DIGITAL LIBRARY:

PILOT TESTING IN KARNATAKA, INDIA

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I Executive Summary

Education Development Center (EDC) has developed a digital library for government primary and secondary schools in India. The digital library, which consists of 450 radio programs, video films and learning software can be navigated and searched in three languages: English, Hindi and Kannada. The content in the digital library, which caters to classes I to VIII, is in the subjects of Mathematics, Social Studies, Sciences, Environmental Science and language and is available in English, Hindi, Kannada and other regional languages. Azim Premji Foundation (APF), Confederation of Indian Industry (CII) Shiksha, Directorate of State Education Research and Training (DSERT) Karnataka, Digital Study Hall and EDC have provided content to the digital library.

The digital library has two components, the first of which is a website (http://www.edudl.gov.in) hosted by National Informatics Center (NIC), Karnataka, which consists of a searchable catalog of all the content in the digital library including links to download all of the content itself. Users can search the website for content by keyword, subject, title, language, audience and type of media, and can then download the content directly from the website or order it from EDC. The second component is a scaled-down CD version, which is a virtual replica of the digital library website but does not contain any links to the content. Once users have searched the CD and identified the content they want they can order it from EDC.

To examine the use and feasibility of the digital library, pilot testing was carried out in the state of Karnataka at six sites including two primary schools, two Block Resource Centers (BRCs), one District Institute of Education and Training (DIET) and one library for a period of three months. Three of the sites were provided a subset of the digital library content (36 items) and three other sites were provided the digital library CD version and asked to order 20 items from EDC. Officials overseeing each site were asked to disseminate information about the digital library to teachers in their jurisdictions; and to further ensure that each site functions as a nodal point where teachers can come to view or borrow the content.

The main purpose of the pilot testing was to examine: the applicability of the CD version of the digital library; how information about the digital library is disseminated to schools and teachers; ways in which officials and teachers make use of the content; the value of the content for teachers and students; and the positive and limiting factors in the access to and usage of the digital library and its long-term feasibility.

The digital library CD was found to be easy to navigate and search provided a computer literate person was present during the process. Further, various successful means were employed to disseminate information about the digital library including,

- Discussing it in meetings at the BRCs and cluster resource centers (CRCs) and in headmasters (HMs) sharing meetings
- BRC and CRC officials sending circulars to schools about it and orally informing HMs and teachers about it during school visits and teacher trainings
- Convening meetings at the sites to inform teachers from neighboring schools about it
- Displaying information about it on notice boards

In total around 150 teachers from approximately 50 schools and 100 teacher trainees viewed the digital library content. Further,

- The majority of teachers borrowed the content from the sites and viewed it at their homes
- Very few teachers viewed the content at the sites or brought their students to the sites
- Teachers from some schools with computers borrowed the content and made copies of it and showed it to their students
- Few teachers borrowed the content and viewed it in public places (with computers)
- The content was shown in teacher trainings
- All the students at the nodal schools and all the teacher trainees at the DIET viewed the content
- Video films were the most popular format of content that were viewed

The teachers who viewed the content felt that is was valuable in many ways including,

- It helped them to empower their knowledge; to build content and subject enrichment; to clarify and reinforce certain concepts; provided methods, examples and activities that could be emulated in their classrooms; enhanced their knowledge by helping them learn new techniques, activities and ideas; and helped them to prepare Teaching Learning Materials (TLMs) including charts and models
- It is useful for teacher trainees in their practice teaching, in subject based teacher trainings and for mutligrade teaching
- It is also very useful for students as it helps create interest; is useful in clarifying difficult concepts and reinforcing learning; helps in retention of concepts and information; and in aiding the students to visualize places and events

However taking into account the information and communications technologies (ICTs) infrastructure and the systemic problems the primary and secondary education sector faces in Karnataka, the sustainability of the digital library depends on many factors including,

- The level of interest that education departments, BEO, BRC and CRC officials; schools HMs; and ultimately the teachers themselves take in the digital library will determine its long term success
- Information about the digital library needs to be disseminated in all meetings where BEO, BRC and CRC officials, HMs and teachers are present
- CRCs and BRCs are the most popular sites for teachers to borrow and return the digital library content as teachers go to these offices on a more regular basis
- Multiple copies of the digital library content are needed so they can be placed in more than one nodal site in a particular cluster or block
- The content that is being used by teachers and officials should be compatible with the school curriculum and its viewing should be coordinated with the academic calendar
- Education offices and schools need Internet access and good bandwidth connectivity so content can downloaded faster from the digital library website. At present only the DIETs have Internet connectivity, but with low bandwidths, so the downloading of the content from the digital library website takes a very long time.

II Introduction and Overview of Pilot Testing

Education Development Center (EDC) had developed a digital library, which will serve as a supplementary educational resource for government run and aided primary and secondary schools in India. The rationale to build a digital library was two fold. First, to provide teachers and officials the flexibility to access and use digital educational materials (radio programs, learning software or video films) as and when they want. Second, to ensure that the digital educational materials produced by diverse organizations in India, which have been used in various education projects, are available for use by teachers and officials after the end of their project cycles.

The digital library, which can be navigated and searched in three languages: English, Hindi and Kannada contains 450 radio programs, video films and learning software. All the content in the digital library can be viewed on computers, and CDs of the radio programs and video films can also be viewed on a TV through a VCD player. The content in the digital library, which caters to classes I to VIII, is in the subjects of Mathematics, Social Studies, Sciences, Environmental Science and language and is available in English, Hindi, Kannada and other regional languages. Various non-governmental and governmental organizations including Azim Premji Foundation (APF), Confederation of Indian Industry (CII) Shiksha, Directorate of State Education Research and Training (DSERT) Karnataka, Digital Study Hall and EDC have provided their content to the digital library.

The digital library has two components the first of which is a web site (http://www.edudl.gov.in) hosted by National Informatics Center (NIC), Karnataka. The website consists of a searchable catalog of all the content in the digital library including links to download all of the content itself. Users have the option to search for content by keyword, subject, title, language, audience, and type of media in English, Kannada or Hindi. Users can then download content directly from the web site or can write to or email EDC to order and obtain the content. The second component is a scaled-down CD version, which is a virtual replica of the digital library website but does not contain any links to the content. Users need a computer to browse the CD to search for content, and then can write to or email EDC to order and obtain it. The CD version of the digital library will be distributed to district and block level education offices, primary schools and to public libraries (that have computers, but no Internet connection).

To examine the use and feasibility of the digital library, pilot testing was carried out in six sites in Bangalore rural and urban districts in the state of Karnataka. Three of the sites were provided a subset of the digital library content (a total of 36 pieces of content chosen in a workshop by teachers and officials from Bangalore urban and rural districts) and three other sites were provided the digital library CD version (and asked to search the CD and to order 20 pieces of content from EDC). Officials overseeing each site were asked to disseminate information about the digital library to teachers in their jurisdictions; and to further ensure that each site functions as a nodal point where teachers can come to view or borrow the content.

The main purpose of the digital library pilot testing was to examine:

- The use and applicability of the CD version of the digital library

- How information about the digital library and its content is disseminated to schools and teachers
- Ways in which officials and teachers view/borrow the content
- The value of the digital library content for teachers and students
- The positive and limiting factors in the access to and usage of the digital library and its long-term feasibility.

A quantitative and qualitative methodology comprising monitoring, registers to record data, a questionnaire, a feedback form and focus group discussions were employed as part of the monitoring and evaluation plan for the digital library pilot testing. The digital library pilot testing began in late November 2006 and ended in the first week of March 2007.

III Pilot Testing Sites

The digital library pilot testing was carried out in Bangalore urban and rural districts. The main criteria for choosing the sites were:

- The site had two or more computers in functioning condition, or some of the schools under the jurisdiction of the site had two or more computers in functioning condition.
- The officials at the site were enthusiastic, responsive and committed to the project.
- Projects employing digital educational materials had been implemented in the area where the site is located.
- The teachers in the jurisdictions covered by the site were aware of digital educational materials, even if they hadn't used them in their classrooms.
- There were at least two primary schools in a radius of 5 km from the site.
- Teachers who were not based at the site had physical access to it.
- The site was a representative sample of a nodal point in Karnataka where teachers could come to access, view or borrow digital educational materials.

Based on these criteria a total of six sites were chosen. Three of the sites were provided with a subset of the content (36 items including a mix of radio programs, video films and learning software) that is available in the digital library; and three other sites were provided the CD version of the digital library and asked to search the CD and order content (20 items) from EDC.

A base line survey was also conducted to determine the current situation in each of the six sites pertaining to what EDC hoped to achieve through the implementation of the digital library. This included examining:

- What the computers at the site are used for, the condition they are in and the computer literacy of officials and teachers
- How and whether any digital educational materials are desired, disseminated to or being used by teachers in and under the jurisdiction of the site; and if there are any libraries in or near the site

- What are the dissemination methods to provide any type of educational materials to the teachers affiliated with the site
- Does the site function as a nodal point for teachers to access/view/borrow any type of educational materials
- Any studies done regarding the impact of digital educational materials used at the site

A discussion of each site is provided below.

1 Ramanagaram Block Resource Center (BRC), Bangalore Rural District

One copy of the subset of the digital library content (36 items) was provided to the BRC and another copy of the subset was provided to a primary school, which is adjacent to the BRC. BRC officials would disseminate information about the digital library and its content to teachers in the block and have them view/borrow the content.

There are 296 primary schools in the block and ten of them have computers. The BRC has two computers both of which are used for administrative purposes, and a TV and a LCD projector which are used for teacher trainings. There is a library with 150 reference books in the BRC, which is used by the officials. The primary school adjacent to the BRC has five computers and three were in working condition. APF's and EDC's learning software are being used in the primary school. Two officials at the BRC and two teachers at the school knew how to use computers. No teachers or students, from any neighboring schools, come to the BRC or the adjacent primary school to use their computers, and the BRC does not disseminate any digital educational materials to the schools in the block. Additionally no formal study has been done regarding the impact of digital educational materials used in the schools in the block, but the BRC officials felt that these materials were helpful to both the teachers and students.

2&3 Basavanagudi Government Higher Primary School, Bangalore Urban District & Srinagar Government Higher Primary School, Bangalore Urban District

A subset of the digital library content (36 items) was provided to both these two sites. BRC and cluster resource center (CRC) officials overseeing the two schools and the headmasters (HMs) of the schools would provide information about the digital library and its content to teachers from primary schools near the two sites and have them view or borrow the content.

The Basavanagudi primary school has eight computers (six were in working order) and the Srinagar school has six computers (four were in working order), and the APF and EDC learning software is being used in both the schools. Two teachers at each school know how to use computers, and no teachers or students visit either of the two sites to use their computers. The BRC and CRC officials overseeing the two schools and the schools HMs know about digital educational materials, and also stated that there was a demand for such materials. There is a public library near both of the schools, each of which has about 10,000 books but there are no digital educational materials in the libraries. No formal study has been done regarding the impact of the digital educational materials used in the two sites, but the teachers in both sites felt that these materials was beneficial to them as well as the students.

Note: The Srinagar primary school was initially not part of the pilot testing. However at the orientation meeting to inform the officials and teachers from the Basvanagudi school about the digital library teachers from neighboring schools were also invited. Two teachers from the Srinagar school attended this meeting and at its conclusion they requested EDC officials to include their school as a pilot testing site for the digital library project.

4 K. R. Puram Block Resource Center (BRC), Bangalore Urban District

The digital library CD version was provided to this site. BRC officials and some teachers searched the CD and ordered content (20 items) and placed it in two primary schools (with two working computers each) in the block. BRC and CRC officials and the two primary schools HMs would disseminate information about the digital library and its content to teachers in the block and have them view or borrow the content.

There are 98 primary schools in the block and 25 of them have computers and some of these schools use the APF and EDC software. The BRC has one laptop, which is used for administrative purposes and all the officials in the BRC know how to use it. There is also a TV, LCD player and a library with 150 reference books in the BRC, which is only used by the officials. No public libraries in the block have any digital educational materials. The officials at the BRC use teleconferencing to train teachers however they do not disseminate any digital educational materials to the primary schools in the block, but they did mention that there is some demand for these materials.

5 District Institute of Education and Training (DIET), Bangalore Urban District

The digital library CD version was provided to this site. DIET faculty and the teacher trainees searched the CD and ordered 20 pieces of content.

There are five computers at the site, which are used by some of the faculty and other officials but the teacher trainees at the DIET don't usually have access to them. There is however, a Microsoft computer lab (used to provide computer training to teachers from all over the state) adjacent to the DIET that has 40 computers. The faculty and officials at the DIET use teleconferencing for training purposes but are not using any digital educational materials to teach the teacher trainees. There are 100 teacher trainees at the DIET every year (divided into 1st and 2nd year students) and they go through a weeklong compulsory computer-training course at the adjacent Microsoft computer lab. There is a library in the DIET that has about 1,500 books but no digital educational materials. Further as the education system has been decentralized the BRCs and CRCs instead of the DIETs are responsible for providing educational materials to schools. The DIET was the only site in the study that had Internet connectivity.

6 State Educational Library, Sheshadripuram, Bangalore Urban District

The digital library CD version was provided to this site. Library officials along with some teachers searched the CD and ordered 20 pieces of content.

The library does not host any digital educational materials, and library officials stated that the teachers who come to the library do not ask for any such materials. There are two computers in the library, which are mostly used for indexing of books, and one librarian knows how to use them. Teachers can request the library to get educational materials, but the library can only do so if it has the required funds. Further the library only loans books to individual members and not to BRCs, CRCs or primary schools.

IV Meetings with Officials & Teachers from the Sites

A series of workshops and meetings were held related to the pilot testing.

Workshop to Choose Digital Library Content for Three Sites

A workshop was held with 35 participants including primary school teachers and HMs and DIET, BRC and CRC officials from Bangalore urban and rural districts in September 2006. The purpose of this workshop was to have the participants choose a subset of the digital library content, which addresses the resource needs of primary schools in Karnataka. As a result of this exercise 36 items (a mix of radio programs, video films and learning software) were chosen.

Meeting With Sites Which Were Provided Subset of Digital Library Content

A daylong meeting was held with officials and teachers from each site (including officials and teachers from primary schools neighboring the sites, which didn't have computers) in the months of November and December 2006. For the three sites that were provided with the subset of digital library content, the scope and features of the digital library were demonstrated to the participants (through the Kannada language collection). After that the aim of the digital library pilot testing was conveyed to the participants. The participants were then broken into the following groups: BRC officials, CRC officials, HMs, teachers from schools with computers, and teachers from schools without computers. Each group was asked the following open-ended questions:

- How can information about the digital library and its content be disseminated to teachers
- How and where can teachers access the digital library content
- How can teachers make use the digital library content once it is available to them
- Time, dates and occasions teachers can come and view/borrow the digital library content

Each group discussed these questions for an hour, wrote down their responses and then presented them. The participants were then informed of the monitoring and evaluation plan regarding the pilot testing for their site. Following this activity two nodal persons were chosen from each site. These nodal persons were held responsible to oversee that all the information pertaining to the monitoring of the site and to the usage of the digital library content would be noted in registers. Further the officials overseeing each site were asked to ensure that information about the digital library and its content will be disseminated to primary school teachers.

Meeting With Sites Which Were Provided the Digital Library CD Version

The agenda and orientation for the meetings for the three sites that were provided the CD version of the digital library were identical to the other three sites, which were provided with a subset of the digital library content. However for these three sites the nodal persons from each site were given the digital library CD version and asked to convene a meeting at their site (with both officials and teachers involved) to search the CD and to order 20 pieces of content from EDC.

Review Meeting

A review meeting was held in the first week of January 2007 with all the nodal persons from the sites regarding what each site has been doing (or is planning to do) pertaining to disseminating information about the digital library and its content; and having teachers view/use/borrow the content.

Focus Group Discussions

Focus group discussions regarding the whole pilot testing process and the feasibility of the digital library were held in the first week of March 2007 at each site. The nodal persons along with officials overseeing each site and some of the teachers who had viewed/used/borrowed the digital library content were invited.

V Monitoring and Evaluation Plan

A quantitative and qualitative methodology comprising monitoring, registers to record data, a questionnaire, a feedback form and focus group discussions were employed as part of the monitoring and evaluation plan for the digital library pilot testing. Specifically the monitoring and evaluation plan consisted of:

- Nodal persons from each site carried out the monitoring at their site based on a monitoring checklist provided to them. EDC officials also monitored each site.
- Registers, maintained by the nodal persons, were used to note information regarding the names of the teachers who viewed/borrowed the content, the schools they came from, the content they viewed/borrowed etc.
- Teachers who viewed/borrowed any of the digital library content filled out a quantitative questionnaire, which addressed the technical and ease of use issues related to the content.
- Each teacher who viewed/borrowed the digital library content filled out a feedback form noting their impressions of the project.
- All the registers, questionnaires and feedback forms were collected and compiled by the nodal persons and submitted to EDC at the end of the pilot testing.
- At the end of the pilot testing focus group discussions were held at each site with the nodal persons from the site, the officials overseeing the site and with some of the teachers who had viewed/borrowed the content from the site.
- During the focus group a series of 12 to 14 open-ended questions, pertaining to the main purpose of the pilot testing, were posed to the participants.

- At the end of the pilot testing EDC analyzed all the quantitative and qualitative data that had been gathered.

VI Results of the Pilot Testing

The data gathered from each of the six sites is enumerated below.

1 Ramanagaram BRC, Bangalore Rural District

BRC officials disseminated information about the digital library in the sharing meetings with CRC officials and school HMs, and in teacher training sessions. Whenever BRC officials visited any primary school in the block they also informed its HM about the digital library. The primary school adjacent to the BRC convened a meeting of HMs of some neighboring primary schools and discussed the digital library.

Twelve teachers from seven schools borrowed content from the BRC. Nine teachers from nine schools borrowed content from the primary school adjacent to the BRC, and two schools with computers copied the content. Further one school brought its students to view the content at the school adjacent to the BRC. The majority of teachers who borrowed the content viewed it at their home since they did not have computers in their schools. 15 of the 36 pieces of content (all the video films) were shown as part of teacher trainings at the BRC. Further eight teachers used the content in the school adjacent to the BRC and showed it to students from classes I to VIII.

The teachers felt that the content helped them in subject enrichment and in reinforcing certain concepts, and some of the examples and activities in the content helped them to prepare Teaching Learning Materials (TLMs). They also stated that some of the teaching methods used in the content could be borrowed and applied in their own classrooms. The teachers also felt that when the students saw the content it helped them in many ways including: making abstract concepts clearer, helped them see places and events that they hadn't been able to visualize and helped increase their retention of information. For example students were better able to understand how electro-magnetic rays pass and how radio waves move after viewing a video film. Additionally BRC officials were of the view that video films were very helpful for subject based teacher trainings at the BRC.

To make the digital library more feasible it was felt that during teacher trainings at the BRC the teachers should be shown the digital library CD version so that they can have an idea as to how it looks, functions, and the type of content it hosts. The teachers then can choose the content to be ordered. Further if two teachers from each cluster were trained about the digital library they could disseminate information about it throughout the cluster more effectively. BRC officials also suggested that the digital library content could be shown to teachers at certain times on every Saturday at the BRC. It was also suggested that if a teacher plans to show the content to students she should view the content in advance, thereby being better equipped to explain it.

BRC officials felt that if an order were passed by the block education office (BEO) to make use of digital library mandatory its usage would increase. They also suggested that it would be better

if multiple copies of the digital library content were made available, rather than having teachers borrow and return the content to one or two designated sites. The teachers were also of the opinion that one important factor for the success of the digital library would be to ensure that the ordered content matched the taught curriculum, and its viewing should be coordinated with the beginning of the schools' academic calendar.

2&3 Basavanagudi & Srinagar Government Higher Primary Schools, Bangalore Urban District

To disseminate information about the digital library one meeting was held at both of the two schools, which was attended by teachers from neighboring schools. The HMs of the two schools also discussed the digital library in the HMs sharing meetings at the BRC and CRC. Teachers from these two schools also told teachers from other schools about the digital library wherever they meet, and students from these two schools were also asked to tell students from other schools about the digital library. Information about the digital library was also displayed on notice boards in both the schools.

Twenty-six teachers from ten schools borrowed content from the Basvangudi school and sixteen teachers from eight schools borrowed the content from the Srinagar school. A teacher-training institute also borrowed six pieces of content from the Basvanagudi school. Further, one teacher borrowed the content and viewed it at the City Central Library and another teacher took her students to an English medium school and showed the content there. Two schools with computers copied all of the content from the Basvangudi primary school and showed it to their students. All the students at these two schools viewed the content.

No Computers in School to View Content… No Problem!

A government higher primary school, located near the Basvanagudi primary school, did not have computers. Yet as part of the information dissemination activities related to the digital library pilot testing the teachers at this school came to know that some of the digital library content was available at the Basvanagudi school. These teachers did not hesitate to borrow some of the content from the Basvanagudi school and took their students to a nearby library, which had computers, to view the digital library content.

The teachers felt that the digital library content was helpful as it empowered their knowledge, built content enrichment, reinforced certain concepts, provided pertinent examples and activities, and was useful for mutligrade teaching. The teachers who viewed the content with students also felt that it helped make abstract concepts clearer for them. For example after seeing some video films the students understood the concept of a reserve forest and were also able to see some historical places for the first time.

Overall it was recommended that the digital library could be more effective if it was shown and clearly explained to teachers and HMs. Further it would be better to designate a BRC or CRC as a site for borrowing content, along with any primary schools, as more teachers go to these offices on a regular basis. Additionally multiple copies of the digital library content were needed as having only one copy of the content at a certain nodal site was not feasible.

4 K. R. Puram BRC, Bangalore Urban District

BRC and CRC officials and ten teachers held a meeting at the BRC during which the participants searched the digital library CD version and chose twenty items to order. The participants felt that the digital library CD was easy to search and understand, however they also felt that a person knowledgeable about computers had to be present during the process of searching the CD. BRC officials then disseminated information about the digital library in monthly sharing meetings with HMs. Further the two nodal schools where the ordered content was placed also convened two meetings each where teachers from neighboring schools were informed about the digital library. In these meetings a timetable to view or borrow the content at the nodal schools was drafted. The CRC officials overseeing the two nodal schools also informed all the schools in the cluster about where the content could be accessed.

In the first nodal school fifteen teachers from ten schools borrowed the content and two teachers came to the school to view the content. In the second nodal school eighteen teachers from twelve schools borrowed the content, and six teachers from four schools came to view the content. Additionally all the students in both the nodal schools viewed the content.

The teachers felt that the digital library content was useful for content enrichment, clarifying difficult concepts, enhancing knowledge and for learning new techniques, activities and ideas that could be applied in their regular classroom teaching. They also felt that when the students viewed the content it enhanced their involvement in the learning process, sustained their interest, helped in the retention of concepts for a longer time and provided examples of role-playing, which could be replicated in the classroom. BRC and CRC officials were of the view that placing the content at the CRC is a better option as then teachers from all schools in the cluster have easy access to it. The officials also felt that it would not be possible for the BRC or CRC to make mass copies of the content and to distribute it in the block or cluster. However teachers' grants and individual schools' and community resources could potentially be used for this purpose. It was also suggested that the digital library needed to host additional content in Tamil, Telegu and Urdu languages for minority schools.

5 DIET, Bangalore Urban District

Twelve groups of teacher trainees (four in each group) went through the digital library CD version, and based on this exercise a list of 45 items was compiled by them in diverse subjects and formats. DIET faculty bearing in mind the future teaching needs of the trainees narrowed this list to 20 items and ordered it from EDC. The DIET faculty and trainees felt that the CD was easy to browse and use, however they pointed out that when detailed information is given about each title in the digital library, it would be helpful to also have a listing of the competencies that the content addresses.

Information about the digital library was provided orally during classes to all the teacher trainees by the DIET faculty. The trainees were then divided into four groups and asked to view the content at the adjacent Microsoft computer-training center. Once all the content had been viewed each group was asked to consolidate and document its opinions about the content. The content was then placed in the in Education Technology Cell of DIET, but only two DIET

faculty viewed it. No information about the digital library was disseminated to any officials or teachers who were not working or studying at the DIET itself.

The teacher trainees felt that the digital library content was helpful to them as they could employ the explanation of concepts, activities, examples and teaching styles in their practice teaching. They also felt that by doing this they could better communicate in the classroom, and that the content helped them immensely in preparing teaching materials like charts and models. The DIET faculty agreed that the digital library content was very useful for the trainees as it helped them become better teachers. Additionally DIET officials were of the view that if they got directives from DSERT to make mass copies of the content they could then provide it to the BRCs and CRCs in their jurisdiction.

Video Films, History and Archeology

During the focus group discussion at the DIET all the teacher trainees appreciated the Kannada video film series: 'Young Historians.' One student by the name of Chetan, a second year D.Ed. student, was inspired by a film in the series called 'Shasana Saruva Ithihasa,' which discussed the history as revealed by stone edicts. Surprisingly he found one of the stone edicts mentioned in the film in his native village of S. Bidare (Kadur taluk, Chikkamagalore district). Chetan copied the writing on the stone edict and provided it to the archeological department in Bangalore to have it deciphered.

6 State Educational Library, Bangalore Urban District

A meeting was held at the library in which library officials and five teachers searched the digital library CD and ordered 20 pieces of content. The participants felt that the CD was easy to navigate, but a person knowledgeable about computers needed to be present during this process.

Information about the digital library was disseminated through the notice board in the library and library officials also mentioned it to teachers who visited the library. Twenty-two teachers and teacher trainees viewed the content in the library, fifteen teachers and teacher trainees borrowed the content and viewed it in their homes, and eight teachers borrowed the content and showed it to their students in their schools. Students from two neighboring schools also came to the library to view some of the content.

The teachers felt that the digital library content was useful for content enrichment, for clarifying difficult contents, enhancing knowledge and learning new techniques and activities. The teachers who viewed the content with students also felt that it enhances their involvement in learning, sustains their interest and is very useful in the subjects of Mathematics and Science. Regarding the long-term feasibility of the digital library the librarian was of the view that apart from teachers borrowing the content he needed to prepare a timetable so that teachers and students could come and view the video films content on a TV in the library itself. Additionally library officials claimed that they did not have the funds to make mass copies of the content to provide it to any schools or teachers.

VIII Conclusion

The pilot testing of the digital library in Karnataka has demonstrated that it is a valuable supplementary educational resource for teachers, officials and students. The succeeding discussion will highlight the insights gained from the pilot testing in the six sites, followed by an enumeration of the limitations and obstacles this project faces. A normative discussion on the additional mechanisms that need to be in place to ensure the long-term feasibility and sustainability of the digital library in Karnataka is included at the end of the section.

Use and Applicability of the CD version of the Digital Library

The CD version of the digital library elicited reactions including,

- The CD is easy to navigate and search provided a computer literate person is present during the process
- Officials and teachers should both search the CD and come to consensus regarding what content should be ordered
- DIET faculty need to oversee what content is being ordered to ensure that is pertinent to the learning and future teaching needs of the teacher trainees

Disseminating Information About the Digital Library and its Content

Various successful mechanisms were employed to disseminate information about the digital library and its content including,

- It was discussed in sharing meetings at the BRCs and CRCs, and in monthly HM meetings
- BRC and CRC officials sent circulars to the schools in their jurisdiction about it
- BRC and CRC officials orally informed HMs and teachers about it during school visits
- BRC and CRC officials orally informed teachers about it during teacher trainings
- Teachers from nodal schools convened meetings and informed teachers from neighboring schools about it
- Teachers from nodal schools orally informed teachers from neighboring schools about it
- Notice boards were used to display information about it
- DIET faculty orally informed teacher trainees about it during classes and stipulated the mandatory viewing of the content

Using the Digital Library Content

In total about 150 teachers from approximately 50 schools and 100 teacher trainees viewed the content. Further,

- The vast majority of teachers borrowed the content from the sites instead of viewing it there

- Teachers who borrowed the content mostly viewed it in their homes as their schools did not have computers
- On an average four pieces of content were borrowed by a teacher for three to seven days from each site (except the DIET)
- Very few teachers took students to the sites to view the content
- Teachers from some schools with computers borrowed the content and showed it to their students
- In some rare cases teachers borrowed the content and viewed it or showed it to their students in some public places where computers were available
- A few schools with computers made copies of the content
- The content was shown in teacher trainings at the BRCs
- All the students at the nodal schools viewed the content
- All the teacher trainees at the DIET viewed the content at the Microsoft computer training center
- Video films were the most popular type of content that were ordered, borrowed and viewed

Value of the Digital Library

The teachers who viewed the digital library content felt that is was valuable in many ways including,

- It helped them to empower their knowledge; to build content and subject enrichment; clarify and reinforce certain concepts; provided methods, examples and activities that could be emulated in their classrooms; enhanced their knowledge by helping them learn new techniques, activities and ideas; and helped them to prepare Teaching Learning Materials (TLMs) including charts and models
- It is useful for mutligrade teaching and can also be shown when teachers are not present in the classroom
- It is useful for subject based teacher trainings
- It is very useful for teacher trainees as it helps them immensely in their practice teaching and also familiarizes them with digital educational materials

Further the teachers who viewed the content with their students also felt that it was very helpful to the students in many ways including,

- It helped create interest; was useful in clarifying abstract and difficult concepts and reinforcing learning; helped in retention of concepts and information; was useful in role playing in the classroom; and aided the students to visualize places and events
- It was useful to address the hard spots in the subjects of Mathematics and Science and in English and Kannada language pronunciation
- It helps slow learners in the classroom

Limitations and Obstacles

The pilot testing of the digital library produced some very promising results but also had some limitations including,

- Due to the time taken to develop the digital library web site and CD version and the date when the project had to be launched, the time period of the pilot testing was limited to three months.
- Once the digital library website was completed it has to undergo a security audit at NIC (with only the auditors allowed to access the site), therefore it was not possible to choose a site (as part of the pilot testing) that could download content directly from the website.
- There were other delays and interruptions as officials from some sites could not meet immediately when the digital library CD version was ready; schools in Karnataka had exams in December; and teachers had to finish the Karnataka State Quality Assessment organization (KSQAO) program during the pilot testing period.

Beyond the specific limitations in the pilot testing there are other embedded factors that currently hinder the long term feasibility and sustainability of the digital library in Karnataka including,

- The relatively underdeveloped but growing information and communications technology (ICT) infrastructure in the primary and secondary education sector
- Lack of computers and Internet access in the BRC and CRC offices and in primary schools
- Low level of computer expertise among teachers and officials
- Inadequate maintenance of computers in schools and offices leading to many computers being left in unused conditions
- Lack of many projects employing digital educational materials being implemented
- Large share of teachers lacking training in using digital educational materials
- A lack of awareness, interest and commitment towards the use of digital educational materials on the part of some education officials and teachers

Long Term Feasibility and Success of the Digital Library

While the pilot testing of the digital library in six sites in Karnataka has revealed some very promising results there are certain obstacles and limitations that need to be faced. Therefore in the long run for the digital library to be feasible and sustainable the following ideas and mechanisms need to be examined and addressed including,

- The level of interest that BEO, BRC and CRC officials, schools HMs and ultimately the teachers themselves take in the digital library will determine its long term success
- The BEO in each block can pass directives to make use of the digital library mandatory and also provide some funds for making copies of the content
- If at least two teachers from each cluster are trained about the digital library they can disseminate information about it throughout the cluster more effectively.
- Information about the digital library needs to be disseminated in every sharing meeting where BRC and CRC officials, HMs and teachers are present

- Information about the digital library needs to be provided orally and through circulars and notice boards
- BRCs, CRCs and schools HMs can come up with a unified timetable for teachers to view and borrow the content at specific nodal sites
- The most popular sites for teachers to borrow and return the digital library content are CRCs and BRCs as teachers go to these offices on a regular basis rather than to any individual school
- The content that is being used by teachers and officials should be compatible with the school curriculum and its viewing should be coordinated with the school's academic calendar
- If teachers view the content with students they should view it in advance to be proficient in it.
- Multiple copies of the digital library content are needed so they can be placed in more than one nodal site in a particular cluster or block
- Making mass copies of the digital library content is a big cost issue and the use of a small amount of BRC, CRC and teacher's allowances for this purpose should be explored
- DIETs can make some copies of the digital library content and provide it to BRCs if they are allocated funds and given permission by DSERT
- BRCs, CRCs and primary schools with computers don't have the software to burn CDs
- Places like the Microsoft computer training lab need to be identified and used for viewing the content (there are four such Microsoft labs in Karnataka, all adjacent to different DIETs)
- The feasibility of using the digital library content in EDUSAT broadcasts needs to be examined
- The digital library content is very useful for teacher trainees and every DIET (and other teacher training institutes) should get the specific content which will help their students in their practice and future teaching
- The digital library content is very applicable and useful for subject based teacher trainings at DIETs, BRCs and CRCs and officials from these offices need to plan its usage while formulating their monthly or yearly trainings schedule
- The viewing of radio programs and video films content on VCD players and TVs needs to be encouraged where these technologies are present
- Teachers have to see the digital library website or the CD version so that they get an ideas as to what it entails and how it functions beyond just viewing the digital library content.
- Teachers from different schools need to come to a nodal site where the digital library CD is available and search it and choose some content which they feel addresses their resource needs, instead of having just some officials choose the content
- The navigation of the digital library CD version requires a computer literate person to be involved in the process.
- More computer training of teachers is required
- Internet access and bandwidth connectivity has to be provided and improved in education offices and schools so more content can downloaded from the digital library website in lesser time

- Currently only the DIETs have Internet connectivity, however their bandwidths are very low. Therefore the downloading of the digital library content from the website takes a very long time
- The digital library needs to regularly update its collection with content that is of high quality and simultaneously useful and relevant to the local schools
- The content available at nodal sites needs to be constantly updated and changed so teachers are not viewing the same content all the time
- If private schools are interested in any of the content they can potentially purchase it for a fee
- In the future the distribution of the digital library content has to be led and managed by select government education departments to ensure long term sustainability

The pilot testing of the digital library in six sites in Karnataka has addressed the main issues this study aimed to examine. The digital library CD was found to be applicable as long as a computer literate person was involved in its navigation. Various successful mechanisms were employed by the BRC and CRC officials and schools HMs to disseminate information about the digital library to teachers. At each site teachers borrowed/viewed/copied the content and all the teacher trainees at the DIET viewed the content. Further there is no doubt that the educational content is very useful for teachers, teacher trainees and students in helping to augment the level of educational quality.

However it has to be noted that digital educational materials and the two components of the digital library are mere tools, and for them to ultimately bring benefits to their target populations they have to fit in with the social and economic contexts within which they are being applied. In this regard the main obstacles to the long-term sustainability of the digital library are also systemic to the primary and secondary education sector and to the ICT infrastructure in Karnataka. Therefore this study while enumerating the successful mechanisms that have been borne out of the pilot testing, has also highlighted the additional ideas and mechanisms that need to be examined and addressed so that the digital library can ultimately function as a feasible and sustainable supplementary education resource for government run and aided primary and secondary schools in the state.