Keywords: E – Learning; Internet Facility; Student's Performance; Six Sigma

Introduction

India ranks fifteenth position in the world for service outputs and employs around 23% of workforce of the country. Since with the launch of *Mangalyaan*, it is proved that India is innovating and education has a vital role on these achievements. Large number of educational institutions are arising in various parts of the country. So, it is necessary to evaluate their performance on the field of education.

Six Sigma is a methodology which was used widely in manufacturing sector but now it is used in Service Sector to increase customer satisfaction and to reduce the defects. Since it is a time consuming and it incurs high cost in implementing it, it aims for high return on investments (ROE). It mainly focuses on the customer preferences. It will prevent variation in the process. It is a data-driven approach. It can be said that, in an educational sector students are the products and the customers are companies that will recruit these students. Since, Internet is a facilitator of E - Learning and the student's performance has a positive relation with Internet. Application of Six Sigma methodology in this study is to improve the medium of

learning i.e. Internet Connectivity through a set of procedures in an effective way.

Objective of the Study

1. To study the six sigma implementation in educational sector.
2. To find the factors that affect the e-learning in educational sector.
3. To suggest the benefits of six sigma in e leaning.

Significance of the Study

The study highlights the importance of Internet Resource for ensuring effective Blended learning in an Educational Organizations, since the blended learning comprises mainly of learning through internet (i.e) E-Learning. Since the Internet Resource is the essential one for such type of learning, the connectivity should be an effective thing and so the six sigma methodology is applied to reduce the defects and flaws in the internet connectivity (mainly internet speed) and make blended learning a successful one, so that student's performance can be increased in an organization.

Review of the Literature

Prasad *et al.*, (2012) in their study titled “Application of Six Sigma Methodology in an Engineering Educational Institution” test were conducted among six core engineering branches to enhance the academic standards and credibility of the institution. The study estimated some five quality characteristics like Motivated Faculty, Modern Communicational Facilities, Industrial-Institution Interaction and Opportunity for knowledge up gradation and Library modernization which are responsible for 80% of failure students. In order to ensure the quality of the characteristics estimated, six sigma methodology can be applied in engineering institutions.

Utilizing Six Sigma for improving pass percentage of students: A technical institute case study, Kaushik (2010) made a research for nine years by collecting passing rate data of various engineering colleges affiliated to Kurukshetra University. It was concluded that the average passing rate of students at SKIET was very low with 51.27% and the institute was operating at a Z-bench sigma level of 2.17 and DPMO level was high with 15134.07. After applying Six Sigma, sigma level of the SKIET was up to 4.17 with DPMO level of 15.05 (an improvement of 11166.98) and the mean of passing rate to 61.348 (an improvement of 9.641 mean).

Akkoyunlu and Soylu (2008) in their research paper entitled “A Study of Student’s Perceptions in a Blended Learning Environment Based on Different Learning Styles” was made to examine the students’ learning styles and their views on blended learning. The following results shown that students’ views on blended learning process, such as web use, evaluation, face to face environment etc., vary according to their learning styles.

Boyle *et al.* (2003) in their research paper entitled “Using blended learning to improve student success rates in learning to program” the study was made to improve student success rates in learning to program. The team introduced a number of changes in module organization, tutorial support and online resources. The blend represents a mixture of traditional and novel elements, and the novel elements were more marked in the online developments. The final results showed remarkable improvements in pass rates.

Dowling *et al.*, (2003) in their research paper entitled “Do hybrid flexible delivery teaching methods improve accounting students’ learning outcomes? The study was made to examine the association between the learning outcomes of students and teaching modules: traditional face-to-face and hybrid flexible delivery. Results indicated that the hybrid flexible delivery model is more positively associated with students’ final marks and improved learning outcomes.

Schweizer *et al.*, (2003) in their research study titled “Blended learning as a strategy to improve collaborative task performance” examined how groups of learners work

together in blended learning and e-learning environments. Three pure e-learning courses were compared to one blended learning course and participants were asked to form learning teams who met at three points in time. All participants were joint learning material to build shared knowledge and individualized information to build unshared knowledge. Variables which were analyzed include students’ extent of online activity, the groups’ task performance, and coherence of the groups’ discourse. Results indicated that achievement in a particular group does not depend on the communication mode used in the learning course.

Definition and Explanation of the Key Words

Blended Learning

“The factory model of education is the wrong model for the 21st century. Today, our schools must prepare all students for college and careers – and do far more to personalize instruction and employ the smart use of technology” (U.S Secretary of Education Arne Duncan). Blended Learning refers to, a student learns a part in traditional school facility and also depend on online course. “By 2019, 50 percent of all high school courses will be delivered online” (Clayton Christensen). Blended Learning is classified into six distinct models. They are: Face-to-Face Driver, Online Lab, Rotation, Self-Blend, Flex and Online Driver.

Internet Facility

It emphasized the effects of the Internet as an effective teaching tool in university education, and proposed that many university teachers publish their course materials via the internet. It is an Inter collection of various networks connected with different devices to help share information among others.

Student’s Performance

Student’s Performance is defined as the standard to which students perform in examinations, skills/talents improvement, Internal Quality Assessment.

Six Sigma: It is a concept which started in late 1900’s. Six Sigma is defined as the find past, tune present and forecast future. Six sigma is a measure, philosophy, business strategy and methodology. It aims to increase the Return on Investment (ROI) after implementing the project. It can be defined as the way in which defects (customer dissatisfaction) can be eliminated. Six Sigma level is 3.4 DPMO ie, Defects Per Million Opportunities or yield is 99.999966%. Higher the sigma, the fewer the defects. Six Sigma team is classified into Champions, Master Black Belts, Black Belts, Green Belts and Yellow Belts.

The primary goal of six sigma is to minimize defect levels in the outcome of a work process; a defect being anything that causes customer dissatisfaction. Maximizing customer satisfaction leads to improved bottom-line performance and global competitive position (Dr. P.Ramasubramanian, 2012).

It is a data-driven approach and it focuses on customers, since customers are the kings. The methodology used is DMAIC ie, Define, Measure, Analyze, Improve and Control. The output from one phase is the input to other phase.

Define: -This is the phase where project charter is established. A project charter is an agreement between management and six sigma consultants. The problem is defined by the voice of customer and it is converted to the factors which is important to the manufacturer. The problem is defined by RIE Analysis or Kano Model or Matrix. The problem is then defined using SIPOC Diagram where the process steps are briefed.

Measure: - In this phase the team will measure the intensity of the problem. It is done by examining the data collected is normal by plotting Histogram, stable by plotting Control Charts and capable by finding capability index.

Analyze: - In this phase the problem is analyzed by finding the root cause for the problem. It can be done by Ishikawa Diagram. The biggest impact on process performance is searched and it can be done by plotting Pareto Charts.

Improve: - Using the findings from the Analyze phase, the team will find solutions for the main cause. The way through which finding the solutions is by Brain storming sections.

Control: - In this phase the solutions for the problem is implemented and control plan is used.

Reliability test

The reliability co-efficient for the variables chosen for the study should have to be more than 0.50 to consider it as an acceptable value. In this study the reliability analysis Table 1, shows that the alpha value is greater than 0.50 indicating the evidence of reliability of the instrument is 0.606. The factors and dimensions included for analysis carry a good degree of reliability to support the objective formulated. Hence, it is concluded that the data collected in this study is highly reliable.

Table 1: Reliability Test

Cronbach's Alpha	N of Items
0.606	27

KMO and Barlett's Test

The KMO measures the sampling adequacy which should be greater than 0.5. For a satisfactory factor analysis to proceed. Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is an index for comparing the magnitudes with the partial correlation coefficients. Proportion of variance in the variables that might be caused by underlying factors. Large values of KMO measure indicate that a factor analysis variable is a good idea. The sample is worth enough to

measure variables. Hence the above test (Table2) shows the uniqueness and homogeneity.

Table 2: KMO and Bartlett's Test^a

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.579
Bartlett's Test of Sphericity	Approx. Chi-Square	665.736
	df	351
	Sig.	0.000

Factor Analysis:

The factors like Internet connection, service provided, expectations for e-learning are the identified factors for the blended learning in educational sector. These factors have the factor value greater than 0.5. Satisfaction – Internet speed (0.909), Satisfaction - n/w Staff Service(0.809) (Table 3), E-learning with Internet Speed (0.704), Attendance Details- net speed(0.982), Computer Problems - internet speed (0.632), Infrastructure -Internet issues (0.641), University policy- Internet connection (0.789), Internet - writing assignments (0.697), Sites provided by University (0.659), speed- better in University than hostel (0.956), Group mail- receiving materials (0.571), Internet role- skill Improvement (0.966). These are the factors which are identified for the e-learning in educational sectors.

Benefits of Implementing Six Sigma:

- (i) Internet has a positive correlation with the performance of the students.
- (ii) University success is dependent upon the performance of the students.
- (iii) Performance of the students is significantly depend upon the dedication of students towards extra-curricular activities and studies.
- (iv) Student's dedication is guided by the efforts of Registrar, Faculty.
- (v) Registrar, Faculty is governed by the Administration.
- (vi) Administration is controlled by the Management of the University.
- (vii) Management makes a key role for building University Reputation.
- (viii) University Reputation attracts companies for placement at high salary.
- (ix) Placement will attract more no. of students to the University.

Table 3: Rotated Component Matrix

Attributes	Component								
	1	2	3	4	5	6	7	8	9
Satisfaction – Internet Speed	0.909								
Satisfaction - N/W Staff Service	0.809								
E-Learning with Internet Speed	0.704								
Attendance Details- Net Speed					0.982				
Computer PBMS - Internet Speed						0.632			
Infrastructure -Internet Issues			0.641						
Univ. Policy- Internet Connection			0.789						
Internet - Writing Assignments		0.697							
Sites Provided by University		0.659							
Speed- Better in Univ. than Hostel.				0.956					
Group Mail- Receiving Materials.					0.571				
Internet Role- Skill Improvement.				0.966					

Conclusion

Now a days all the service or manufacturing sector are trying to implement Six Sigma in their concern. Internet is a facilitator of E- Learning (Blended Learning) and the student's performance has a positive relation with Internet. Application of Six Sigma methodology in this study is to improve the medium of learning i.e. Internet Connectivity through a set of procedures in an effective way.

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