Ministry of Human Resource Development

Department of Higher Education

The History of Aakash Low Cost Access cum Computing Device

The Aakash device was launched by India's Minister for Human Resource Development (HRD) on Oct 5, 2011. Present at the launch were representatives of various agencies involved in the development, manufacture and testing of this device. Members of the MHRD design teams who had been working all along on creating this innovative design were present. Faculty and students from IIT Rajasthan, Jodhpur who had worked closely with the MHRD teams on Aakash development were also present. IIT had also been given a project and funds by the Ministry to procure and test the first 100,000 devices as a pilot and members from the testing teams were also present. Also present were staff from Datawind, the manufacturer who had worked with the team from the Ministry over the last one year in refining the specs and who also did the manufacturing.

To give the larger picture, lets start with talking about the Mission – National Mission on Technology through ICT (NME-ICT)

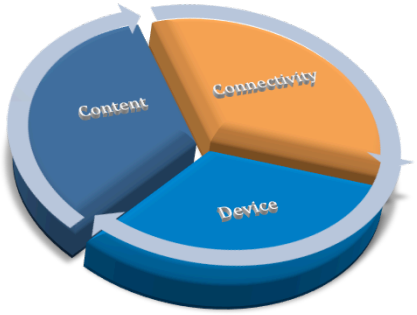
National Mission on Education through Information and Communication Technology

The Mission was launched in Feb 2009 by the then HRD Minister, Mr. Arjun Singh.

The objective of this Mission is to convert India's demographic advantage into a knowledge powerhouse by nurturing and honing the knowledge and skills of our higher education student and faculty population of around 22 million.

This Mission aims to leverage the potential of ICT in providing high-quality, personalized, and interactive knowledge modules over the internet in a any-time, any-where mode

The National Mission on Education comprises 48 different components structured broadly around building CONTENT, enabling ACCESS and developing LOW COST ACCESS cum COMPUTING DEVICES.



Connectivity:

Orders have been placed for connecting every University and college in India under this Mission. About 60% of the total Mission funding has been reserved for this.

Each University will get 1Gbps connectivity (via NKN). Each University will also get a LAN of about 400 nodes under NMEICT. Each College will get connectivity of 20 x 512 kbps which they can club together to make 10Mbps

The Mission pays for fibre connectivity for each University to connect to the nearest NKN node. The Mission has placed a consolidated order for connecting all Universities and Colleges to BSNL and about 80% of the Universities and Colleges have been connected already

Content Creation:

The Mission has proposed 18 different line items for content creation. All content that is created under this Mission needs to meet the following criteria:

- It should be related to education delivery.
- It should involve faculty from different institutions
- All IP (Intellectual Property) created under projects funded by this Mission will vest with MHRD
- All content should be created using open-source software.
- All content created under this Mission is for open access by all and cannot be charged for in any way

ABOUT THE DEVICE

The decision of the Ministry of HRD to develop a device:

Around 5 years ago the government was approached by an organization with a proposal that the Government of India should purchase large quantities of a device at an offer price of US$ 100 per device, which on further discussions was found to be over US$ 150 per device. The device, while it was billed as a "laptop" was found to have limited functionality and was targeted at school children. Since requirements in India were of very large numbers, MHRD felt that the device should be ideally priced at under US$50/device with the ultimate goal of reaching $10 per device much later. Their response was that it was impossible to produce a device at such a low cost

This was the genesis of the program that was then set up by MHRD under this mission with the objective of designing and productionising a functional computing device at an ex-factory cost that was around US$ 35/device. A number of small teams consisting of hardware and software designers and persons with experience of commercial issues and negotiation were nucleated under the Mission to achieve the goal

The team, as expected, met with a fair amount of criticism and scepticism both from within the system and from outside experts. Vested interests from within the industry were also very active in publicizing their views that such a device was not possible.
However, the teams persevered in their task with the single-minded determination and the thought that such a device would revolutionise delivery of education in India

The thinking of the Core Team when development began:

The core team of experts decided to create specifications for a made-for-purpose device, meant especially for educational purposes.

There have been a lot of comments about this or that feature missing from the device. People need to remember that our teams could have gone on adding all kinds of functionality, much of it irrelevant to our core purpose of education. This would, quite clearly have inflated the price too. Hence, the specifications that were finally devised for

the first prototype of Aakash are focused on education and on keeping the cost of the device within the parameters originally thought of by MHRD

Since the Mission (NMEICT) is meant for higher education, this device has all the capabilities required by a student, including wifi, streaming video (to play NPTEL lectures), e-book reader etc. Various open-source educational software packages like Sci-lab etc will also be ported on to this device. Using this device, students can also access all the content created under the other components of NMEICT like Virtual labs, N-LIST etc

Methodology followed in the creation of the device:

MHRD started its efforts in the direction of designing a Low Cost Access cum Computing Device and requested big players in VLSI design to work with the Ministry so as to have a true system on chip. In spite of a lot of talk about Corporate Social Responsibility there was lukewarm response to the idea from big names. MHRD then decided that it would create teams from within academia and attempt the task of working on a viable design. What was done was to discuss the idea with a group of Professors and experts at IISc Bangalore, IIT Kanpur, IIT Kharagpur, IIT Madras and IIT Bombay before moving in this direction.

The teams began working on various designs and came out with different prototype devices. **The challenge, however, was to design a device that could be productionised at an ex-factory cost that was around US$ 35.** Initially, the team's efforts were met with skepticism and scorn. However, as various prototypes appeared, not only did the confidence of the team members increase but also as word spread about this initiative., we noticed that internationally and in India, tablet devices started appearing at sub-US$100 prices. Thus, **this initiative of the Mission has resulted not only in an ultra low cost device for the students in India, but has also created a new market niche.** Today, there are devices appearing commercially in India and abroad at prices much lower than US$ 100

There was already a lot of chatter on the Internet about this device, much of it negative. To ensure complete transparency and a level playing-field, the Mission decided to task one of the IITs (IIT Rajasthan at Jodhpur) with the job of procuring and testing these devices based on the design and specifications that the Mission's team had finalized.

IIT Rajasthan followed an open tender process. A three-step process was followed to evaluate the bids that were received. First, a committee scanned all bids to check their eligibility based on the conditions specified in the tender. Next, a technical evaluation committee comprising of eminent academics and industry experts evaluated the eligible bids. Bids that were found technically suitable were then evaluated by a financial evaluation committee that then declared the lowest bidder. Following set government norms, a further negotiation was then held with the lowest bidder and a further discount obtained from them

On 22nd July, 2010 Mr. Kapil Sibal, the Minister for HRD had unveiled a device that was expected to cost "around US$ 35". The lowest bidder quoted an ex-factory price of US$ 37.98 which was close to the cost mentioned by HRM. This cost that comprised of cost of components and material as well as manufacturing expenses. The final landed price of $49.98/unit (which translated to INR 2276 at the exchange rate at the time of the order) included taxes, levies, and charges like freight and insurance, servicing and documentation etc. The landed price also includes one-year free replacement warranty from the manufacturer

It needs to be mentioned that this price does **not** include any subsidy from the Government and is a price that has been arrived at following a commercial tender process.

This is a unique device and is a first of its kind in the world. There is no other device that offers so much functionality at such a low cost

The development of this device has been done in India. There has been some criticism that this is a made-in-China device. We have available a video that shows these devices being manufactured in a plant at Hyderabad

The Aakash tablet comprises of many hundreds of components sourced from around the world. The major countries of component supply (by value) are as follows:

- South Korea 39%
- China 24%
- United States 16%
- India 16%
- Taiwan 5%

This unique device is meant for students across India. Using this device, and the connectivity also provided under this Mission, learners will be able to access all the thousands of items of content available on the Sakshat portal and other educational web-sites

MHRD has brought in a paradigm shift in the educational computing environment. The real paradigm shift is in seeking education delivery in any environment at any time without much dependence on regular power supply. The student does not get bound to a brick and mortar classroom, but can access world-class lectures and educational content on this device, in anytime, anywhere mode even in the most remote corners of this country

Learners, therefore, are no longer hampered by the lack of infrastructure or facilities but have the entire power of ICT available to them for educational purposes

The device will be distributed to students through the institutions at which they are studying.

The independent team approach of MHRD has also paid rich dividends as the success of some of the teams could be interwoven to overcome bottlenecks of other teams.

Roadmap:

This current phase was a pilot to procure 100,000 devices. This pilot helped in sorting out the production related issues. These devices are now being distributed to students all over the country so that they can be extensively tested in various climatic and usage conditions. The feedback obtained from the testing will form an input into the design of the next version of the device. This is important, as the numbers that the Mission needs to procure are very large.

To achieve this, the team of experts working on this project would be broad-based. The production capacities of Indian manufacturers would also have to be substantially expanded to meet production requirements of a few million devices within a six-month time frame

The Mission now wants to build the next version of the device around a System-on-Chip that this group of experts will design. By reducing the number of discrete components on to one chip, efficiency is expected to go up and price will reduce

Broadly speaking, future efforts will move in two directions – to achieve the same functionality at a lower cost and to achieve added capabilities at the same cost

MHRD invites collaboration, ideas and inventions from the community of academics and experts and inventors to achieve the cherished goals.

MHRD also encourages display manufacturers, semiconductor fabs, component manufacturers and system integrators to establish their facilities in India so that in the long run a suitable eco-system gets developed in the country to attempt even more ambitious goals.

5th October 2011