Educational Technology and its Acceptance Level Among the Students and Teachers in Some Rural Areas

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Abstract: The benefits of educational technology have not fully reached the students and teachers particularly in the rural areas, although there has been a flurry of activities in the computerization of teaching-learning process in India. Post globalization, we have witnessed tremendous extension of educational reach. Technology has become an integral part of the teaching-learning process in the urban and semi urban areas. All the universities and colleges are being digitally connected through the National Knowledge Network (digitally), however, this expansion of e-learning and associated changes in pedagogy, are yet to percolate fully to the schools, particularly those run by the government. These schools which act as feeders to the universities and colleges make it difficult for their passed-out students to suddenly accept a radical shift in the pedagogy and other e-tools that are now widely used in higher centers of learning with the benefit of producing trained human resource to sustain the economic growth.

We have successfully conducted an experiment on e-learning in rural areas in the state of J&K under a Government of India funded project titled "VSAT enabled Mobile e-Learning Terminals (MeLTs)". Based on a Need Assessment Survey (NAS), which was carried out in 22 districts of 6 northern states of India by 8 different institutions covering 515 schools/ colleges, 12 custom fabricated MeLTs were deployed in the various educational institutions where there was either none or limited penetration of IT enabled learning. Our group had successfully deployed 2 MeLTs in the state of J&K and demonstrated their role and impact to the stakeholders. After the deployment and delivery of e-learning with the help of the MeLTs an impact assessment survey was carried out by a third party. Here we shall present the results of this study.

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1. Introduction

Making available the benefits of new technology, especially, the information and communication technology is among the "top-down millennium development goals" which were envisaged over a decade back. No doubt a lot of progress has been made in this direction; however, a herculean effort is needed to implement this more effectively particularly in the rural areas. Besides good and effective governance, access to technology has proved to be a great enabler for improved quality of life. However, such benefits have remained limited to developed countries, thus, affecting the lives of only a fraction of the world population. It is well established that socio-economic factors often tend to play a critical role in deciding who has access to technology. This in turn leads to a digital divide. India, in last two decades, has become a leader in software exports and computer related services. However, this has happened due to only a small fraction of our population. There is a vast populace, particularly, in the rural areas that still does not have access to technology and technology-enabled learning; and this is unable to contribute and therefore participate in development process. Prosperity of a country depends on the ability of how well its population can use technology, in general, and computers in particular. One may argue that the problem can be simply solved by providing computers to schools. However, it may not work in case of people who belong to the lower strata of the socio-economic ladder. It has been seen that providing computers alone to schools does not turn out to be an effective solution as there are many other enabling factors which often determine the success of such interventions (Wanchoo *et al* LINC 2010). At the same time, studies carried out by experts and researchers world over have indicated that if technology is made available to people, especially to younger population, they would learn to use it in a manner as may be suitable to their needs. Experiments such as "hole in the wall" which is a "minimally invasive" learning model conceived by Sugata Mitra and his team has demonstrated this concept by placing computers in the walls in slums and observed that soon the children had learnt to use these systems without any formal classroom or any other direct teaching being imparted. The results of this experiment indicate that irrespective of diversity in terms of ethnicity, language, gender and socio-economic status, children can learn to use computers. Clements (1999) observed that computers give children opportunities that cannot be offered in the computer less world. Children have the opportunity to complete a given task on their

own, and thus, they have the chance to develop their thinking skills (Papert, 1980). One can therefore safely argue that availability of technology enabled pedagogy is essential in improving the quality and standard of education which will enable India to continue on the growth path by readying (equipped with the necessary skill sets) the large population pool in the rural segment so as to enable them to meaningfully contribute to GDP. Therefore, there is a constant need to evolve new and innovative models to reach out to this vast pool of people, and transform adversity into opportunity. This has become essential ever than before due to the increasing digital divide among the urban and rural populace although mobile telephony has been able to penetrate deeper into these pockets thereby increasing the user expectations from technology.

2. VSAT Enabled Mobile e-Learning Terminals (MeLTs):

The prime objective of the MeLTs has been to make available to the students, e-lectures and knowledge e-contents of their interest free-of-cost. By providing data connectivity in remote areas MeLTs are expected to help in reducing the digital divide between the urban and the rural areas. The need assessment survey carried out by our group established that data connectivity in most of the remote areas is either not available or it is not satisfactory (Wanchoo *et al* LINC 2010). Sparse population in many areas motivated us to go for mobile rather than stationary e-learning terminals, as the later would remain under-utilized and would invite higher initial and maintenance costs. MeLT based data connectivity have been demonstrated to be more effective and make better utilization of the investment. MeLTs can provide access to e-learning to anyone, anytime and anywhere. This would ensure standardization of quality of the contents which is pre tested/ verified and it is no longer a static closed door student teacher interaction. Nature of e-content utilized to which students were provided exposure included: Mathematics, Computer, Science, Social Sciences, Languages and Social issues.

Participatory approach was used to undertake the project. A series of workshops were organized to finalize the modus operandi for implementation of the project in consultation with network institutions. The following 10 institutions were identified as network institutions (table 1) for the project:

University Institute of Engineering & Technology, Panjab University, Chandigarh.
Sant Longowal Institute of Engineering & Technology, Longowal
National Institute of Technology, Jalandhar
HNB Garhwal University, Srinagar (Uttrakhand)
Birla Institute of Applied Sciences, Bhimtal
Rajasthan Technical University, Kota
Shri Mata Vaishno Devi University, Jammu
National Institute of Technical Teachers' Training & Research, Chandigarh
Mahatma Gandhi Central Library, IIT, Roorkee
Dharmsinh Desai University, Nadiad, Gujarat

Table 1: List of Network Institutes

Network institutions undertook a need assessment survey in their respective regions to determine the present status of technology in schools, colleges and technical institutions. After the development of prototype mobile e-learning terminal, Van based VSAT enabled mobile e-learning terminals were procured and provided to the identified ten network institutions. MeLT Vans were well equipped with 8 modes of e-learning (table 2):

DTH supported e-learning
Edusat/SIT supported e-learning
Multimedia drive supported e-learning
Internet/LAN supported e-learning
Local server/WLAN supported e-learning
Internet/WLAB supported e-learning
Local server/LAN supported e-learning
CD/DVD supported e-learning

Table 2: supported modes of e-learning

In addition, twenty computers with LAN facility and twenty chairs were provided in each van for use by the students.

3. Need Assessment Survey for MeLTs:

A need assessment survey was carried out in 515 institutions in the six states covered under the pilot to identify the areas in which the MeLTs need be deployed on the following broader parameters (table 3).

Physical access	ICT access
Teacher student ratio	Computer student ratio
Infrastructure availability	Willingness to participate in our initiative
Availability of the relevant e-content	

Table 3: Deployment parameters for MeLTs

These 515 institutions that have been surveyed by the NIs include various levels as given in the figure 3. All these beneficiary institutions are supposed to be covered by the corresponding NI.

4. Deployment of MeLTs:

In order to deploy the MeLTs a need assessment survey was conducted in 515 schools and colleges in 22 districts of 6 states by 8 Network Institutions in their respective regions in greater detail and our group was responsible for conducting the survey in J&K where present authors (from SMVDU) were directly involved.

In Jammu & Kashmir a total of three districts bordering each other were covered for the pilot under NAS. The districts surveyed were: Jammu [covering 22 institutions], Udhampur [covering 17 institutions] and Reasi [covering 16 institutions]. The institutions that have been covered include 19 High Schools, 27 Higher Secondary Schools, seven Degree Colleges & two Polytechnics (Wanchoo *et al* LINC 2010).

Based on the results of the NAS, Van based VSAT enabled mobile e-learning terminals were fabricated and provided to the 10 identified network institutions by the coordinating institute (Table 4):

Coordinating Institute at National Level	**Network Institute**	**Type of MeLT deployed**	**State/ UT**
Indian Institute of Technology, Roorkee	NITTTR, Chandigarh	V-MeLT	Himachal Pradesh, Punjab, Chandigarh*, Haryana
	UIET, Chandigarh	V-MeLT	Punjab, Haryana
	SLIET, Longowal	V-MeLT	Punjab
	DBRA NIT, Jalandhar	V-MeLT	Punjab
	SMVDU, J&K	V-MeLT B-MeLT	Jammu and Kashmir
	HNBGU, Srinagar	V-MeLT	Uttarakhand
	BIAS, Bhimtal	V-MeLT	Uttarakhand
	MGCL, IIT Roorkee	V-MeLT B-MeLT	Uttarakhand Utter Pradesh
	RTU, Kota	V-MeLT	Rajasthan
	DDU, Nadiad	V-MeLT	Gujrat
10 Network Institutions		12 MeLTs	8 States + 1 UT*

Table 4: Deployment chart of MeLTs

The deployment of MeLTs was done after several workshops, training programs to train the deployment staff. A short audio visual film on MeLT was also produced and distributed for the purpose of increasing the appeal of the concept and its advantages.

The MeLTs were deployed in select institutions in several regions covered under MeLT. In Jammu and Kashmir technology exposure was provided to the students of 15 schools and colleges in the three sample districts. As a part of this a deployment roster was prepared and V-MeLT was deployed for 8 hrs a month in each school for a select group of a minimum of 26 in institute to a maximum of 44 students in another one. Technology exposure was provided for 8 hours in a month spread over four days. There were four slots of 2 hours each for which the V-MeLT was stationed for a given class in a given institute. The exposure composed to instructional part and hands on part. Basic idea of this exposure was to expose the students, teachers and administrators of these institutions to the concept advantages and applications of MeLTs. The sessions composed of introduction to computers and various applications such as Ms Office, paint, internet explorer etc. All most all the students either did not have any prior knowledge or very primitive knowledge so far as ICT skills is concerned. Most of them did not even know how to switch on a Laptop. One teacher said that he did not have the opportunity to see or use computers as a student but is happy that his students would have access to them thanks to MeLTs. The technology exposure sessions were a treat to the students and they showed lot of enthusiasm in attending the same.

To evaluate the outcome of the technology exposure a third part post-test only experimental design method was used to undertake the impact assessment study.

5. Impact Assessment:

5.1 Objectives:

The objectives of impact assessment study were to determine the profile of the beneficiaries of the MeLT project. To study the nature of e-content utilized through VSAT Enabled Mobile E-learning Terminals and to study the reactions of students, teachers and administrators towards various modalities used in delivering e-content as listed below:

- Quality of e-contents delivered (relevance of content, quality of video, quality of audio, simplicity of language, adequacy of explanations, quality of illustrations,

quality of text, rate of delivery, relevance of examples, integration of questions to stimulate thinking, usefulness of content etc.)

- Benefits (in terms of interaction among learners and with teacher. Learning, motivation, interest, access to education, supplement to teaching, additional knowledge and skills, independent learning, development of higher thinking skills, awareness regarding use of technology etc.)
- Problems faced (seating arrangement, supervision, screening, concentration of students, audio, viewing, distraction from environment, pace of delivery, etc.)
- Problems faced by project staff (number of students, non-cooperation by teachers, punctuality, students' basic knowledge, concentration, motivation, distance, basic amenities and facilities, etc.)
- Suggest strategies to improve the effectiveness and efficiency of the Van Based MeLT.

Thus a purposive sampling technique was used and was applied in the institutions falling in the jurisdiction of the following four network institutions (table 5):

Birla Institute of Applied Sciences, Bhimtal
HMD Garwhal University, Srinagar (Uttrakhand)
Rajasthan Technical University, Kota
Shri Mata Vaishno Devi, Katra (SMVDU)

Table 5: Deployment parameters for MeLTs

Technology exposure was provided by the four selected network institutions to the students of selected schools and colleges in their respective regions. From each school, 20-60 students, 3-5 teachers and Principal were included in sample for the study. In this paper we shall restrict the scope of our discussions to the five institutions/ schools falling under the jurisdiction of SMVDU, Katra.

5.2 Tools used for the impact assessment:

A set of four bilingual questionnaires, one each for Principal of the school/college, Teachers, students and Project Personnel were designed to elicit the necessary data and information. Data collection was done after providing the technology exposure to students of selected schools. Questionnaires were filled by the Principals, Students and Teachers based on the information pertained to the following:

General Information **(Principals)**
Number of Students **(Principals)**
Number of Students & Teachers **(Principals)**
Quality of e-content **(All)**
Benefits of e-content **(All)**
Problems faced **(Principals, Teachers, Students and Project Personnel)**
Attitude Towards Integration of Technology **(All)**

Table 6: Broad parameters of the questioners

5.3 Perceptions of Principals: Quality of e-content

The e-content was considered relevant and simple to understand by 80% of the principals. Sixty percent of the principals found the audio quality and the examples used in the content delivered as most relevant or relevant to the context. The quality of video of e-content was rated as good by 80% of the Principals. Seventy percent of the principals of schools found quality of illustrations (diagrams, figures, illustrations) as good. Majority of the Principals (86%) rated the quality of demonstrations as good.

5.4 Perceptions of Principals: Benefit of e-content

All the Principals agreed that e-contents used in VSAT mobile e-learning materials has created interest for the subject among students (100%); increased motivation for further study (100%); generated interaction among students (100%); supplemented classroom instruction (100%); created awareness regarding technology among students (100%); enhanced skills in use of computers (100%). All the Principals stated that there were no major problems related to seating arrangement, supervision, arrangement for screening, audio and viewing and pace of the delivery.

5.5 Perceptions of Teachers: Quality of e-content

Sixty four percent of the teachers covered under the survey perceived that the quality of e-content as relevant or most relevant and found the language of the e-content easy. One factor for this percentage to be slightly low can be that the e-content was not developed specifically as a part of this project and ready to use content from different sources was used. The development of e-content was not a mandate of this project.

Almost all the teachers opined that examples used in e-content were either most relevant or relevant. Quality of audio in e-content was rated as satisfactory by majority of the

teachers. Both the quality of illustrations and demonstrations in e-content were rated to be good by majority of the teachers.

5.6 Perceptions of Teachers: Benefits of e-content

The plot (figure 1; table 7) show percentage of teachers who agreed, were indifferent or totally disagreed with the perceptions that were posed to them. It is clear from the plot that most of the teaches opined that e-content created interest for the subject among students, increased motivation to attend class and to opt for further study, provided examples for wide variety of settings, generated interaction among students and enhanced interaction with teachers, supplemented classroom instruction, provided additional knowledge, promoted independent learning, made learning easy, helped in clarification of doubts, provided exposure to number of experts, helped in developing reasoning ability, created awareness regarding technology among students, enhanced skills in use of computers and stimulated thinking. Majority of the teachers were of the opinion that e-contents were beneficial for them personally as well and created awareness regarding technology, suggested additional ways to use technology, motivated teachers for integration of technology in teaching-learning, enhanced use of technology in class-room, increased knowledge of subject matter, provided exposure to method of teaching, provided examples from wide variety of settings, helped in acquiring demonstration skills, helped in clarifying doubts and provided deeper insight in to the subject.

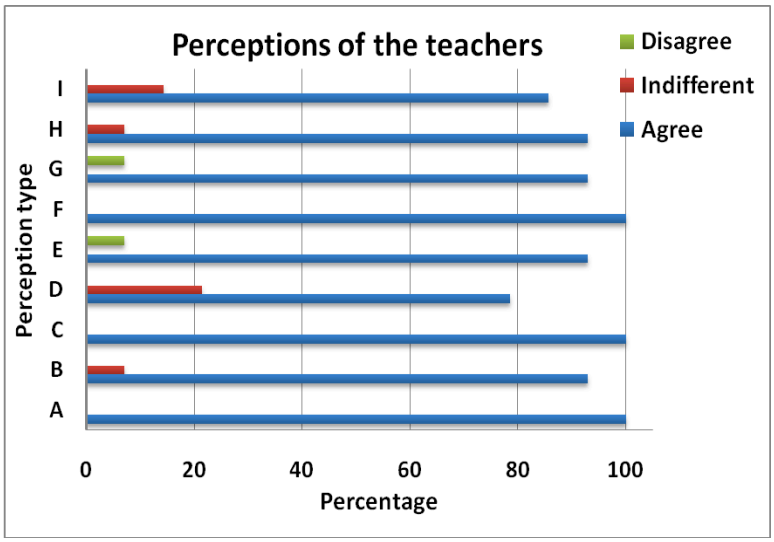

Fig 1: A plot of the percentage perceptions (table 7) of the teachers

Label (Y axis)	Particular perception of the teachers
A	e-content created interest for the subject among students
B	Increased motivation for further study
C	Generated interaction among students
D	Supplemented classroom instruction
E	Promoted independent learning
F	Made learning easy
G	Enhanced skills in use of computers
H	Created awareness regarding technology among teachers
I	Provided deeper insight into the subject

Table 7: Type of perceptions of the teachers that were included in the survey

5.7 Problems faced

Majority of the teachers did not report any major problems of, supervision, screening, and concentration, distraction from environment and pace of delivery during technology exposure to students. However, majority of teachers reported problem in supervision during technology exposure to students, problem in viewing of video films and some problems in audio which could be because of the fact that some of the schools did not have proper AV grade rooms and the sessions had to be conducted in the open. As a long term solution to this problem bus type V-MeLT was also developed and demonstrated. In this case the sessions were held inside the bus which is equipped with all such facilities.

5.8 Attitude towards Integration of Technology in Teaching-Learning

As a result of the technology exposure, it was observed (figure 2; table 8) that majority of teaches agreed that integration of technology in teaching and learning can lead to enhanced access to education. It is an excellent way to supplementing class-room teaching and leads to an increased interaction between teachers & students which acts as an enabler to make students more and more active. Integration allows students to learn at their own pace. Learning in multi-media environment leads to enhanced learning thereby arousing motivation to learn more than in normal class making learning an enjoyable affair than learning in normal classroom. Teachers also agreed that delivery with individual computer is beneficial than through shared terminals.

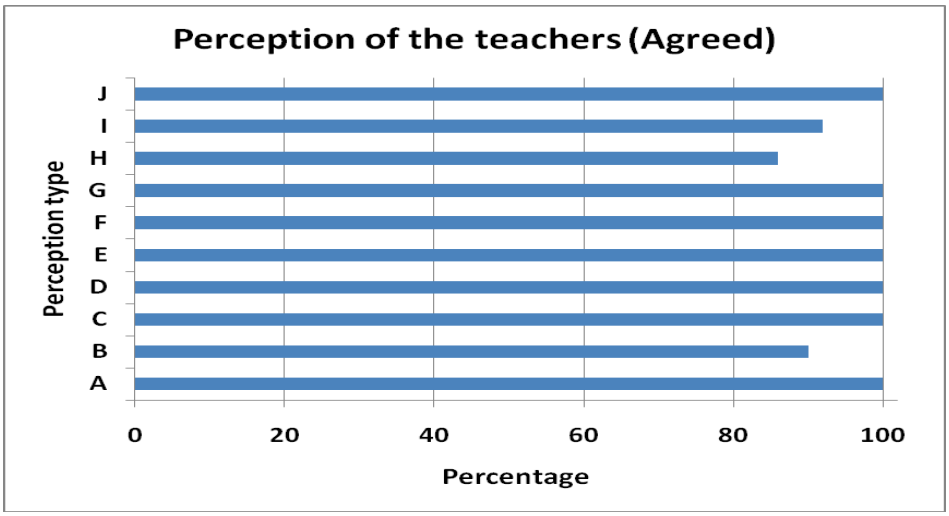

Fig 2: A plot of the percentage perceptions (table 8) of the teachers in agreement

Label (Y axis)	Particular perception of the teachers
A	Integration of technology in teaching and learning resulted in enhancing access to education (100%)
B	Supplementing class-room teaching (90%)
C	Increasing interaction between teachers & students (100%)
D	Increasing interaction among learners (100%)
E	Making students active (100%)
F	Allowing students to learn at their own pace (100%)
G	Enhancing learning in multi-media environment (100%)
H	Arousing motivation to learn more than in normal classroom (86%)
I	Enjoyable than learning in normal classroom (92%)
J	Delivery with individual computer beneficial (100%)

Table 8: Type of perceptions of the teachers

One can conclude (figure 3; table 9) that majority of the teachers expressed their disagreement that use of e-content is a waste of time and e-content delivery is just a tool for fun and nothing more of the students. Majority further disagreed that e-contents do not provide opportunities to students to clarify their doubts and that sitting and listening to e-contents is boring.

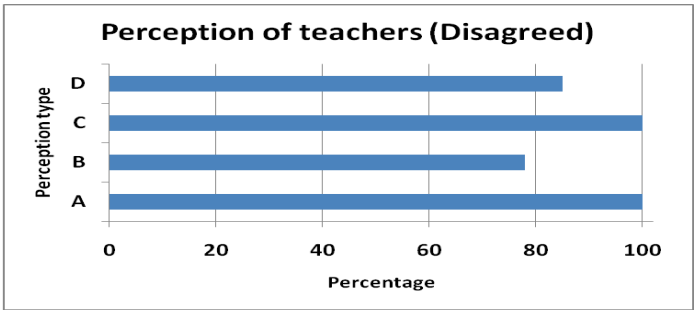

Fig 3: A plot of the percentage perceptions (table 9) in disagreement of the teachers

Label (Y axis)	Particular perception of the teachers
A	Use of e-content is a waste of time (100%)
B	e-content delivery is just a fun for students (78%)
C	e-contents do not provide opportunities to students to clarify their doubts (100%)
D	Sitting and listening to e-contents is boring (85%)

Table 9: Type of perceptions of the teachers

Both Principals and teachers of various schools opined that there were no facilities in classrooms for use of technology in teaching learning and teachers lacked skills in use of technology. Internet facility is not available in most of the schools in remote areas. A few schools have computer laboratory but its utilization is limited. Principals suggested that teachers should be trained in integrating technology in teaching learning and adequate facilities should be created in classrooms.

5.9 Perceptions of Students - Quality of e-content

As a part of this study it was observed that majority of the students found that the e-content which was delivered to them was either most relevant or relevant. Most of them found that the language of the e-content easy (a mixture of English and Hindi based e-content was used). Majority of the students found the use of examples in e-content as most relevant or relevant. They rated the quality of audio, video, illustrations and demonstration as good.

5.10 Benefits of e-content to students as described by students

Majority of the students (figure 4; table 10), who were provided technology exposure, were of the opinion that use of technology in teaching learning has been beneficial to them in creating interest for the subject among them. They feel motivated for further study after having gone through the exercise. It has lead to increased interaction among the students. They have been able to get extra inputs which they were unable to get in their normal classroom teaching resulting in excellent supplementing of the classroom teaching. The technology exposure has provided them with additional knowledge and has promoted a sense of independent learning among the learners. Since most of the students were exposed to e-learning technologies for the first one could observe that the awareness levels of the students were enhanced. Students observed that learning through technology is more enjoyable than traditional classroom learning. At the end of the technology exposure resulted in enhancing the computer skills of the students.

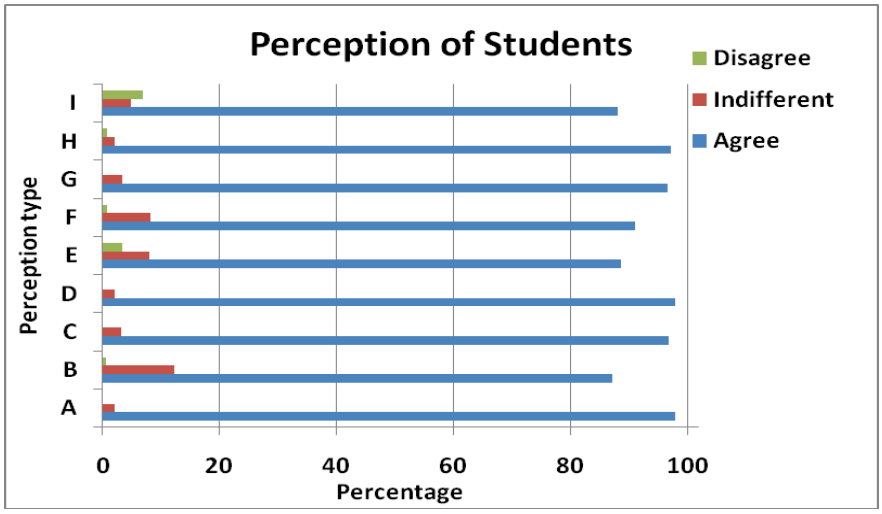

Fig 4: A plot of the percentage perceptions (table 10) of the students

Label (Y axis)	Particular perception of the teachers
A	Created interest for the subject among students
B	increased motivation for further study
C	generated interaction among students
D	supplemented classroom instruction
E	provided additional knowledge
F	promoted independent learning
G	created awareness regarding technology among students
H	enhanced skills in use of computers
I	learning through technology is more enjoyable than learning in classroom

Table 10: Type of perceptions of the students that were included in the survey

5.11 Problems faced

As most of the schools did not have proper rooms (AV grade) some of the students reported that there were some problems with respect to the seating arrangement, inadequate arrangement for screening which resulted in lack of concentration in a few cases, distractions from environment.

5.12 Attitude towards Integration of Technology in Teaching - Learning

Majority of the students agreed that use of technology in teaching-learning results in enhancing access to education not only for the normal students but is also helpful to students who are faced with some disabilities. It helps in supplementing classroom learning by the use of proper e-content which is helpful and provides that extra input which otherwise is missing due to non availability of access to technology in rural areas. Use of technology leads to a lot of queries among the students which, forces enhanced levels of interaction with the teachers and peers. It also allows them to learn at their own

pace and enhanced learning due to multi-media environment (text, audio, visuals etc.) which is normally missing in chalk and board type of teaching prevalent in all such schools. As a result of this students reported that it has motivated them to learn and has made learning more enjoyable than learning in their traditional classroom. Access to individual computers is beneficial.

Majority of the students disagreed that use of e-content is a waste of time and e-content delivery is just a fun for students. E-contents do not provide opportunities to students to clarify their doubts and sitting and listening to e-content is boring.

6. Lessons Learnt

On the whole, the technology exposure provided to the students and teachers through V-MeLT has been appreciated and well received by Principals, students and teachers. As a matter of fact this happened to be the first intervention of its kind to have reached these schools as was opined by most of respondents. One of the significant remarks made by the Principals include the following "Students are getting lot of benefits of educational technology through MeLT project. This project needs to be continued. I strongly recommend this MeLT project to continue so that students may get most benefit of it".

On the basis of the findings and suggestions made by Principals, teachers and students, it is observed that identification of network institutions in various regions proved to be a one of the most critical reasons behind the successful implementation of the project and enhanced efficiency and effectiveness of the intervention. It was observed from the study that selection of e-content should be based upon the needs of the students and the context. The e-content should be preferably developed in regional or local language involving local teachers especially in case of school students to make it more effective. Another strong possibility that was observed from the study that the students and teachers suggested that the available e-content developed at the international level by various organizations should be dubbed in local language to make it easier for the students to understand for the students. It was also observed that there is a strong need for e-content covering variety of subjects and which would inculcate curiosity and creative thinking among the students rather than focusing alone on standard e-content being developed by most of the agencies. One important lesson that was learnt as a part of this exercise was that MeLTs sould be planned primarily for remote areas with inadequate educational facilities, disadvantaged or minority groups lacking educational facilities or time, physically challenged groups not in a position to take advantage of existing facilities and

economically weaker sections of the society. The duration of intervention, technology exposure should be for a longer duration.

7. Acknowledgements

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