Empowering Last Mile Learner Through IT-Initiatives in Difficult Geographies

(a case study of Uttarakhand, India)

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***Abstract*—** The present paper has been envisaged in the wake of the latest catastrophe that hit Uttarakhand in India. The Himalayan tsunami washed away thousands of people. The number of lost lives is still not known after about three months of this disaster. Reconstruction after devastation is important because it brings in hope and also provides opportunity to rebuild. From the technological perspective the role of IT-Initiatives is indispensably crucial in re-building. Here comes in education which happens to be the most vital reconstructor. Education heals and strengthens the human-endurance and sustenance to fight against the worst of odds. In the light of above the present paper puts forward a newer approach to embed the advancement of IT in the domains of education to reach out the learner located in the remotest areas in difficult geographies like Uttarakhand. We have termed such learner 'last mile learner' (LML). This last man at the last leg in a difficult geography is a vulnerable human being who needs serious attention and care. Therefore, this last mile learner becomes very important in the overall reconstruction plan. Tough geographical terrains and social-economic coordinates are major issues in places of Uttarakhand in India where this study has been undertaken.

The paper demonstrates the existing gaps between readiness of the last-mile learner to assimilate the current practices and trends in education and the availability of resources to ensure quality education in a difficult geography. The results show that there is significant gap between these two parameters. Lastly, the paper has suggested reconstructing education facilities in difficult geographies by introducing moocs in new avatar.

***Keywords*—** LML, Difficult geography, Moocs, Associative Learning, Inclusive IT, v-Governance.

I. Introduction

A difficult geographical terrain is characterized with unequal contours, tough elevations, steep and uneven landscape and settlement of humans which has less access to modern-day resources due to its critical location. It has limited access to basic amenities and survival is rigorous. Mountains, coastal regions, deserts, islands form difficult geographies for one reason or other. Disasters are also frequent in difficult geographies. The field study for the present paper has been conducted in the mountainous terrain of the central Himalayan mountains in Uttarakhand state of India. In a recent catastrophe in Uttarakhand in June 2013, thousands of people and livestock died and many more were rendered homeless. More than 2,000 road links were snapped due to floods and landslides and over hundreds of bridges were destroyed in the tragedy that followed. The total damage is estimated to over and above thousands millions.

Reconstruction after deluge of such magnitude is vital. Schmidt E & Cohen J in their latest book [1] 'The new digital age- Reshaping the future of people, nations and business' discuss the role of technology in such situations. "Reconstructing human habitats and providing sustainable livelihood practices including education, health and other basic amenities will become more innovative, more inclusive and more efficient over time, as old models and methods are either updated or discarded. Technology cannot thwart disaster or halt a civil war, but it can make the process of putting the pieces back together less painful.

Information Technology, as we have experienced and witnessed, has great transformational prowess [2]. The way Information Technology has changed the world, is truly amazing. Over the years, it has blended seamlessly into our psyche [3]. The human society has been immensely impacted by the agriculture and industrial waves in its long journey of evolution but the information wave that started sweeping across the planet in the later half of the 20th century, no doubt has been phenomenal and has left an indelible mark all through [4].

An initiative is a deliberate attempt on the part of an individual, society or government to carry out specific objectives. It is an endeavor to achieve the so-far-unattained objectives. Initiative is taken for the larger welfare of the society. Initiatives are thought upon to be aimed at strengthening the grass roots of any society. It facilitates in bringing about an impact for the welfare of one and all. Since it is a deliberate attempt therefore, needs special emphasis and push. To improve the efficiency and to help the government in interacting effectively with the stakeholders, world over IT-initiatives have been introduced by various governments at different levels [5].

An initiative should henceforth trigger a change which is difficult as such to measure, quantify or even report in difficult geographies [2]. Though these initiatives can facilitate in the following

- Formulating development strategies for a state, organization or country.
- Economic development, job-creation, rural development and poverty-alleviation etc.
- Social transformation by enhancing its access to people, services, information and other technologies.
- Boosting living standards in remote and rural areas by providing important commercial, social and educational benefits.

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However, the discourse on the impact of IT- Initiatives on human habitat and sustenance would not be conclusive without viewing it in the context of socio-economic discrimination and difficult geographies. Technology has no bias neither it is alien. However, the spectrum of technological initiatives needs to be widened which could truly remove existing asymmetries to attend a quantifiable and affirmative impact on society. It is in this light that previous research [6] therefore, emphasized on technological schema in the form of Inclusive IT that addresses inclusion and welfare of all sections of society. Henceforth, Inclusive IT leads to the empowerment of informatics have-nots. The life of the inhabitants of difficult geographies can be significantly improved by this approach since it lives on the bottom-up approach rather than the traditional top-down approach.

II. Education and IT Initiatives

IT- initiatives have the capacity to contribute in almost every domain of human sustenance and survival. These initiatives are rapidly becoming available for use in every setting and that also envelops in education, teaching-learning etc. It is true for formal, informal, and non-formal teaching and learning programmes. However, such access is much more common among the rich, and in the developed countries, than for the poor, or in developing countries [7]. In India social, economical and geographical divides is huge challenge to proliferate the potential of IT initiatives for every individual in our society. Learning through technical aid provided by Information technology has a long Journey but its accessibility to everyone is a stone which need to crack to embrace knowledge economy. Therefore, there is need to empower the LAST MILE LEARNER (LML). Such an attempt and approach would facilitate individuals of difficult geographies and deprived sections of society through technical interventions.

In a world that is fast globalizing and is supercharged with information, it calls for innovative efforts on behalf of the change leaders to look, sound and feel different. The key engines for a country's growth are the social and physical infrastructure, which require continued investments to accelerate growth prospects [8]. The social infrastructure needs to be developed in parallel to capacity building. The top down governance model have since inception neglected the needs of the citizens which are seen in the failure of many deemed to be successful initiatives.

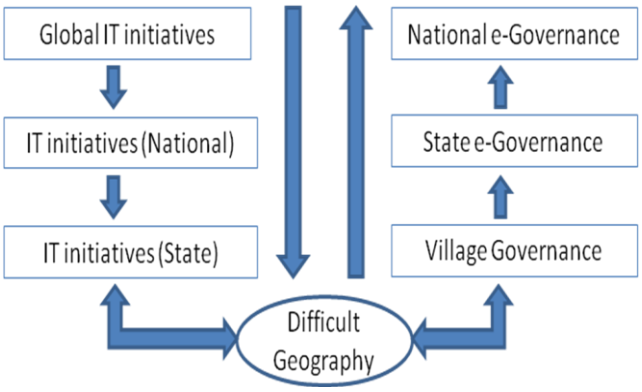


Fig. 1 Bidirectional Model for Analysis, Study and Implementation of IT- Initiatives and Policies

III. Research Design

In our previous work [9] we have defined v-governance which reflects the electronic engagement at the micro-level. It has been seen as a set of five random variables. Out of these connectivity is one parameter that defines effectiveness of v-governance practices. In our previous work, we acquired primary data from a sample village Samalta in central Himalayan region of Uttarakhand and then mathematically concluded the importance of connectivity issues for the implementation of v-governance practices. Taking the results and conclusions of the previous work as springboard for our present study, we, in this present work, make attempt to identify the gap between readiness of people for accepting the IT initiatives and availability of connectivity in the sample region. Notwithstanding, the last mile learning hinges heavily on these two factors.

IV. Pilot Study

Use The pilot study has been conducted at Munsiari. It is a far-flung small place in Pithoragarh district of Kumaun region in Uttarakhand (India) at about 6000 feet having proximity to mighty Milam Glacier. Again, the coincidence is that Munsiari and its neighboring areas were severely hit by the catastrophe on 16-17th June. Since, it falls in a difficult geography therefore, it was selected for this pilot. Owing to its difficult geography the place needs special push and interventions on the technological front in the form of IT-initiatives. Such initiatives can play a huge role in the overall holistic development of these places.

Primary data is collected through a questionnaire of 100 questions asked to the people about awareness, availability, connectivity and their readiness to accept the IT- initiatives particularly pertaining to the educational practices using technology. To find out how respondents feel about the IT practices, we grouped those questions into different variables related to satisfaction. The questionnaire is given to 300 respondents of different age groups, both male and female. Data collected primarily in ordinal scale.

Questions were raised to gather the quantitative information about different parameters that shows a mathematical association with the implementation side of technological-initiatives. Current status of educational qualification in sample project area is collected as primary data and analyzed statistically. It represents the following statistics:

Education

TABLE I
FREQUENCY ANALYSIS

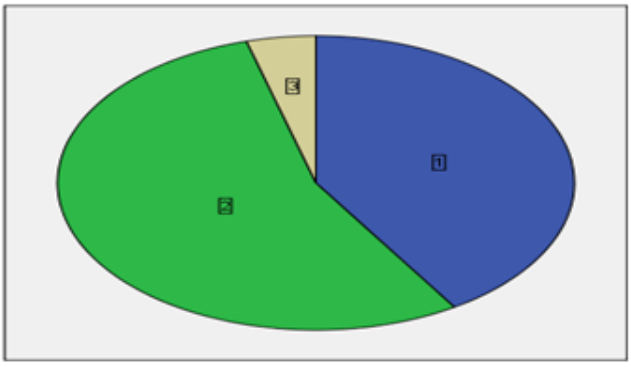
N	Valid	300
	Missing	18

TABLE II

CURRENT EDUCATION STATUS IN MUNSIYARI

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	123	38.7	41.0	41.0
	2	164	51.6	54.7	95.7
	3	13	4.1	4.3	100.0
	Total	300	94.3	100.0	
Missing	System	18	5.7		
Total		318	100.0		

Where group 1 represents people having educational qualification lower than High School (class 10) = 41.0%
Where group 2 represents people having educational qualification as Graduation= 54.7%
Where group 3 represents people having educational qualification as Post Graduation = 4.3%



1 = Less than High-school, 2= Graduate, 3 = Post graduate
Fig. 2. Education Status Graph

Acquired data is analyzed for readiness of the people for acceptance of technological intervention and connectivity available at present in sample geography, using nonparametric test for independent sample i.e. Mann-Whitney test is used for this study. We conducted Mann – Whitney test for two different parameters, readiness_to_accept and connectivity separately. The output of test, for first parameter **readiness_to_accept** is as follow;

TABLE III
DESCRIPTIVE STATISTICS

	N	Mean	Std. Deviation	Minimum	Maximum	Percentile		
						25th	50th (median)	75th
Requirement	300	53.96	3.908	42	67	52.0	53.00	56.0
Gender	300	1.53	.500	1	2	1.00	2.00	2.00

TABLE IV
MANN- WHITENY TEST
Ranks

	Gender	N	Mean Rank	Sum of Ranks
Requirement	1	142	172.74	24529.50
	2	158	130.51	20620.50
	Total	300		

TABLE V
TEST STATISTICS

	Requirement
Mann-Whiteny U	8059.500
Wilcoxon W	20620.500
Z	-4.246
Asymp. Sig.(2 tailed)	.000

The above table is useful because it indicates male respondents can be considered as having higher readiness for accepting technological interventions. Rank table represents, Number of female respondent who participated in data collection procedure is higher than male respondents while their mean rank i.e. readiness parameter is lower than male respondents. These statistics represents traditional social and gender discrimination present in the society.
Similarly, we conducted Mann – Whitney test for **availability of connectivity** to implement IT-initiatives in sample geography using acquired data and results are as follow:

TABLE VI
DESCRIPTIVE STATISTICS

	N	Mean	Std. Deviation	Minimum	Maximum	Percentile		
						25th	50th (median)	75th
Connectivity	300	33.69	3.458	16	42	31.00	34.00	35.0
Gender	300	1.53	.500	1	2	1.00	2.00	2.00

TABLE VII
MANN-WHITENY TEST
Ranks

	Gender	N	Mean Rank	Sum of Ranks
Connectivity	1	142	191.94	27256.00
	2	158	113.25	17894.00
	Total	300		

TABLE VIII
TEST STATISTICS

	Connectivity
Mann-Whiteny U	5333.00
Wilcoxon W	17894.00
Z	-7.927
Asymp. Sig.(2 tailed)	.000

Results show the gap between willingness of people belonging to use IT initiatives to empower their lives and the ground-level facilities available for them to do so is significantly high. However, we have in our earlier research work concluded that Associative informatics is key to the resource allocation problem faced by developing economies [10] though connectivity is a critical issue to be addressed for successful implementation to bridge the digital gap.

V. The Changing Scenario: Enabling Last Mile Learner

Traditional education system has to withstand various challenges of the present day digital era. It is imperative to have a relook at the entire gamut of learning and its accessibility. Technology is a huge enabler and it has the distinct capability to provide the level playing field. However, the spectrum of the technically enabled people in the world in general and present world is very asymmetric. This paucity is compounded by the corresponding shortfall in quality of education in difficult and technically marginalized geographies. To grapple with plethora of these shortfalls; we bring forward the notion of empowering the **Last mile learner (LML)** to simulate the process of transforming every individual of society, especially those who are at last position of development process, into learner through IT-initiatives.

On one hand, delivery of quality education in difficult geography is a challenging task in a country like India that has the 1/6th of the entire population of the globe. On the other hand, millions who aspire for higher education are unable to access formal time-bound education, even if access is available. This asymmetry gives rise to the need of an alternative mode of education. Present advancements in digital technology have parallel alternate vertical. Educational leaders at all levels (national, provincial, district and institutional) have to bring in IT as a leveraging tool for improved educational performance at all locations in general and last mile in particular.

Undoubtedly, technology's offerings increased dramatically in recent years. These advances also introduced requirement for virtual education or digital campuses for remote learners at remote places. The notion of LML aims to concentrate on defining an integrated digital learning campus with a capability of complete virtual school for individuals residing in far flung areas. Furthermore, there is need to have a collaborative digital platform with internationalized as well as localized tools and mediums to facilitate the learner at remote areas. The need of time is to use digital technology to rebuild a quality educational infrastructure. Coming back to the geography in question i.e Uttarakhand the following steps may bring in tremendous recovery in the backdrop of the recent devastation;

- Digital Space: Bricks & mortar be replaced by digital buildings.
- Digital teaching: Redefines role of a teacher: Teachers may take up the role of technology curator.
- Digital content: Best of content in flexible formats.
- Real time interaction: Last Mile Learner gets real time attention.

For example, MOOC (Massive Open On-line courses) symbolizes technological advancement which can bridge the existing disparity of Conventional education System. However, in the present set up a redefined MOOC (Massive open ON-LINE (OFF-LINE) courses) can bring in lot of promise and opportunity. MOOCs can be one of the efficient methods for delivering education to the last mile learner.

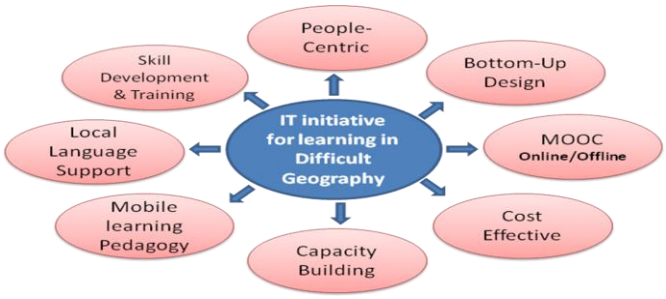


Fig. 3 IT-Initiatives for LML in Difficult Geography

The redefined MOOC has:

- Capacity to connect with the last mile learner.
- Encapsulates everyone within its ambit and delivery
- Space to all vocations & professions
- Information empowering
- Online and offline modes

VI. Conclusion

The induction of IT-initiatives can galvanize the whole gamut of education in general and to the last mile learner in particular. It is specially important for difficult geographies like Uttarakhand in India where the mountain-state is prone to disasters. The reconstruction phenomenon involving education domain is incomplete without IT and digital technologies. This IT-centric approach shift is the need of the hour and it has been adequately demonstrated in this paper. The findings of data analysis show that people in difficult geographies are affirmative about embracing technological advancement and willing to have electronic engagement. Despite tough geographical habitats, low physical connectivity and low accessibility of resource, they intend to be networked with pace and quality of present technological trends. The paper has identified and mathematically analyzed the requirement for a comprehensive initiative to empower the last mile learner. Furthermore, based on quantitative analysis of acquired field data the idea of a renewed approach of using MOOC for skill development and trainings, learning, and information sharing has been put forward.

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