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COMPUTER EDUCATION IN SCHOOLS: THE HEADSTART PROGRAMME

Visualize the following two scenes:

Scene One
Location: Rajiv Gandhi Shiksha Mission, Bhopal, Madhya Pradesh
Date: 14 August, 2003

It was the eve of Indian Independence Day. Amita Sharma, Director of the Rajiv Gandhi Shiksha Mission (RGSM), Madhya Pradesh, looked back on the eventful three-year period since the launch of the Headstart project in November 2000. The project was a major initiative to bridge the digital divide, with the specific objective of familiarizing schoolchildren in rural areas with Information and Communications Technologies (ICTs). It had made significant progress: the first phase had been successfully completed, and the second phase, to cover 2,070 schools, had been launched. Context specific content in English, science, and mathematics had been developed; open source software had been obtained free of cost; hardware maintenance issues had been streamlined; and most importantly, the initial resistance of teachers had been surmounted, and large numbers of them had been trained. Yet, significant challenges also lay ahead. How could the program be implemented smoothly in the 2,718 schools corresponding to both phases? Sharma wondered how she should modify her blueprint for taking on such challenges.

This case was prepared by Mr. N. K. Mohandas, with the collaboration of S. Ramakrishna Velamuri, Professor at IESE Business School, to serve as a basis for discussion and not to approve or criticize the programs or decisions described. The preparation of this case was sponsored by the World Bank. Nevertheless, the points of view and interpretations in this document are attributable to its authors alone. The facts and figures presented in the case are real but the characters and their views are imaginary.

Scene Two
Location: Tilendi School, Raisen District, Madhya Pradesh
Date: 16 August, 2003.

Bhuria Bai, a lithe and tanned woman of forty or thereabouts, from Chormou, in Raisen[1], was the president of the Parent Teacher Association of the local school. But she had not seen or heard of computers until a teacher told her about them. Bai was fascinated and depressed: fascinated because she wondered how a 'TV-like machine' could perform such a plethora of tasks; depressed because she had not been fortunate enough even to see the master machine. However, she did not want her daughter to grow up as ignorant as her. Indigent though Bai was, she resolved to get her child instructed in the use of computers. She took her to the computer center at the JSK (Jan Shiksha Kendra) School, Tilendi, where computer classes were held under a program called 'Headstart', once a week. The school was a link school of the JSK centre, which was authorized to impart such instruction. Bai did not mind traveling over eleven kilometers of tricky terrain from Chormou to Tilendi to accomplish her dream project of making her child computer literate. The terrible roads, the absence of public transport and the dense forests en route did not dampen her spirits. Though she herself had not stirred out of the house after marriage, the prospect of having a tech-savvy daughter reinforced her resolve. Bai's maternal instinct lent it steel.

The perspectives of Amita Sharma and Bhuria Bai throw into high relief the way we shape our 'realities'. While for the savvy bureaucrat a project connotes both fear and hope for varying reasons, for an illiterate woman from a village, any scheme that promises betterment for her children is like manna from heaven. Perhaps it is the naïve resolve of such folk, combined with the finely tuned expertise of professionals, that often make a project a resounding success.

Bhuria Bai was just one of many beneficiaries in the most remote areas of the Indian state of Madhya Pradesh, where a computer education program called Headstart got underway. The program had been hailed as a unique attempt to fill the gap between 'the technology haves' (with access to Information and Communication Technologies – ICT) and 'the have-nots' (without access to ICT), otherwise called the digital divide. This divide manifested itself in a deficiency of opportunities for those with limited access to technology vis-à-vis those who could effectively use new information and communication tools. This was a sociological truism that continued to haunt policy makers and administrators.

ICT in Education

Education was one area which had been universally accepted to have the potential to reduce the digital divide**.** Information and Communication Technologies (ICTs)[2] were ushering in unprecedented changes in the nature, content and imparting of education. They had opened up new vistas for stakeholders in education – teachers, students, parents and the public – by making them more involved.

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1 Source: Field visits.

2 ICT (Information and Communication Technologies) is an umbrella term that includes any communication device or application. The radio, television, cellular phones, computer and network hardware and software and satellite systems, as well as various services and applications such as videoconferencing and distance learning all come inside its frame of reference (Source: Whatis.com (www.whatis.com/definition/0,,sid9_gci928405,00.html)

Naturally, governments across the world had recognized the importance of ICT and had undertaken appropriate policy measures and formulated several programs for an ICT-enabled education. Developed as well as developing countries had begun to spend considerable resources to harness this suite of technologies to improve the quality of education.

(See **Exhibit 1** for a table showing expenditure incurred by various countries).

Computer systems, including computer hardware/software and networking, led to an acquisition of increased technical expertise, which in turn motivated students, increased problem-solving capabilities, and deepened understanding.

However, according to a study[3], the vast majority of the schools in many developing countries did not even have a computer. Moreover, most of the teachers had yet to familiarize themselves with them. Seldom had there been any systematic study in developing countries to indicate links between computers and qualitative educational improvement. An objective comparison of computer-aided pedagogy with conventional pedagogy also remained to be undertaken.

As the Director of Headstart, Sharma's biggest challenge was to determine how best the program could be implemented on a large scale. It meant making this technology available to children in the remote villages of Madhya Pradesh, which until recently was considered one of the most backward states by all educational indices. It also meant designing a program that made the learning process interactive and interesting, through computers in rural schools, and therefore requiring local flavor and gusto. Sharma recalled that she wanted "Headstart to be an integrated scheme to enhance learning; something that should not be viewed as an independent initiative but as complementing other educational processes. It should attempt to leverage technology for enhanced learning and thus bridge the rural-urban divide".

The landmark policy on computer education in India was evolved by the National Task Force on Information Technology and Software Development, constituted by the then Prime Minister in July, 1998. The IT Task Force recommended that the government should launch an 'Operation Knowledge' campaign to universalize computer literacy and to spread the use of computers and awareness of IT in education.

Many NGOs also later undertook projects to introduce computer enabled education in schools: Azim Premji Foundation's Computer Assisted Learning Centers (CALCs) in Karnataka, Rural Relation's project in Maharastra, Goa Computers for Schools Project (GCSP) in Goa, and Pratham's project in Mumbai, among others.

Basic Tenets of Headstart

Rajiv Gandhi Mission's Coordinator, Mr Gopalakrishnan, listed the basic principles of the Headstart Programme: "The program should focus on IT based or computer enabled

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[3] "Computers in secondary schools in developing countries: costs and other issues" Andy Cawthera, jointly published by: The Department For International Development (DFID). World Links For Development (WorLD): a part of the World Bank Institute. Another study is for The Human Development Network of the World Bank: "Computers in Education in Developing Countries: Why and How?" by Luis Osin

learning. It first targets the elementary classes. Neither distance nor inaccessibility should be a constraint for providing computers. Emphasis is given to curriculum-based or customized content, laying emphasis on culture-specific content and improved analytical thinking".

The Headstart booklet outlined the basics of the program: "Head start is a project about empowerment. Empowerment of children and teachers through information technology… with a perspective of computer-enabled education or the use of computers to stimulate learning in exciting new ways using multidimensional media to enliven the process of learning".

The program was to cater to students from elementary classes (Classes I–VIII), with the initial focus being on Classes VI to VIII. It was to be implemented in a phased manner, with the first phase, covering 648 schools, starting on November 14, 2000.

The objectives of the program were to:

– improve the quality of learning through the use of Information Technology,

– develop Multi Media Rich Lessons (MMRL),

– redefine the pedagogic process through interactive learning, self-learning and interrogation,

– familiarize primary school children with computer operations,

– seek to provide equal opportunities for children in remote areas.

The Challenges

Providing computer education was a solution, but ensuring good quality computers in remote locations and maintaining them was only one of a host of attendant problems. Good quality content was necessary for computer aided education, but how to develop it quickly? Teachers needed to be trained, but how fast and how well could it be done? Since computers could not be provided to all students and to all schools due to lack of resources, what was the best way to ensure an equitable distribution? And finally, how could one garner enough resources to see the project through?

The Headstart team was also haunted by the following set of issues: how well did computers assist the pedagogic process? Could one rationalize an investment of approximately 50,000 Rs., the then cost of a system? Would teachers respond encouragingly to this change and challenge? Who would maintain the computers? How could the systems be kept running during power cuts extending to as much as six hours? How would one procure the relevant expertise to develop appropriate pedagogic content?

In spite of all these challenges, Sharma and her team decided to go ahead, and that was how the first phase was born. Funds were taken from the District Primary Education Programme (DPEP), a national level initiative aimed at the universalization of elementary education

In order to make up for scarce resources, a cluster school called the Jan Shiksha Kendra (JSK) was chosen as the Headstart Center. The JSK is at the center of a cluster of

primary and middle schools for improving the quality of elementary education and adult education, established in 1996-97 as part of the DPEP program. The other schools in the cluster (called link or satellite schools) were situated within an 8 km radius of the JSK. The JSKs were to work as a quality circle for all the schools in their respective areas.

A teacher in the school was placed in charge of the program and given training.

The students from the link schools were allotted one week day for computer classes, also by turn. The other four days were allotted to the students from the JSK school.

Those JSKs which did not have the facilities to install computers had to be adequately funded. Despite resource and manpower problems, the initial effort was to flag off the program. Limitations could be looked into later; snags dealt with as they arose.

First Phase Implementation

The first phase of implementation itself was quite rewarding. It confirmed some of the earlier convictions. The enthusiastic response from the students, even in remote locations; the ever increasing attendance, despite inclement weather, difficult terrain and erratic bus services, were just two of the many pluses of the program. Children from link schools came in tractor trolleys; many came dragging their apprehensive parents along.

The program, however, had not been without clouds. Problems related to procurement of hardware, acquisition of fault-free systems and governmental procedures often smacking of illogicality were ominous enough. The lukewarm response from many of the teachers was yet another letdown. Many technophobic teachers felt that the machine was going to tamper with the teacher-student relationship. A few felt that this was the beginning of the end of teaching!

But the scene was not without a silver lining: there were indeed a few teachers who went the whole way to master the new initiatives and prepared Power Point presentations of a few lessons to prove a point or two.

Perhaps the cold feet that others suffered were the result of a hidden fear or two. “Will the new stuff make me redundant? Will I be held responsible if a system conks out through no fault of mine?”

Neeraj Saxena, Coordinator of the Headstart Programme, said that the teachers were assured (though not with much success) that even if a system went awry, they would neither be held responsible, nor have to pay any kind of recovery (financial penalty). The headmasters feared a cut in their pensions if something went wrong or a listed item was found missing. So better not to allow others to operate! Who would ensure the safety of these machines? If they were stolen who would be responsible? Who would maintain them? Why should I shoulder this burden?

As a common precaution, the RGSM asked schools to insure the systems from theft. But the forms supplied by the insurance companies were in English, with all types of legal jargon. One teacher said, “We couldn’t make anything out of it”.

Prakash Deo, Chief of the Content Development Team, recalled that most of the problems were administrative or technical and not pedagogical. Basically, the problem was attitudinal.

There were other problems too. An honorarium of Rs 100 given to the teacher in charge of the computers irked the rest who did not get any perks for the 'added workload'. The indignant teachers were not in a mood to share the responsibilities that would befall anyone in charge of such projects. 'Why bother without rhyme, reason or remuneration' was the refrain often heard. (This practice of giving honorariums was subsequently discontinued in the Second Phase).

Some teachers who became proficient in the use of computers faced a problem of a strange sort. They were summoned by superior officers, like the district collector, and ordered to do other *sarkari* (Hindi for *government*) jobs involving the use of computers. They were even asked to take the machines along with them in crisis situations. Some of the district collectors found the prospect of having immediate access to both a computer-literate person and a computer much to their liking. So it was only natural if teachers were reluctant to showcase their talents.

"See there were innumerable small problems" said Neeraj Saxena. "How can we give orders and instructions for each and every thing?"

Sharma and her team had by now acquired the ability to receive both bouquets and brickbats with poise. The program had already been implemented in 648 JSK schools and nearly 15,000 link schools, targeting 130,000 students (in the JSKs alone). They were now determined not only to take on the shortcomings of the program but also to expand the program to more schools in the state.

The second phase was launched on July 1, 2003 (official launch date), covering 2,070 schools. The thrust of the program was that all the students, by the time they came out of middle school, should be computer literate.

Headstart: Second Phase

In the second phase, much more planning was made regarding the layout of the Headstart room. Provisions for TV tuner cards and Integrated Receiver Decoders (IRDs) were made, foreseeing a need for teleconferencing in the future, once the JSKs were equipped with dish antennae. A concept called Daily Learning Centres was also introduced for the benefit of the local public so as to put to good use the facilities offered by the centers, especially after school hours, with provision for tele-learning.

The students from the link or satellite schools got only one day per week for computer classes, and that too by turn. Detailed guidelines were given for preparing the timetable for the JSK schools and the link schools, taking into consideration factors like availability of teachers, numbers of shifts in the class, number of students at the school and in each class, holidays, bazaar days, availability of power, number of computers and their working conditions, monthly meetings of JSKs, teachers on leave, availability of CDs, etc. A child in a JSK school was to get approximately two hours of computer time per week. A child in a link school, however, got only minimal access to the machines.

Content Delivery via CDs (Compact Discs)

The Mission Team did realize that without relevant content delivery via CDs and other such media applications, a computer-aided education program of such mammoth proportions would not take off. Though there were some initiatives in this direction even within the Headstart Programme, they were not enough. One was really a mix of videos converted to CD format. Though Bhoj University also collaborated by sending in a few programmers, the enterprise did not click well.

Worse still, content in Hindi and for elementary classes was almost nonexistent. The Headstart Team had to take up this responsibility quickly.

The team discovered that the problem could be tackled in two ways: one was to develop content in-house, and the other was to outsource from other agencies. Although outsourcing attempts were made by the team, it was found that no agency did justice to the challenges posed by the unique nature of the work. This set the team thinking again, why not go in for in-house content development? One advantage of in-house development was that whatever experience and expertise were generated could be retained within the system.

Sharma scouted around for people within the system. Prakash Deo and Ravi Thakur, both from the State Council for Educational Research and Training (SCERT) and rich in experience, were roped in.

Prakash Deo recalled that the earlier production lacked many things, but they improved as time passed. One month's training was given to a set of twenty programmers in multimedia and animation at Pentamedia, an IT company based in Chennai.

Again, a crucial decision had to be taken regarding the nature of the content. RGSM decided to focus on hard spots. Hard spots are difficult areas/concepts in text books/syllabus. Multimedia Rich Lessons (MMRL) were to be produced on CDs, based on hard spots. For instance, in mathematics, fractions or the use of decimals could be called a difficult area. In social studies, the cause of an eclipse or the description of our solar system could be hard spots. Such hard spots were also identified in other subjects. In English, for instance, correct pronunciation was a problem for many students, and even teachers, in MP.

Hard spots were identified in grades from 1-8 by the analysis of the results of evaluation and examinations. The next process was to engage an academic group, comprising District Institute of Education and Training (DIET) lecturers and teachers, to conduct diagnostic tests for confirming hard spots. An expert group of three to five persons in each subject, comprising subject specialists, prioritized the hard spots for the production of the CDs. They were also to prepare the scripts.

The script was discussed with the programmers and media personnel. Wherever necessary, graphics, animation, text, and such like, were included.

Once a prototype was developed, it was shown to prospective users (students/teachers) to get feedback. Suggestions for improvements were noted.

Most of the material for the CDs was taken from the Internet. Only authentic sites were browsed and wherever necessary, copyright problems were also sorted out. Usually three to four months of research, scripting and trial running went into the production of a single CD.

The CDs were to be evaluated first by the teacher. Feedback from the Cluster Resource Centre (CRC) meetings was also taken. The demand was for more CDs in subjects like English, science and mathematics, from both teachers and students.

A film on hard spots was also made for the teachers, detailing their general nature, and ways to surmount difficulties in classrooms.

Area Specific Content: Potential and Necessity

Locally relevant or area-specific content had a tremendous potential to lure any kind of target audience – for example a desert background may not be familiar to a student from Kerala and would only serve to distract, whereas coconut trees could be an alluring factor. Likewise cheese and *paneer* may not be as common in MP as in Haryana or Punjab. Thus proximity factors were taken into consideration in content development.

Each Multimedia Rich Lesson (MMRL) CD had a track for teachers – a sort of teachers' CD user's manual. The CD could also be used by a peer group in the absence of the teacher. Each lesson was based on two types of activity: computer and off-computer activity.

Nearly 40 CDs had been produced in subjects like social sciences, mathematics, science, Hindi and English. Hindi and English CDs were meant for elementary classes. However, the people involved in the program realized that much more content needed to be developed.

Prakash Deo and his team had worked out and prepared a 154 parameter diagnostic procedure for checking the quality and content of CDs. However, he felt that the quality of the CDs could have been better had there been more technical, human and financial resources. The evaluation patterns could also be improved, according to Deo. Animation, especially 3D animation, was another grey area. Teachers too needed to be better orientated in the use of CDs.

The CDs, priced at Rs. 300 (now reduced to Rs 100), were purchased by a few private schools, a few NGOs and Navodaya Schools[4]. States like Rajasthan and Uttar Pradesh had also shown interest in them. UP had recently given an order for 4,000 CDs.

In parallel, other things were also happening. DPEP was in its concluding phase. A new national program called SSA (Sarva Shiksha Abhiyan), aimed at the universalization of elementary education had just started. Though the SSA implementation framework did not provide a slot for computer education, the program did contain many provisions under which computer-based education could be supported. Funds could be made available to Headstart from SSA.

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[4] Navodaya schools are fully residential co-educational schools covering classes VI to XII established by the government of India and managed by The Navodaya Vidyalaya Samiti (NVS) an autonomous body set up in 1985. One Navodaya Vidyalaya is proposed to be established in each of the districts of the country. They are primarily meant for talented rural children. Education in these schools is provided free of cost to all the students selected through an entrance test, including the costs of boarding and lodging, text books, uniforms, travel etc.

Changing Perceptions

The most heartening thing about the program was that it could change the age old perceptions of teachers, albeit slowly. In a focus group discussion of teachers held at the Amoda upper primary school in Raison district, the consensus was that the CD was a useful teaching aid. It reduced their strain and labor, and in certain cases, saved time too.

Many of the teachers realized that apart from the utility aspect of CDs, the medium provided a much needed novelty that could maintain the interest of students. According to one of the teachers, "On many occasions, while taking lessons, I knew that the children did not understand many difficult concepts, but I purposefully did not venture to ask them whether they did understand, and hopped onto the next lesson. But now with the help of CDs I feel more confident". Another teacher said, "In the class we used to say 'D – O – G' and asked children to spell it. Without knowing that it was *kutha (Hindi* for *dog)* they memorized it. We realized this only when one child, after seeing the picture of the dog in the CD, screamed, *'yeh to kutha hai'* ("Oh! this is a dog !")" It was often these seemingly innocuous outbursts that led serious academics into redefining goals and setting new parameters for evaluation.

Citing an example of water, one teacher said "though I tried to explain different uses of water and the need for its conservation, I was sure that they did not get it internalized. I realized this when I showed them the CD on the uses of water, problems of contaminated water etc. They immediately recognized it, and related it with their day to day lives and their experiences. Similarly in English, even ordinary words like 'jumping', 'drinking' they used to learn by heart without properly understanding their meaning. CDs certainly help them to familiarize these words better. Pronunciation is also another area in which CDs help the students well".

The CDs generated a range of possibilities for a creative teacher to improve his/her teaching. A few teachers expressed confidence in making Power Point presentations, and this skill could be shared with others. Teachers felt that once they gained practice, it would be possible to do away with unnecessary explanations.

The content development facility in the RGSM building was also expanded. More than 20 computers with relevant software were made available. A leased line from BSNL (Bharat Sanchar Nigam Ltd.) with a speed of 128 Kbps was taken for speedy connection. Nearly 40 computers came to share the line, with plans to increase the capacity to 100 nodes.

With respect to content, Headstart had certainly achieved significant gains, and the program's resolve to update itself on technology and pedagogy-related content development was commendable.

Hardware: Challenges

Although hardware was the foundation on which educational technology was built, its viability also had to be looked into. Even countries like the USA were worried about the rising cost of technology. There were complaints that computers were growing older, could not be networked properly, could not run the latest software, and so on. If this was the situation in a developed country where 99% of public schools had computers and more than 90% of the students used them, one can imagine the situation in less affluent countries.

How did the Headstart Programme tackle these issues?

The Headstart Programme evolved a two-phased approach to tackling hardware-related issues. Its main challenge lay in getting the computers to schools and most importantly, to remote areas.

In the first phase of the program, computers were purchased at the district level. A district level purchase committee was constituted for the purpose. They evaluated various offers submitted by the local vendors and purchased from the lowest bidder. The experience showed that much more quality assurance and better maintenance contracts would be required. How could these be ensured? Sharma and her team were seriously thinking of better options to overcome these.

Also, the state of Madhya Pradesh, with its many inaccessible regions, had a different set of issues to tackle. If the hardware, for instance, developed glitches, these could not be looked into immediately for want of expertise at hand. Since the transport and communication facilities were poor, after-sales-service personnel often proffered only alibis and seldom gave service on time. This, however, did not deter RGSM from launching itself into a massive procurement exercise covering 2,070 centers.

The organization which came in with technical support for RGSM was NICSI (National Informatics Centre Systems Incorporated), the commercial arm of the National Informatics Centre, a Government of India organization.

It all started with a presentation by NICSI to RGSM in September 2002. The proposal was that NICSI would act as the nodal agency for procurement of computers. It would ensure optimum quality control and maintenance of computers.

Detailed discussions and consultations preceded the decision concerning the configuration for the systems to be purchased (see **Exhibit 2** for detailed configurations). The Celeron processor, and a UPS, with a minimum of four to five hours backup (with 25 AH batteries), was proposed. Quotations conforming to these specifications were invited from manufacturers or their agents. NICSI acted as the technical consultant for the selection of vendors, evaluating the offers by setting up detailed quality standards and benchmarks; NICSI was given 7% of the overall cost as consultancy charges.

A unique aspect of the offer was the penalty clause, which stipulated the payment of a penalty (of Rs. 250/- per day) if the vendor did not attend to the complaint launched by the JSK center after three working days.

COMPAQ, ACER and PCS computers were the successful bidders. The processes were completed in January 2003 and the machines installed (approximately 6,200) in all the schools within two months. The official launch took place only in July 2003.

The operating system chosen was Linux and the “distros” (distribution CDs) were provided by Red Hat India, free of cost.

Mr. Neeraj Saxena, Coordinator of the Headstart Project, said that all the computers were purchased under Phase II of the program, after ensuring quality. He hastened to add that a few minor complaints were reported from a very small number of schools.

The computers and UPS were supported by a three year on-site warranty. NICSI opened a website (mpnic.in-headsart.org) with a complete database of all the schools provided with computers. Anyone could lodge an online compliant regarding the working of the computers, which would be immediately routed to the vendor who had supplied the equipment, with a copy to the Headstart program managers. Complaints could also be lodged by e-mail and telephone.

A UPS with adequate backup ensured that problems due to electricity did not crop up. The cost of a UPS varied from Rs. 18,000/- to Rs. 20,000/-.

Though Headstart had made all efforts to sort out hardware maintenance, problems did crop up: issues such as Web interface, e-mail and telephone and lack of basic infrastructure were a few of the major hurdles faced. In such cases, registering the complaint by phone to the persons concerned was often the only solution.

Open Source Software (OSS)

The choice of open source software (OSS) for the second phase of the program was a decision of phenomenal consequence.

The State Technical Advisory Group (STAG), comprising experts, representatives from industry and NIC also recommended the introduction of open source software.

Free software was considered to be a valuable resource for education. Its advocates claimed that it was technically and pedagogically superior to proprietary alternatives. There were several groups and projects that were working with Free Software and Education. Free Learning Resources, Debian Jr., DebianEduis, the "OpenWebSchool," and Wikipedia were some of them.

Linux, a free alternative to Microsoft Windows, was the most popular Open Source Operating System. It came in different distros. Fundamentally, Linux was a kernel and each distro acted with its own features. Several companies dealt in Linux distros. The obvious advantage of Linux was that it was a free operating system. Compared to Windows (Windows XP costing Rs. 12,000/-), Linux distros could be downloaded free from the Internet.

Red Hat India came forward to supply Linux distros, free of cost, to the Headstart Programme (nearly 2,070). In addition, they provided training and support to more than 6,500 teachers, and helped in the implementation of the program. They had also done the customization (in Hindi) after eliciting feed back from prospective users. As part of the customization, other tools, like media player, flash player and typing tutor, were also provided. Red Hat India had opened an office in Bhopal for rendering better support.

It was indeed a refreshingly welcome aspect to see the RGSM's customized desk top appearing on monitors when the computers were booted.

Saxena said that customization had greatly helped to make it easier and to be at par with the features of Windows. "We have tried to simplify the whole thing and make easier, while customizing it".

There were reports that little support was available locally for Linux. There was also no company support at the district level which was a major handicap.

Success Comes Slowly

The teachers' initial apprehensions about computers slowly began to fade. They understood that their guidance, inspiration, motivation and mediation were all important in computer-aided education and that their role was critical. The view currently held was that technology was a tool, and the acid test was how effectively it was used. Teachers had also started feeling that better use of computers could empower them in making them instructional designers and presenters.

Out of the nearly hundred and fifty teacher respondents for this case study, none except two spoke out against computers. Fear of computers and a diffidence to use them did exist, but this mindset was found everywhere, both in developing and developed countries. Teachers all over the world had a fear that computers would usurp their eminence.

But now teachers had even started giving guidelines to overcome all kinds of techno-phobia. A teacher from Raisen district suggested that they should be allowed to disassemble a computer as part of the learning process. This he claimed would help them to demystify the notions they had about the machine. The computer, ideally, should be presented as a tool rather than as a 'Big Brother' machine. The teachers must be made aware of the rich potential of computers and how they themselves could make use of the machines not only to complement their teaching methods but also to increase their own knowledge.

Perhaps a sense of 'ownership of technology' could work wonders among teachers. That feeling could contribute to their active and creative involvement with the children and in helping them with their studies and using the computer as a tool much more purposefully. The following few examples illustrate how such a feeling of euphoria could manifest itself in teacher-student interaction and pedagogic initiatives.

A teacher from Khandwa district did a remix of some of the patriotic songs of Kishore Kumar (the popular Hindi playback singer who hailed from Khandwa), and developed a multimedia presentation for teaching students to great advantage. Ajit Yadav, again a teacher from Khandwa, made a thought-provoking multimedia presentation on the destructive powers of science.

Other than using computers for enhancing teaching techniques, some teachers used them for creating a database for examination marks. Results were then analyzed and compared with the students' performances in previous tests. Weak students were thus identified and given special care.

The CD was used for helping the students in their studies and to help them to understand concepts better. Students were also given opportunities to access the answers given in the CD for getting more clarification on difficult areas. The CD thus became a remedial teaching tool. Teachers from the Devas district, for example, had, on their own, conducted pre-tests and post-tests in lessons, before and after teaching a lesson through computers.

Another use to which the computers were put was the storage of demographic data on the particular villages and towns where the schools were based. In certain places, details of the Village Education Register (VER) were also kept as databases in the JSK computers.

Wherever introduced, Headstart worked wonders. Students showed keen interest, and their 'fight for the mouse' was indicative of how both the rural and urban children took a fancy to gadgetry.

There were independent initiatives as well, like the "Reach to Every Child Approach" in Khandwa district, formulated as an offshoot of the Headstart Programme focused on academically weak students.

In many places teachers narrated instances of children drawing and painting high quality pictures using computers, and one could watch the process of collaborative learning in which students and teachers were actively involved in carrying out the learning activities. Teachers were also convinced of the computer's potential to ease error correction and remedial teaching.

Studies conducted by district personnel said that a 15 to 20% difference was noticed in the achievement level in many classes. This was conducted with a control group with the use of CD for one month, in schools with and without computers.

There had been reports of an over 40% increase in enrolment in some schools in Bhopal where computer education was in place. Enrolments in some schools had shown a five year record. Similarly, student absenteeism, late arrivals and related problems had reduced substantially. These were all remarkable achievements. Because of computer-enabled education computer literacy had come as a bi-product. There had been reports of girls showing tremendous interest in these aspects. Children showed eagerness to draw pictures and even learn open office, etc.

Children in developed countries grew up in a world of computers and information technology. Undoubtedly this exposure gave these children a novel way of interacting with knowledge/information which was not available to children of earlier generations. It should be remembered that many children in less affluent counties did not get this exposure. Headstart was an ambitious program designed to make the rural child also get a feel for technology and thus rid him/her of the pangs of diffidence. A good slogan for Headstart could be "Technology is my birthright and I shall have it".

The Future

The second phase was now six months into its implementation. Sharma realized that she and her team had many pressing issues to deal with to ensure the success of this phase. The quality of the content had to be enhanced, more technology was available to aid this but then it meant more facilities and orientation to the people who did it. More teachers had to be trained and that too with more on-site support, and all the more since the third phase of implementation was due to cover the rest of the schools. Sharma wondered how she should go about tackling these issues.

Exhibit 1

COMPUTER EDUCATION IN SCHOOLS: THE HEADSTART PROGRAMME

Expenditure on Computers in Education in Various Countries

Country	**Population** (millions)	**Expenditure** (US$ million)	**Expenditure** (millions of US$ per million population)
USA	250	5,000	20.00
UK	58	500	8.62
FRANCE	58	1,800	31.03
JAPAN	126	1,800	14.28
AUSTRALIA	18.6	1,400	75.26
CHINA	1,200	2,800	2.33

Taken from "Computer Based Elementary Education under Sarva Shiksha Abhiyan" Report of the Committee for Formulation of Guidelines for Computer Education at Elementary Stage, Government of India Data complied from difference sources – OECD Report, UNESCO Report, National Statistics of Education UK, National Centre for Policy Analysis USA by Department of Information Technology for their Vidya Vahini Project

The above table shows the expenditure by various countries on ICT enabled education. China with a population of nearly five times that of the USA, spent only 50% of what the USA spent. The inadequacy of this situation is further seen when comparing the expenditure per million population. USA spent about 10 times China's figure. In other countries, the UK spent far less than France. In fact, France spent almost 2.5 times more than Japan. But Australia was the biggest spender.

Exhibit 2

COMPUTER EDUCATION IN SCHOOLS: THE HEADSTART PROGRAMME

Specification of Computers and Peripherals under the Headstart Programme

Item-1: Desktop Computer (3 computers in each Headstart Jan Shiksha Kendra)

No.	Component	Specification
1.	Processor	Intel Celetron 1.2 CHz 128 KB Cache
2.	Mother board	Intel motherboard, Intel 81 SE CPU Socket 370, Memory Maximum 512 MB (unbuffered); External Connectors: 2 USB, 1 PS2 Keyboard, 1 PS2 mouse, 1 Game/MIDI, 3 Audio Jacks Expansion slots; 1 AGT slot (Supports 4x/2x AGP), 2 PCI slots; Audio on Board AC '97 Audio codec; Video on Board: Integrated 3D graphics, 4 MB display cache.
3.	Floppy Drive	1.44 Mb, (3.5" form factor)
4.	RAM	128 MB SDRAM, PC 133 specification, configured with motherboard
5.	Hard Drive	At least 20 GB ultra DMA/100.
6.	Monitor	15" Digital Color Monitor
7.	CDROM drive	52X
8.	Mouse	2 Button
9.	Keyboard	104 keys
10.	Cabinet/Power supply	Cabinet from Factor ATX, generic built-in power supply, Power supply should be ATX, supply of at least 250 Watts.
11.	Speaker	100 Watt PMPO
12.*	TV Tuner card	
13.*	Modem	56 KBPS Internal Modem
14.	Certification	Linux Certified ISO 9002

Systems using Linux operating system. Driver support responsibility of the Vendor.

(*) One Desktop Computer with all components mentioned in 1-14, and 2 Desktop Computers without (12) and (13) components.

Item-2: Dot Matrix Printer (1 DMP in each Headstart Jan Shiksha Kendra)

24 Pin, 300 CPS 132 column Dot Matrix Printer with built in Hindi firmware for faster printing in Hindi.

Item-3: UPS (3 UPS in each Headstart Jan Shiksha Kendra)

No.	Feature	Desire
1.	Technology	Offline
2.	Capacity	500 VA
3.	Input Voltage range	140 V to 260 V AC
4.	Charger Capacity	15 Amp.
5.	Battery type	120 AH Battery to ensure 5hrs Backup Time
6.	Output Voltage	230V
7.	Output port	4
8.	Built in AVR	Y
9.	Cold Start	Y
10.	Certification	ISO 9002