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REVIEW OF LITERATURE

NEED/IMPORTANCE OF THE STUDY

STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

SCOPE FOR FURTHER RESEARCH

ACKNOWLEDGMENTS

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APPENDIX/ANNEXURE

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CONTRIBUTIONS TO BOOKS

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

JOURNAL AND OTHER ARTICLES

- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS

- Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

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- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

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WEBSITE

- Garg, Bhavet (2011): Towards a New Natural Gas Policy, Political Weekly, Viewed on January 01, 2012 http://epw.in/user/viewabstract.jsp

TELECOMMUNICATION, TECHNOLOGY & TRAINING (3TS) - A UNIQUE LEARNING MODEL FOR TELCOS

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ABSTRACT

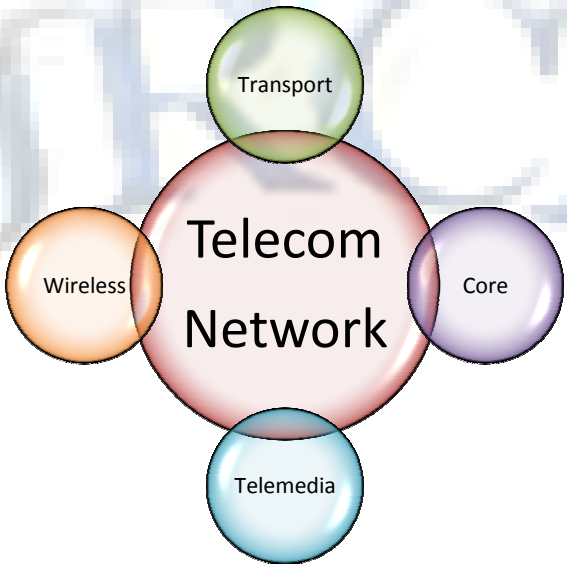
The liberalization of the telecom industry opened the doors to the state-of-the-art technologies and equipments that were deployed by the private incumbents. Major Indian telecom operators have deployed numerous cutting edge technologies like GSM, GPRS, Enhanced Data Rates for GSM Evolution (EDGE), CDMA2000 1X, Evolution for Data Only(EVDO), Universal Mobile Telecommunications System (UMTS) /High Speed Packet Access (HSPA), Long Term Evolution (LTE), WiMAX, Next Generation Network, Synchronous Digital Hierarchy, Dense Wavelength Division Multiplexing, Metro Ethernet etc on their network in order to offer a host of services ranging from basic voice telephony to video calling, gaming, m-Commerce, Internet etc. This resulted in a huge knowledge gap as the Indian educational system and industry were not ready for this intellectual influx. The Indian telecom industry, the third largest in the world, is facing a tumultuous time on account of falling revenues and non-availability of sufficiently trained technical manpower. This has been coupled with a high rate of attrition. Operators are putting efforts to make world class network. In such a scenario competency building through training has an important role to play in increasing organizational performance and hence its revenues. This paper presents a unique training model (3Ts) that can be used by telcos for meeting their current and future workforce competency requirements. This paper is based on primary research data compiled over a span of one year and attempts to unravel the co-relation between the primary variable – training, 3Ts model and its effectiveness on competency development in the telecommunication industry.

KEYWORDS
3Ts, Distance Learning, Network Learning Center, Self Learning Module, SLM.

1.0 INTRODUCTION

The Indian Telecommunications network is the third largest in the world and the second largest among the emerging economies of Asia. The telecom sector has been one of the fastest growing sectors in the Indian economy in the past 4 years. This has been witnessed due to strong competition that has brought down tariffs as well as simplification of policy environment that has promoted healthy competition among various players. The growth of the industry prompted the government to allow more players on the field. The liberal policies of the government and the extensive need for communication created a conducive business environment contributing to the growth of the industry. The number of telephone subscribers in India increased from 787.28 million in December 2010 to 846.32 million at the end of March 2011. The telecom technology has evolved significantly over the last decade with several path breaking innovations that have changed the face and architecture of the telecommunication network. The modern day telecom network is a convergence ready broadband network, spread over large geographical area through terrestrial, submarine and satellite links, with a scalable and restorable global NGN footprint, MPLS enabled CORE data network, certified MEN network (e.g. MEF forum), integrated BSS-OSS to support complex suite of services with end-to-end connectivity provided over fibre. The network is generally organized around four major domains as highlighted in the figure 1 below.

FIGURE 1 – TELECOM NETWORK – PRIMARY DOMAINS



The technologies deployed include Plesiochronous Digital Hierarchy (PDH), Synchronous Digital Hierarchy (SDH), Dense Wavelength Division Multiplexing (DWDM), Optical Transport Network (OTN), Microwave, VSAT and Optical Burst Switching (OBS) on the transport domain, 2G to 3G, GSM to UMTS, CDMA to HSD in the Wireless domain, Switching to Routing, IP to MPLS, TDM to NGN Soft Switch, Utilities, OSS and many more. The services provided includes POTS, PRI, Leased line, VoIP, HSD, Video Calling, Ethernet Leased Lines, L3-VPN, Mobile TV, Mobile broadband on 3G, etc.

The Reliance Communications (RCOM) Network group is tasked with planning, deployment, monitoring, operation and maintenance of overall telecom network. The primary network functions include Planning & Engineering, Installation & Commissioning, Provisioning & Fault Management, Operation, Maintenance, Administration & Performance (OMAP), Quality and other Support functions.

Network Learning & Development function is generally tasked with the responsibility of ensuring the readiness of the organizational manpower to quickly adapt to the technological advancements, in consonance with the business requirements while maintaining high learning standards. The Network Learning Center (NLC), an ISO 9001:2008 certified entity of a leading integrated telecom player, was established in the year 2002 with an expectation to build a world class learning facility that could support the technology training demands of the present and the future. Over the past nine years, NLC has trained & certified more than 56,000 employees through instructor led trainings as well as distance learning programs. In addition over 61,000 employees were certified using proprietary self learning methodologies. The NLC portfolio comprises of over 220 Instructor Led Training (ILT) courses and 92 Self Learning Modules (SLM) on cutting edge telecom equipment, technologies and services in the domains and functions listed in the previous section. The NLC lead trainers (Subject Matter Experts – SME) are functionally aligned to the domain experts. NLC takes responsibility in mentoring new recruits through comprehensive induction program, field & on the job training in the first year of their professional careers.

2.0 RESEARCH PROBLEM

India has more than 885 million telephone users[1]. On an average more than 11.4 million mobile subscribers are added per month. Huge subscriber addition brings challenges not only from within but also from other network providers too, in maintaining good service quality. Operators deploy Operation Support System (OSS) and Business Support System (BSS) to automate processes and effectively manage telecom equipments, services & customers. These processes and managed technologies necessitate availability of competent and skilled professionals. The Indian telecom industry is facing a tumultuous time on account of falling revenues and non-availability of sufficiently trained technical manpower, which has been coupled with a high rate of attrition. In order to keep operating expenses under control, telecos deploy optimal number of professionals to manage huge networks while satisfying established Key Performance Indices (KPIs).

Studies (NASSCOM-McKinsey report, 2005) have revealed that only about 25% of total engineering graduates passing out of colleges/universities are possessing skill sets relevant to the telecom industry. To compound matters, university engineering syllabus does not change very often to keep pace with technological advancements. Thus the quality of technical manpower available in telecom industry is not up to the mark and cannot handle current and future challenges of the modern day telecom network. With the advancement of technologies to speed up communication across the globe changing customer perceptions, telecom engineers are finding it hard to integrate, interwork and interoperate the network elements. Continuous network expansions, additions of millions of customers in the network, changing market dynamics, fierce competition, backend OSS & BSS process automation, demands highly professional, experienced, capable employees in telecom sector. Employee high level of engagement along with learning builds confidence and capability to address challenges & KPI effectively and efficiently.**[1]**Training on telecommunication technologies gives leverage to a corporate on doing strategic planning, data security, offering competitive B2B & B2C solutions, efficient network operation and management. **[2]**

New age training requirements cannot be fulfilled merely by conventional classroom training. A paradigm shift is required in training need identification, equipping trainers (SMEs) with sufficient skills and knowledge, course design & development and delivery. It is thus conclusively established that continuous learning and skill updation is mandatory to the various stakeholders in the telecom domain – the individuals as well as teams/organizations.

The following list summarizes the key problems:

1. A multi skilled workforce is required for efficient operations of the modern telecom networks and meeting all Key Performance Indices (KPIs).
2. Training on telecommunication technologies enables a telco in achieving better strategic planning, data security while offering competitive B2B & B2C solutions and resulting in efficient network operations and management.
3. Training requirements cannot be fulfilled merely by conventional classroom training. A paradigm shift is needed in training need identification, equipping trainers (SMEs) with sufficient skills and knowledge, course design & development and delivery.

3.0 LITERATURE SURVEY

Literature survey was undertaken to study the subject in hand. The key works that were highly pertinent to the research problem have been reproduced in this section. The study of literature validated the research solution.

BOOK [3]

NAIDU SOM, E-Learning - A Guidebook of Principles, Procedures and Practices, 2nd Revised Edition, CEMCA, 2006, Commonwealth Educational Media Center for Asia (CEMCA)

This guidebook systematically helps to approach employees' engagement with e-learning, irrespective of the educational sector or level within which it is applied. The content of this guidebook highlights issues in relation to e-learning. Besides the great deal of resources in this guidebook, its unique feature is the opportunity it offers us to "tell a story" about our experiences in relation to the issue or subject under discussion. Telling a story enables us to pause and reflect upon, and share our experiences or connect with others in a meaningful way. Various types or modalities of e-learning activity defined are:

1. *Individualized self-paced e-learning online* refers to situations where an individual learner is accessing learning resources such as course content online via an Intranet or the Internet. A typical example of this is a learner studying alone on the Internet or a local network.
2. *Individualized self-paced e-learning offline* refers to situations where an individual learner is using learning resources such as a computer-assisted learning package offline (i.e. accessing downloaded course content).
3. *Group-based e-learning synchronously* refers to situations where groups of learners are working together in real time via an Intranet or the Internet.
4. *Group-based e-learning asynchronously* refers to situations where groups of learners are working over an Intranet or the Internet where exchanges among participants occur includes on-line discussions via electronic mailing lists and text-based conferencing within learning managements systems.

This recommended e-learning practices mentioned in the book validates the NLC philosophy of blended learning. The NLC learning model is in consonance with the e-learning framework outlined in the book.

RESEARCH PAPER [4]

Deb Sagarmay, Effective Distance Learning in Developing Countries Using Mobile and Multimedia Technology, International Journal of Multimedia and Ubiquitous Engineering, Vol. 6, No. 2, April, 2011

This paper highlights the problems restricting the widespread use of e-Learning. These include the lack of proper management and infrastructure. This is despite the developments in the field of multimedia technologies and internet networks, which have contributed to immense improvements in the standard of learning as well as distance learning in the developed world.

The NLC model works around the common problems and succeeds in deploying modern technologies to deliver effective training interventions.

RESEARCH STUDY [5]

Barbara Means, et. al., Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies, Revised September 2010, U.S. Department of Education, Office of Planning, Evaluation, and Policy Development Policy and Program Studies Service

[1] TRAI Aug 2011

This paper presents the analysis of a systematic search of the research literature from 1996 through July 2008, identifying more than a thousand empirical studies of online learning. Analysts screened these studies to find those that (a) contrasted an online to a face-to-face condition, (b) measured student learning outcomes, (c) used a rigorous research design, and (d) provided adequate information to calculate an effect size. Paper addresses four research questions:

1. How does the effectiveness of online learning compare with that of face-to-face instruction?
2. Does supplementing face-to-face instruction with online instruction enhance learning?
3. What practices are associated with more effective online learning?
4. What conditions influence the effectiveness of online learning?

The self learning aspect of the NLC model is derived based on the findings of the above study. NLC incorporating the recommendations study of on-line/off-line chat sessions to improve the effectiveness of the training interventions.

4.0 3Ts LEARNING MODEL

Change appears to be the only constant in the field of information and communication technologies. Telcos are required to cope with such rapid changes in the field of transmission, data, laser and semiconductor technologies. Academics and educators need to adapt to the complex telecom technologies and processes while grappling with the effective educational delivery mechanism.

3Ts (Telecommunication, Technology and Training) Blended Learning Model (Figure 2) is a cost effective learning solution, developed by leveraging NLC's experience in delivering learning solutions for over a decade, as compared to conventional & virtual classroom techniques. It is tempered with a voluntary self learning and mandatory certification mechanism, thereby increasing its effectiveness and creating a learning organization. The model goes beyond traditional e-learning and is an amalgamation of online learning, virtual learning, distributed learning, networked or web-based learning techniques. 3Ts training model includes hands-on experience on live equipments in training labs that can be accessed locally as well as remotely over Intranet/Internet. Trainers provide online guidance and evaluation to individual participants during practical sessions. 3Ts model facilitates balances learning while developing proficiencies required in managing huge multi service global networks within specified quality levels. On an average 20900 trainee mandays were imparted during the period of 2002 to 2008. During the same period on an average more than 5800 employees were trained. The training delivery highlights from 2009 are graphically presented in the figure 3 below.

FIGURE 2 – 3TS BLENDED LEARNING MODEL

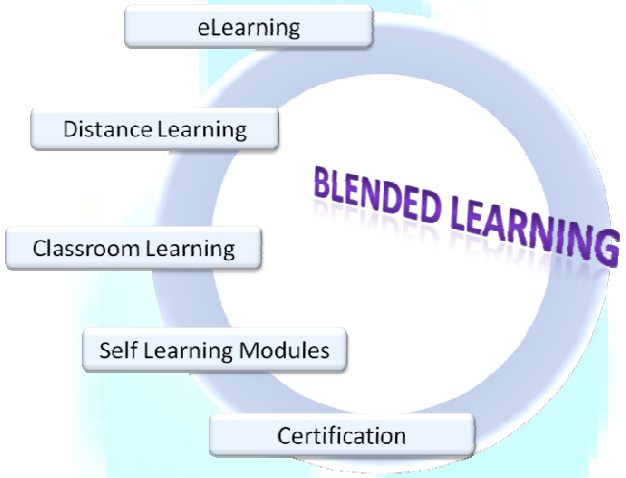
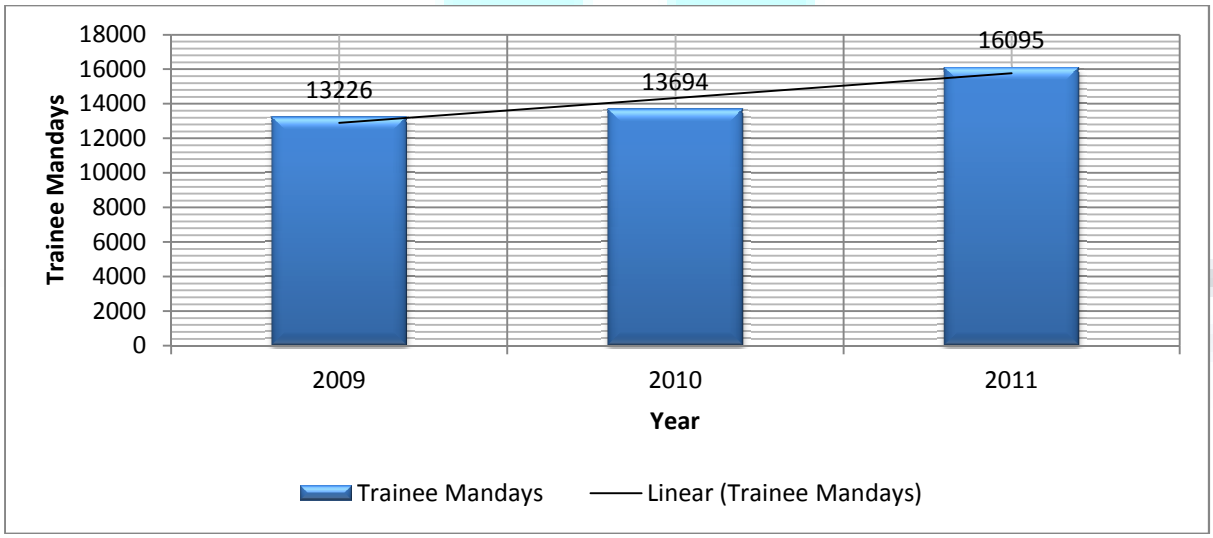


FIGURE 3 – TRAINEE MANDAYS IMPARTED BY NLC



To maintain a world class network, telecom operators must ensure the technical capabilities of its employees through suitable training interventions. There are nonstop additions of new equipments during network expansions and in the era of fast changing technology, it becomes essential to keep all employees abreast of the latest developments in their respective domains. NLC strives to fulfil this responsibility by systematically capturing training requirements and ensuring that the network employees have the required Knowledge, Skills & Attributes (KSA) essential to operate and manage network efficiently. The telecom industry requires skilled manpower and organizational learning builds them for long-term competitive advantage. Formal training helps them to relate and connect with their own learning, as they begin to form a powerful knowledge base.

SELF LEARNING MODULES

Self Learning Modules (SLMs) are learning solutions designed for participants to facilitate anywhere, anytime and on demand learning. SLMs are animated audio-video presentations that offer a flexible learning option to employees. SLM duration is typically between 30 minutes to 60 minutes and are based on generic topics ranging from technology or product overview to specialized topics including Operation & Maintenance of telecom equipments, demonstration of maintenance activities etc. An advanced version of an SLM, Interactive SLM (iSLM) offers real time experience to the learners simulating live scenarios. These modules help an employee optimizing their time spent in learning and contribute to improved productivity and operating efficiency.

SLMs were introduced in the year 2008 to provide fast track learning opportunities and 100% certification of engineers working in the field. A set of authoring tools were used to introduce required animations, relevant video clips and other documents into the presentations. Concepts and information are conveyed using simple audio visual explanation and even using vernacular languages. The benefits of these innovations were further extended to various other groups of employees of the network.

This research study indicates that the SLMs improve the understanding of core concepts while simplifying the efforts to assimilate complex topics. Self Learning provides learning control and helps them prepare for subsequent in-class discussions, improves understanding and retention. The benefit summary is as enumerated below:

1. "Must know technical know-how" is passed on as a set of procedure to follow.
2. It is available to participants before he/she attends formal training.
3. It can be referred any time after the training.
4. Fast deployment as compared to conventional classroom training, which has limited seats to accommodate at given point of time.
5. Learner gets the control over pace.
6. Interactive SLMs (*i*SLM) help simulate the real on-line feel of working on live telecom network elements.
7. The SLMs improves understanding and help improving network performance indices.
8. It reduces queue time (conventional classroom) for learning.

INTERACTIVE SLM (*i*SLM)

Online integrated interactive self learning activities designed to simulate classroom instructor lead training experience. *i*SLM (Interactive Self Learning Module) are a series of interactive, self-paced learning modules delivered completely online. They are a convenient, flexible and cost-effective way to train new employees, or to increase the skill levels of existing staff. It is intended for engineers working at Network Operation Center (NOC), as system operators, Network administrators, Field staff, Installation and commissioning to manage, maintain and monitor telecom network.

The acquisition of knowledge, which is the new global power, is a lifelong experience, not a collection of facts or skills. With knowledge expanding exponentially, existing technologies are becoming fast obsolete. In order to continue to gain expertise & stay ahead of competition NLC has designed *i*SLM. The *i*SLM consists of two series - Foundation and Intermediate. Each series is divided into short, objective centric and focused modules of 30 or 60 minutes each. *i*SLM leverages the power of multimedia technologies to overcome the limitations of time, distance and resources. *i*SLMs can provide convenience and control to individuals and groups at their pace enabling just-in-time solution. Integration of variety of technologies has made it possible to develop an iSLM - A highly interactive medium of pedagogy.

Engaging learners is very important for high level of information retention. A computer simulation or demo stimulates learning and interaction as in the real world while allowing participants to test their concepts prior to engaging a live network. SLMs and iSLMs enriches conventional learning interventions adding Videos, Audio clips, charts, diagrams, widgets, self assessment ensuring higher employee interaction, engagement and learning. It helps in meeting the different styles of learning basically Kinaesthetic, Auditory and Visual.

NLC measures effectiveness of SLMs through certification, which is elaborated in next section. The corporate *mantra* is Voluntary Self Learning & Mandatory Certification.

EMPLOYEE CERTIFICATION

Technology roles within the Network group require specific skill sets and qualifications. Employees acquire these skills through training when they move to the respective roles. At the end of each classroom or distance learning through audio/video conference, a validation and feedback is taken to assess the effectiveness of the program as well as evaluate the learning's of the participants. Online Certification through the administered objective questions is the preferred method to assess the acquired skills through the NLC learning model. Percentage of employees with relevant certifications is a reliable method for the capability estimation of groups. The certification increases individual & team performance as a whole, and helps in quick and reliable solutions to prevalent network operational issues.

Organizations focused on driving growth, managing complex and sophisticated telecom equipments, offering multitude of diverse technological services and solutions requires certified task-force on technology and telecom equipments. Focus on training & certification helps in improving network operation and maintenance by reducing downtime and thereby increasing network availability to its customers. This translates onto improved services quality higher network usage and hence higher revenues.

NLC has made all SLMs, course material and other reference document online. Employees are encouraged to learn and participate in Certification programs. Offering full featured distance learning methodology has eliminated the need for travel and provides work-life balance. NLC often conducts field training in areas where the network performance is poor or faults are high. A telecom network is heavily dependent on optical fibre backbone, which is often laid along main roads. In developing countries like India with a high level of infrastructure building activities, the incidence of fibre cuts are very high. This affects a multitude of services like voice, Internet, Data, IPTV, Video calls which are dependent on the optical backbone. Field engineers must be proficient in conceptual as well as practical aspects of fibre ducting, trenching and splicing techniques. Field trainings help an employee to get a real stock of the situation and learn maintenance techniques right at the site. In the month of January 2011 (an illustration), series of field trainings were conducted on fibre & utility. The effect of this training program had a highly positive co-relation with the network availability and is reproduced in the table 1 below:

TABLE 1 – CORE NETWORK AVAILABILITY

Platform	Transport-Optical	MW	RDN	DCN	Switch
Dec'10	99.998	99.753	100	100	99.999
Jan'11	99.996	99.781	100	100	99.999
Feb'11	99.998	99.766	100	100	99.9998
Mar'11	99.999	99.764	100	100	99.9997
Apr'11	99.998	99.716	100	100	99.9978
May'11	99.998	99.677	100	100	99.9829
Jun'11	99.994	99.676	100	100	99.9761
Jul'11	99.995	99.628	100	100	99.9992
Aug'11	99.995	99.678	100	100	99.9996
Sep'11	99.994	99.655	100	100	99.9999
Oct'11	99.995	99.642	100	100	99.9999
Nov'11	99.994	99.687	100	100	99.9998

5.0 RESEARCH METHODOLOGY

This section outlines the methodology adopted for this research.

5.1 RESEARCH OBJECTIVES

The broad objective of this research is to analyze the impact & effectiveness of Self Learning Modules in the telecom industry. The specific objectives include:

1. To establish the impact of SLM on Employee Competence
2. To measure the effectiveness of SLMs on telecom technology training

5.2 HYPOTHESIS

Hypothesis for this research is as below:

H1: Organizational Self Learning initiatives have a positive impact on employee competency development.

H2: Self Learning Module is an optimal solution for telcos (in terms of cost and time)

5.3 SAMPLING DESIGN

Sample data for analysis was collected from NLC database for the period 2010-2011. Over this period, NLC has logged over 13000 certifications in all four network domains. The certification drive covered over 7000 employees spread across India. The certifications held during September and October 2011 was included as a part of this study.

5.4 DATA COLLECTION

The primary data for this research is extracted from the NLC Management Information System (MIS) database. This reflects the training delivery, course development, customer feedback, employee evaluation, training needs analysis data maintained in standardized International Organization for Standardization (ISO) compliant format by the NLC. The network performance is extracted from the standardize reports collated by the operation team. The employee performance data is collected from HR MIS and SAP-HR respectively.

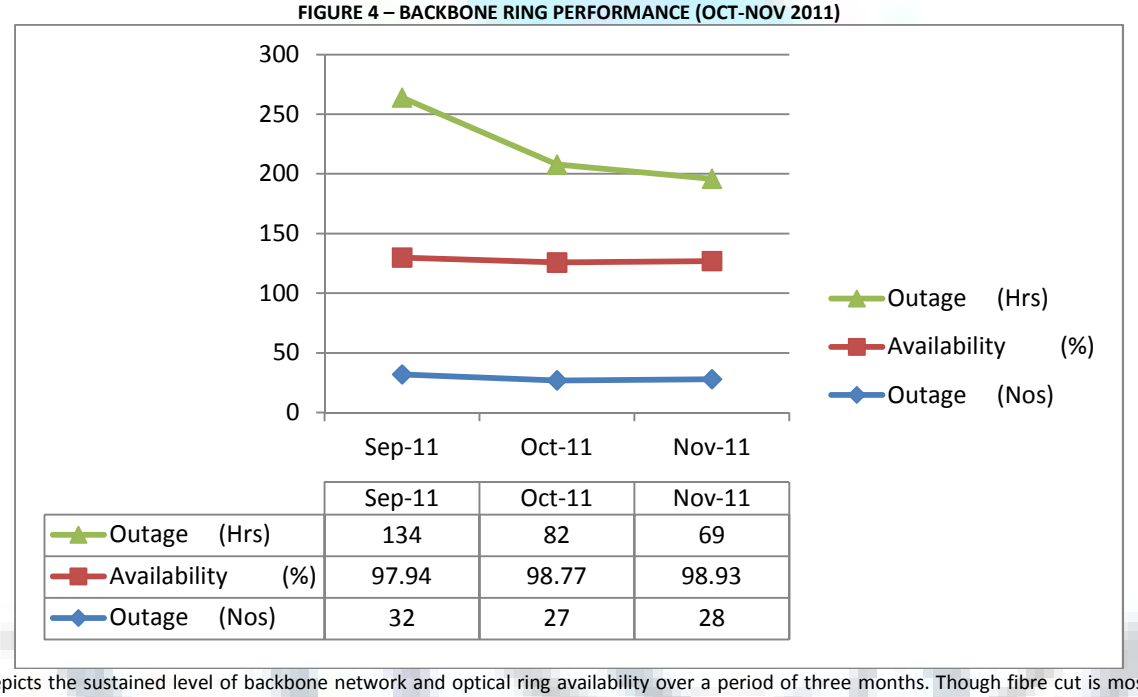
5.5 DATA ANALYSIS, INTERPRETATION AND HYPOTHESIS TESTING

It is observed that most of the network issues can be traced to the Fibre & Utility, Fixed Access & Transport domains. The faults in these domains have the most impact on customer satisfaction, experience and revenues. The faults also take longer to be corrected given the extent of the network size (over 1,90,000 Kms of terrestrial network). Identification of the exact location and the extent of fibre cuts is a tedious & time consuming effort. Self learning modules and certification help the employees to build understanding on best practices of optical fibre ducting, trenching, splicing etc. The SLMs on utilities including power supplies, batteries, ACs and DG sets help in efficient utility management at telephone equipment convergence sites.

TABLE 2 – NETWORK BACKBONE OPTICAL FIBER RING AVAILABILITY DURING SEP - NOV 2011

Month	Outage (Nos)	Availability (%)	Outage (Hrs)
Sep-11	32	97.94	134
Oct-11	27	98.77	82
Nov-11	28	98.93	69

FIGURE 4 – BACKBONE RING PERFORMANCE (OCT-NOV 2011)



	Sep-11	Oct-11	Nov-11
Outage (Hrs)	134	82	69
Availability (%)	97.94	98.77	98.93
Outage (Nos)	32	27	28

Table 1 & 2 depicts the sustained level of backbone network and optical ring availability over a period of three months. Though fibre cut is mostly because of external factors, the skill sets developed through trainings and SLM helps constructively reduce the mean time to repair faults (MTTR) and reduce splicing losses. This is evident from a cursory look at the statistics provided in the figure 4 above.

TABLE 3 – ALL INDIA CERTIFICATION DURING SEP/OCT 2011

Circle (All India)	Domain (Certification count)				Total Employee Count		
	Fixed Access	Fiber & Utility	Transport	Grand Total	Fixed Access	Fiber & Utility	Transport
00-NHQ	516	156	493	1165	189	211	211
01-AP	699	617	463	1779	147	473	473
02.1-BH	2	181	55	238	16	210	210
02.2-JH	2	11	5	18	1	85	85
03.1-GJ	209	643	278	1130	139	315	315
03.2-RJ	79	109	66	254	58	300	300
04-KN	152	268	187	607	127	335	335
05.2-MU	112	177	20	309	191	193	193
06.1-MP	98	272	92	462	75	364	364
06.2-CG	2	212	62	276	2	125	125
06.3-OR	53	196	16	265	19	207	207
07.1-PB	236	147	114	497	89	219	219
07.2-HR-HP	2	60	53	115	4	178	178
07.3-JK	7	30	10	40	1	66	66
08.1-KL	223	235	200	658	89	214	214
08.2-TN	268	340	272	880	152	358	358
09.1-UPE	87	24	21	132	74	329	329
09.2-UPW	21	130	94	245	11	258	258
10.1-WB	60	194	178	432	8	211	211
10.2-KOL	82	114	104	300	103	176	176
10.3-AS-NE	0	106	14	120	0	150	150
11-DL	116	127	36	279	207	224	224
12-MHG	208	393	157	758	125	443	443
Others	91	283	156	530	0	0	0
Grand Total	**3318**	**5025**	**3146**	**11489**	**1827**	**5644**	**5644**

The pan-India SLM certification data during the period Sep/Oct 2011 on Wireless, Fixed Access, Transport Network and Data Networks is presented in the table 3 above. In over 45 days of certification camp held in two phases, 1827 Fixed Access employees have completed 3318 certification exams, 5644 employees of Fibre & Utility and Transport have completed 5025 and 3146 certifications respectively. The large number of SLM based technology certifications had an important bearing on the employee competency development and network availability and performance.

The summary of the cost benefit analysis of conventional as well as the 3T training model is provided in the table 4 below. The table highlighting the detailed breakup of the costs is included within the appendix.

TABLE 4 – COST EFFECTIVENESS OF SLM BASED CERTIFICATION

S.N	Parameters	Training Mode	
		Classroom	Self Learning
1	Employees to Train	13587	13587
2	Per Employee Certification Cost (INR)	1895	178
3	Total Certification Time (Days)	6123	45
4	Total Cost (INR)	19303300	300000

The key inferences of this research study are as follows;

1. The certification cost per employee using the 3T model is Rs. 178 as compared to Rs 1895 by conventional method.
2. Time required to build workforce competencies through the 3T model of learning is only 45 days for against 6123 days for classroom training.
3. The Anova of the network performance data (Table 2) resulted in a p factor of 0.008. The hypothesis H2 thus stands proved.
4. The Anova of the certification data P Value is less than 0.05, hence hypothesis H2 stands accepted.

7.0 KEY FINDINGS

1. Telecom operators require multi-skilled manpower to manage & operate complex networks. Skill development is time bound and has limited shelf life these days.
2. Timely certification of all concerned team members across all geographies improves organization competency & productivity.
3. SLM and E-Learning are cost-effective ways to deliver telecom training to the employees.
4. SLM based learning drastically reduces training delivery time & cost as compared to conventional training.
5. iSLM helps employees master complex skills requiring a high level of psycho-motor skills.
6. SLM based learning creates better work-life balance and adopts adult learning techniques.
7. There are no disruption to operation & maintenance on account of training nominations, with the use of the prescribed 3Ts method of learning.
8. Higher commitment to learning is accomplished through certification.
9. Flexi place, time for learning is inbuilt in the learning methodologies.
10. Continuous training and retraining is possible through this method.

8.0 SCOPE FOR FURTHER STUDY

1. Effectiveness of 3Ts method of training through SLM can be measured and validated via online chat for resolving technical queries.
2. Research on ROI for 3Ts method of training through SLM can be measured with respect to telecom network performance & employee performance.

9.0 CONCLUSION

1. The study conclusively establishes the positive impact & effectiveness of Self Learning Modules in the technology intensive telecom domain. The use of self learning modules has a significant impact on building of employee competence.
2. 3Ts method of learning optimally manages cost of learning and certification for ROI.
3. SLM/iSLM certifications through 3Ts model of learning resulted in enhanced employee competence & network operational efficiency & productivity.

10.0 THEORETICAL, PRACTICAL IMPLICATIONS & LIMITATIONS OF THE STUDY

3Ts Blended learning model is designed to provide telcom engineers a holistic learning framework and helps in reducing technology knowledge gaps while resulting in improved customer satisfaction, increased revenue, reduced subscriber churn and improved network availability and service quality. Network Learning Center (NLC) has applied it in grooming fresh engineers, right from their induction. 3Ts blended learning programs for fresh graduates at NLC covers 360 degrees of learning, including classroom training, SLM, Certification, mentoring, coaching, on-the-job training, field visits, presentations, soft skill, job rotation etc. NLC offers many aspects of learning, such as building awareness to various compliances, Self Learning & Certification program etc. The validity of this model is to be empirically validated across multiple organizations within the industry and can form the basis of similar models straddling the entire service industry value chain.

The efficiency of this model has been tested for trainings suitable to the fresh recruits and frontline operational staff. The model has to be tested for efficacy of learning delivery across all organizational roles including leadership and middle management. The model should also encompass behavioural and soft skill training programmes.

REFERENCES

1. Cushing Anderson, Impact of Training on Network Administration: Certification Leads to Operational Productivity
2. Thalheimer, W. (2003, January). The learning benefits of questions. Retrieved November 31, 2003, from http://www.work-learning.com/ma/PP_WP003.asp
3. NAIDU SOM, E-Learning - A Guidebook of Principles, Procedures and Practices, 2nd Revised Edition, CEMCA, 2006, Commonwealth Educational Media Center for Asia (CEMCA)
4. Deb Sagarmay, Effective Distance Learning in Developing Countries Using Mobile and Multimedia Technology, International Journal of Multimedia and Ubiquitous Engineering, Vol. 6, No. 2, April, 2011
5. Barbara Means, et. al., Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies, Revised September 2010, U.S. Department of Education, Office of Planning, Evaluation, and Policy Development Policy and Program Studies Service
6. Newell E. Chiesl, Indiana State University, DESIGNING INTERACTIVE SELF-LEARNING MODULES USING MACROMEDIA DIRECTOR, Developments in Business Simulation and Experiential Learning, Volume 28, 2001
7. NAIDU SOM, E-Learning - A Guidebook of Principles, Procedures and Practices, 2nd Revised Edition, CEMCA, 2006, Commonwealth Educational Media Center for Asia (CEMCA)
8. Deb Sagarmay, Effective Distance Learning in Developing Countries Using Mobile and Multimedia Technology, International Journal of Multimedia and Ubiquitous Engineering, Vol. 6, No. 2, April, 2011
9. Barbara Means, et. al., Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies, Revised September 2010, U.S. Department of Education, Office of Planning, Evaluation, and Policy Development Policy and Program Studies Service

APPENDIX

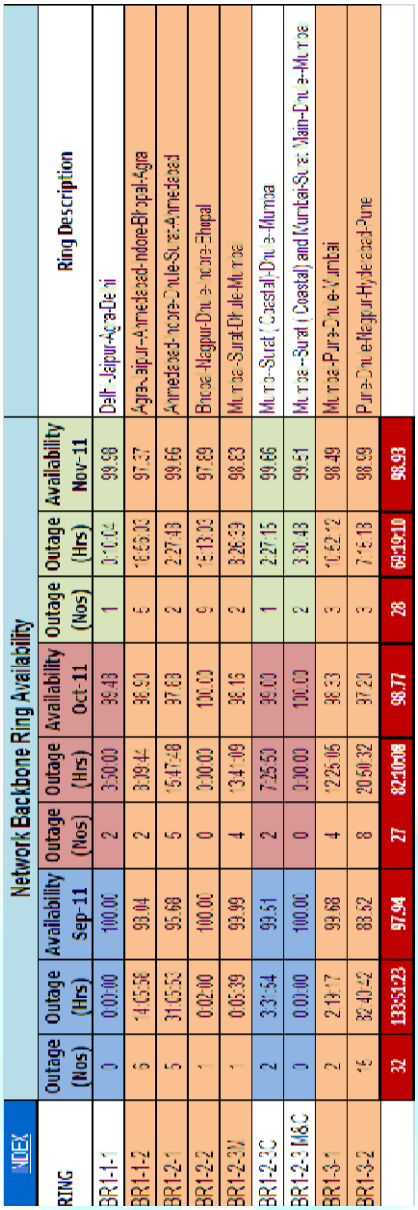
TABLE 5 – COST ANALYSIS OF CLASSROOM BASED TRAINING AND CERTIFICATION

Cost Analysis - Classroom Training												
Domain	Courses	Employees Eligible for Certification (A)	Course Duration (Days/Subdomain) (B)	Total Training Days per Domain (C)	Average Batch Size (D)	Total Batches Required (E=A/D)	Time Required (Days) (F=C*E)	Training Cost (INR)	Participant Travel Cost (INR)	Total Cost (per Batch, Average of 16 participants)		
Fixed Access	FA Telemedia - Wireline, Wireless & Data	1827	5	15	16	114	1713	500000	6508688	7008688	TOTAL COST	2,57,51,188
Transport	NEC-SDH- PDH MW, SDH Basics	5880	3	9	16	368	3308	2756250	9922500	12678750		
Fiber & Utility	Fiber Splicing, OTDR & Utility	5880	1	3	16	368	1103	2756250	3307500	6063750		
CERTIFICATION COST PER EMPLOYEE				1895		TIME REQUIRED (Days)	6123					

TABLE 6 – COST ANALYSIS OF SLM BASED TRAINING AND CERTIFICATION

Cost Analysis - Self Learning										
Domain	Courses	Employees Eligible for Certification (A)	SLM Duration (hours) (B)	Total Training Days per Domain (C)	Average Batch Size (D)	Total Batches Required (E=A/D)	Time Required for Certification (Days)	SLM Development Cost (INR)	Participant SLM Attenging Cost	Total Certification Cost
Fixed Access	FA Telemedia - Wireline, Wireless & Data	1827	3	NA	NA	NA	30	100000	285469	385469
Transport	NEC-SDH- PDH MW, SDH Basics	5880	4	NA	NA	NA	30	100000	918750	1018750
Fiber & Utility	Fiber Splicing, OTDR & Utility	5880	2	NA	NA	NA	30	100000	918750	1018750
		CERTIFICATION COST PER EMPLOYEE		**178**		**TIME REQUIRED (Days)**	**45**	**TOTAL COST**		**24,22,969**

TABLE 7 – NETWORK BACKBONE RING AVAILABILITY



INDEX	Network Backbone Ring Availability									Ring Description
RING	Outage (Nos)	Outage (Hrs)	Availability Sep-11	Outage (Nos)	Outage (Hrs)	Availability Oct-11	Outage (Nos)	Outage (Hrs)	Availability Nov-11	
BR1-1-1	0	0:00:00	100.00	2	3:50:00	99.48	1	2:10:04	99.98	Delhi-Jaipur-Agra-Delhi
BR1-1-2	6	14:05:36	98.04	2	3:39:44	99.50	6	16:56:06	97.37	Agra-Jaipur-Ahmedabad-Indore-Bhopal-Agra
BR1-2-1	5	31:05:53	95.68	5	15:47:48	97.03	2	2:27:43	99.66	Ahmedabad-Indore-Pune-Surat-Ahmedabad
BR1-2-2	1	0:02:00	100.00	0	0:00:00	100.00	9	15:13:05	97.89	Baroda-Nagpur-Pune-Indore-Bhopal
BR1-2-2W	1	0:05:39	99.99	4	13:41:09	98.16	2	3:28:39	98.83	Mumbai-Surat-Pune-Mumbai
BR1-2-3C	2	3:37:54	99.61	2	7:25:50	99.00	1	2:27:15	99.66	Mumbai-Surat (Coastal)-Pune-Mumbai
BR1-2-3 M&C	0	0:00:00	100.00	0	0:00:00	100.00	2	3:30:43	99.51	Mumbai-Surat (Coastal) and Mumbai-Surat Main-Pune-Mumbai
BR1-3-1	2	2:10:17	99.88	4	22:05:05	98.33	3	10:52:42	98.49	Mumbai-Pune-Pune-Mumbai
BR1-3-2	15	82:40:42	83.52	8	20:50:32	97.20	3	7:16:13	98.99	Pune-Pune-Nagpur-Hyderabad-Pune
	32	133:51:23	97.94	27	82:10:08	98.77	28	69:19:10	98.93	

TABLE 8 – ANOVA - NETWORK PERFORMANCE

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Outage (Nos)	3	87	29	7		
Availability (%)	3	295.64	98.54667	0.282433		
Outage (Hrs)	3	285	95	1183		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	9205.318	2	4602.659	11.60059	0.008675	5.143253
Within Groups	2380.565	6	396.7608			
Total	11585.88	8				

TABLE 9 – DESCRIPTIVE STATISTICS OF CERTIFICATION DATA

	Fixed Access	*Fiber& Utility*	*Transport*
Mean	138.5416667	209.375	131.0833
Standard Error	34.39007794	32.92970183	27.24672
Median	89	179	93
Mode	2	#N/A	#N/A
Standard Deviation	168.4762863	161.3219337	133.4811
Sample Variance	28384.25906	26024.7663	17817.21
Kurtosis	5.102388102	2.327527482	2.171422
Skewness	2.138676239	1.477333337	1.564548
Range	699	632	488
Minimum	0	11	5
Maximum	699	643	493
Sum	3325	5025	3146
Count	24	24	24
Largest(1)	699	643	493
Smallest(1)	0	11	5
Confidence Level (95.0%)	71.14129605	68.12027791	56.36413

TABLE 10 – ANOVA – 3T VS CONVENTIONAL MODEL

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Classroom	3	6122.813	2040.938	1296256		
SLM Certification	3	90	30	0		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	6065804	1	6065804	9.358962	0.037686	7.708647
Within Groups	2592512	4	648127.9			
Total	8658316	5				

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