

# An Empirical Study on Effectiveness of Web Based Training Methods

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## Abstract

*In the globalised corporate world, web based technology is being used as tool for imparting training to employees beyond geographical boundaries of the organization at a minimal cost. This study is aimed at evaluating effectiveness of Web Based Training (WBT) and also explored the effect of selective demographic variables such as age, team size, education and income. Empirical analysis supported that learning outcome from using WBT method, by and large, affected by factors like mental focus of trainees, technical difficulties encountered during learning and to a lesser degree dimensions like self efficacy of trainees, negative thoughts had an impact on learning outcome.*

**Key words:** *Technical difficulties, Self efficacy, Negative thought, Mental focus, Meta focus.*

## Introduction

Advent of globalization of Indian corporate has created enormous thrust to improve the competency levels of people at all levels in line with multinational organizational standards of performance. Human, as an element of key resource in any business, has been emerging in a fast phase as critical differentiator of business outcome. This trend is observed not only in IT / ITES sectors but also in manufacturing industries look for competent workforce for improving business results. Web Based Training (WBT) has come handy for the professional trainers to cover up infinite population with a least cost and use this method as an effective approach. It is necessary to understand impediments in implementation of WBT methods for imparting knowledge and skills. In India, web based learning are offered by many lead institutions, professional associations and corporate spreading its units globally at different locations for enhancing levels of competency. However very little attempt has been made by the scholars to examine effectiveness of web based approach in delivering training. There are many successful studies on web-based training reported in the literature but most of these evaluated students in a special environment such as university campuses or were restricted to computer-savvy professionals in certain specialties or settings. Hence this study is undertaken to investigate and find solutions for enhancing usage of web based approach as an effective training tools since multiple locations employees would be main source true challenges for training professionals.

## Review of Literature

Future of training instructional model hinges on virtual classrooms using web based training instructions. Technology takes a centre stage of delivering of training instructions and trainees / learners through web enabled programmes confront with a variety of workplace and technological interruptions. It is quite often found that web based instructions to learner adopts simulation techniques to impart training. In the whole process of imparting knowledge, technology occupies core control determinant of quality deliverables. Technological interruptions significantly relate with some of the dimensions such interruption (frequency, duration and timing) content (relevance and complexity). In general, interruption frequency affects the mental focus, meta cognitions and learning

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speed of the trainees and at times technical interruptions might lead to more attrition (dropping out or withdrawing from programs) of trainees and at times technical interruption causes dissociation of trainees from the effective learning process. Some of the notable scholars on the subjects are reviewed briefly with a view to gain right perspectives in to web based training related stream research and related literature.

Noe (2011) suggests that many new technologies have features which ensure perfect learning and transfer of learning at work place. Present technologies provide variety of options to the trainers such as Computer based training, CD-ROM, Internet, Intra net, E-learning, Distance Learning, Intelligent tutoring, simulations and virtual reality. Training related to operation of machineries, tools and equipment can be best imparted using Virtual reality and intelligent tutoring. Technologies like CD-ROM, internet, intranet and E-learning are best suited for teaching facts, figures, cognitive strategies and interpersonal skills. Training delivered on public or private computer networks and displayed by web browser or in other word Internet based training. Baldwin-Evans (2004) selected a sample of 200 employees across 16 organizations and 14 countries to examine what percentage of trainees complete web based training programs. The study findings confirm that 77 percent of those surveyed expressed their inability to complete courses in one attempt due to various interruptions such as time constraints, work place interruptions etc., Welsh, Wanberg, Brown and Simmering (2003) found that technical difficulties are considered as one of the main causes for higher attrition rate in web based training and poor levels of learning while comparing with traditional methods of training. North, Strain and Abbolt (2000) viewed that trainees experienced frustrations arising from technical difficulties in the web based training and that led to have negative impact on satisfaction levels with the instructional experience(Wentling, Park and Pieper, 2007). Yeo and Neal (2004) argued that self efficacy of trainees is another important dimension in learning process. It is found from growing body of research that individual differences influence trainees self regulatory processes and learning ability over a period of time. Specier et.al., (2003) identified technological difficulties, self efficacy, negative thoughts, mental focus,metacognition are some of the broader issues influence learning through web based training. Above review provides a scope for selecting appropriate variables for undertaking effectiveness study in web based training and hypotheses are framed on the basis of reviewed literature.

### **Operational Definitions of Variables**

The following variables are selected for the purpose of understanding WBT influence on learning outcome from the web based training.

**Technical difficulties:** It is an interruption that occurs while learning through web based training which brakes continuity of cognitive process on a learning.

**Self Efficacy:** Trainees confidence levels in both their computer skills and their ability to overcome technical difficulties for enhancing learning values.

**Negative thoughts:** Trainees' thought process while undergoing WBT arising from technology, lack of clarity on training content, and the like.

**Mental focus:** Trainees' ability to concentrate and absorb in to learning through WBT.

**Meta Cognition:** Trainees' knowledge levels and control over learning process

**Learning:** Knowledge acquired from WBT is assessed at the end of each learning event by making trainees to respond for specific multiple choice assessment tools based on the contents of training.

## Objectives

This study is intended to explore the following research areas:

- (a) Assess the levels of effectiveness of web based learning
- (b) Examine demographic impact on learning ability through web based learning.

## Hypotheses

**Ho<sub>1</sub>** There is no significant perceptual differences that exist towards study dimensions such as technological difficulties, self efficacy, negative thoughts, mental focus, meta cognition and learning on the basis of selective demographic variables like age group, team size, education and income.

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**Ho<sub>2</sub>**: Study dimensions such as technological difficulties, self efficacy, negative thoughts, mental focus, and Meta cognition are not significantly related by explaining variance in Learning from WBT.

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## Methods

This study was conducted in manufacturing organization having manufacturing units at multiple locations globally. The organization offered one specific web based training programs recently with an objective of imparting knowledge to their staff members in Integrated management system ( ISO – standards meant for QMS,EMS & OSHAS ) and the same was taken for assessment of effectiveness of web based training. A total of 457 questionnaire instruments were administered and 307 responded. Out of this valid 300 questionnaires were used for this study. The response rate was 67 percent. All employees of the organization, who had participated in the said web based training program, received instruments. The decision to include all participants of the program was made in anticipation of a low response rate and the paucity of time to follow up for a better response rate.

## Measurement

Based on literature review, the questionnaire was designed and each study dimensions had specific items for measurements viz., technological difficulties (5 items), self efficacy (7 items), negative thoughts (5 items), mental focus (6 items), and meta cognition (6 items). All these predictor variables of learning were measured with five point scale

(1= strongly disagree, 2= disagree, 3 = neutral, 4 = agree, 5 = strongly Disagree). Learning, as dependent variable, was assessed by administering 20 items as memory recall test after completion of training and scores were taken and graduated as 0-100 percent. The reliability and validity of questionnaire was ensured through cronbatch alpha values and eliciting views from specialist professional trainers. Further Pilot study has provided for making necessary changes in questionnaire.

## Analysis

The descriptive statistics such as mean and standard deviation computed values are given in the table no 1. These mean values are presented in reference to the five point scale used in the questionnaire for a meaningful analysis. The scores of the negative statements (reverse) in the questionnaire are reversed for computing the mean values. Analysis of the data provided in Table No.1 reveals that the over all mean score of technological difficulties occupy first position in relative ranking and other variables are placed in descending orders of self efficacy, learning, mental focus, negative thoughts, and meta cognition on the basis of computed mean values. The mean ranking indicated that the technological difficulties, self efficacy, and learning occupy more towards positive higher end of scale continuum comparatively and rest of the study variable viz. mental focus, negative thoughts, and meta

cognition are placed more or less around middle point of scale of continuum in terms of its computed mean values.

Table No. 2 presents the results of the ANOVA for significant difference in study variables and its influencing ability based on age group of respondents. It is summarized from table that age group as demographic variable showed significant differences in the negative thoughts ( $F = 3.417, p = < 0.001$ ), mental focus ( $F = 7.506, p = < 0.001$ ) and meta cognition ( $F = 7.750, p = < 0.001$ ). However results of ANOVA showed insignificant relationship in respect of technological difficulties, self efficacy, learning with in age group. All the study dimensions viz., technical difficulties ( $F = 5.133, p = < 0.001$ ), self efficacy ( $F = 12.282, p = < 0.001$ ), negative thoughts ( $F = 9.789, p = < 0.001$ ), mental focus ( $F = 8.073, p = < 0.001$ ), metal cognition ( $F = 12.033, p = < 0.001$ ), and learning ( $F = 15.263, p = < 0.001$ ) showed significant relationship with education. Similarly Income also exhibited significant relationship with study dimensions viz., technical difficulties ( $F = 5.603, p = < 0.001$ ), self efficacy ( $F = 12.962, p = < 0.001$ ), negative thoughts ( $F = 11.364, p = < 0.001$ ), mental focus ( $F = 19.894, p = < 0.001$ ), metal cognition ( $F = 25.668, p = < 0.001$ ), and learning ( $F = 7.854, p = < 0.001$ ) and hence the null hypothesis was rejected in respect demographic variables education and income. Number of members in the team showed no statistical difference with any of the study dimensions and the null hypotheses was accepted.

Second hypothesis of this study put in to test using hierarchical regression model and results are narrated in the table no 3. The linear regression output as a model reveals that the entire study variables contribute for explaining variance in the learning. The  $R^2$  value is indicator measure of how much of the variability in the learning, is accounted for by the each predictor's variable. In summary, impact is found in the relative order of the mental focus (multiple  $R = 0.948, R^2 = 0.898, p = < 0.001$ ), technological difficulties (multiple  $R = 0.540, R^2 = 0.292, p = 0.001$  self efficacy (multiple  $R = 0.628, R^2 = 0.394, p = < 0.001$ ), meta cognition (multiple  $R = 0.994, R^2 = 0.987, p = < 0.001$ ) and finally negative thoughts (multiple  $R = 0.656, R^2 = 0.431, p = < 0.001$ ). Further it is inferred that relative explanatory power of the variables are listed in the order of descending viz., mental focus (MF), technological difficulties (TD), self efficacy (SE), meta cognition (MC), and negative thoughts (NT). As an aggregate regression model, all the independent variables together have explained variance to the extent of 98.7 Percent in the dependent variable learning. This finding is clearly confirm this the research work had chosen most appropriate impacting variables as predictors and thus established predictors impact on the dependent variable significantly. Hence, the alternative hypotheses are accepted and accordingly it is concluded that all five predictors impacted the web based learning outcome significantly and thereby it is conclusively established that learning as an outcome of WBT are critical determinants of effectiveness of web based training.

## Findings and Discussion

One of the main strength of this study is that sample covered a broad spectrum of employees with varying levels of age, education, income and team size. Findings of the study reveal that all study dimensions exhibited statistically significant variance in learning and confirm that the effectiveness of WBT relays on the factors like Technical difficulties, self efficacy, Negative thoughts, mental focus, and Meta cognition.

In summary, it is found from the results of regression analysis that technical difficulties and mental focus are most influencing variables on WBT outcome. Comparing differences in the effects of technical difficulties on learning processes and its

Out comes provide strong evidence for the importance of accounting for trainees losing interest for focused learning. Trainees may even eventually drop from the training if the option is provided to them. It is natural response for any trainees, with low self efficacy, to the situation of encountering technical

difficulties may lead to increased negative thoughts and decreased learning. Conversely, in the investigated samples there was no such scope for trainees to withdraw from the training as such as it is training of Integrated Management system certification program and main objective of the training is to make them to implement ISO system by interpreting standards learned from WBT. The vast majority of Web-based training research focuses exclusively on trainees who complete the course (e.g., Johnson et al., 2000; O'Neil & Poirier, 2000) and interestingly this study is also focused on completed trainees of WBT.

In this study, negative thoughts as predictor had very negligible percentage of explanatory variance in learning. Chen, Gully, and Eden (2004) found negative affectivity had a detrimental effect on learning. Resource allocation theory (Kanfer & Ackerman, 1989) provides a sound theoretical basis for understanding these results. Individuals have a limited pool of attentional resources, which can be directed towards on-task thoughts, off-task thoughts, or regulatory functions (Kanfer & Ackerman). These attentional foci all draw from the same resource pool. Thus, as more resources are directed towards off-task thoughts (e.g., negative thoughts), there are fewer remaining resources to be directed towards on-task thoughts (i.e., learning the training material).

Study findings indicate that age as a demographic variable influenced negative thoughts, mental focus and meta cognitions of trainees. Levels of maturity relates with the age in many psychological stream of research (Welsh et.al. 2003). It is evident from such studies that age could be a factor to be reckoned for its influencing ability in learning from WBT. In this study, education and income had statically significant relationship with all independent variables. It is confirmed from results of ANOVA that the effectiveness of WBT can also be influenced by demographic variables like education and income levels of trainees. Further it is inferred that mere robust design and delivery mechanism of WBT alone not sufficient enough to enhance the learning levels of trainees from WBT and some of the demographic variables have also influenced the training outcome. It is pertinent to look at studies of Debourgh (2003) and Cook (2005). In their studies, findings evidenced that education of trainees has greater impact on WBT learning and satisfaction there from. This study findings are also fully echoed views of these scholars. Results on education with that of study dimensions concludes that even employees who are not computer naïve can successfully complete their WBT (Blair, 2003).

## **Conclusion**

At present, the literature on web-based training in manufacturing setting is limited. Our study systematically evaluated the use of web-based training across a broad spectrum of Employees in a large integrated delivery network at multiple international locations. The results suggest that web-based training can serve as a primary method of training to impart organizational initiatives like ISO standards for implementation at their geographically dispersed respective work sites. Demographic factors such as education and income levels of trainees had totally influenced on all study dimensions and WBT is not influenced by the team size. Age of the trainees showed significant relationship with some of the predictors viz., negative thoughts, mental focus and meta cognition. Based on the empirical evidence it is concluded that learning as an outcome of WBT is largely statically significantly affected by factors like mental focus of trainees, technological difficulties encountered while learning, and to lesser degree learning affected by self efficacy of trainees, meta cognition and negative thoughts.

## **Research Limitation**

This study has all limiting factors of exploratory research and confined its data collection and interpretations to single organizations using one WBT programs. The longitudinal studies with specific focuses on multiple organizations with different WBT programs may provide greater insight in to effectiveness of WBT as means of training delivering method.

### Implications

The present study is made in the organizational setup functioning at multiple locations globally and predictors chosen for investigations would be more appropriate for using in similar study field. This study is also made an attempt to provide constructs description which would enable future researchers to frame the tools of investigation with ease. Any organizational need based training imparted through WBT method can relay on this research works.

### Future Research

The study findings indicate technical difficulties as most critical variable in learning besides mental focus. It is suggested that technical difficulties alone can be taken as variable for understanding its influence at various stages of learning would provide in depth evidence on effectiveness of WBT methods. Research investigation on paid training programs of WBT methods might provide different outcome in the matter relating to trainees self efficacy levels, mental focus and meta cognition.

### Tables

**Table No: 1. Descriptive Statistics of Study Variables**

n =300

Sl. No.	Study Variables	Mean	Mean Rank	Standard Deviation
1.	Technological Difficulties (TD)	41.02	1	4.84
2.	Self Efficacy (SE)	39.69	2	5.69
3.	Negative thoughts (NT)	26.59	5	3.73
4.	Mental Focus (MF)	28.88	4	5.70
5.	Meta Cognition (MC)	24.44	6	4.57
6.	Learning (L)	32.25	3	3.50

**Table : 2 ANOVA Results of Study Dimensions and Demographic Variables**

Independent Variables		Dependent variable	Dependent variable	Dependent variable	Dependent variable	Dependent variable	Dependent variable	N =300
Frequency		TD	SE	NT	MF	MC	L	
		Mean	Mean	Mean	Mean	Mean	Mean	
1. Age	Young ( 35 or less)							
	Lower Middle (36-45)	40.87	39.26	26.20	27.94	23.72	31.97	183
	Upper Middle (46 +)	41.03	40.01	27.01	30.08	25.24	32.54	99
		42.50	42.28	28.22	31.89	27.33	33.56	18
	F - Ratio, p - Level	0.922 NS	2.575 NS	3.417 0.001	7.506 0.001	7.750 0.001	2.170 NS	
2.Size of team	Small (3 or less)							
	Medium (4-5)	41.16	39.50	26.58	29.14	24.75	32.09	160
	Larger (6 +)	40.96	39.98	26.66	28.85	24.29	32.36	121
		40.26	39.37	26.21	26.95	22.74	32.89	19
	F - Ratio, p - Level	0.309 NS	0.279 NS	0.121 NS	1.259 NS	1.759 NS	0.543 NS	
3.Education	High School & HSC							
	UG or Equivalent	40.74	38.76	26.08	28.05	23.22	31.61	74
	PG and above	39.59	37.40	25.21	27.04	23.01	30.71	68
		41.77	41.11	27.42	30.06	25.62	33.22	158
	F - Ratio, p - Level	5.133 0.001	12.282 0.001	9.789 0.001	8.073 0.001	12.033 0.001	15.263 0.001	
4.Income	Rs. 20000 or less							
	Rs. 20001 - 30000	40.26	38.09	25.61	26.86	22.68	31.45	155
	Rs. 30001 - 40000	41.04	40.28	26.92	30.05	25.30	32.54	79
	Rs. 40001 - 50000	41.46	41.27	27.50	30.42	25.77	33.50	26
	Rs. 50000 +	43.68	43.68	29.10	33.42	22.68	34.00	40
	F - Ratio, p - Level	5.603 0.001	12.962 0.001	11.364 0.001	19.894 0.001	25.668 0.001	7.854 0.001	

**Table No: 3 Results of Linear Regression analysis of Independent Variables with Learning (Dependent Variables)**

Independent variables	Std. Coefficient Beta	t	R	R2	p	F
Technical Difficulties	0.540	11.077	0.540	0.292	0.000	0.000
Self efficacy	0.597	7.079	0.628	0.394	0.000	0.000
Negative thoughts	0.540	4.389	0.656	0.431	0.000	0.000
Mental focus	0.968	36.858	0.948	0.898	0.000	0.000
Meta cognition	0.896	45.274	0.994	0.987	0.000	0.000

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