Building Capabilities and Capacity through ICT for Medical Students and Schools in India

Multifaceted approach through public/private partnerships improves medical education

Increasing the capacity and productivity of the medical education system in India and ensuring it is developing highly competent medical professionals is essential to increasing the overall capacity of the healthcare system.

Like many parts of the world, India faces significant challenges in delivering adequate healthcare to its citizens. Although India is one of the fastest growing economies in the world, with respect to healthcare a massive portion of its population is unserved or underserved. Approximately one million people, mostly women and children, die in India each year due to inadequate healthcare.1 Access to healthcare is especially limited in rural areas, as 80 percent of the country’s specialists live in urban areas.1 Approximately 700 million people have no access to specialist care.2

The shortage of professional healthcare workers – including doctors, radiologists, dentists, and nurses – is severe. For example, India has a shortage of 600,000 qualified doctors3 – in spite of the fact that medical schools in India produce the largest number of doctors of any nation in the world. It’s clear that any strategy to increase the capacity of the Indian healthcare system and improve access to healthcare must address the abilities of India’s healthcare education system. Over 540 medical and dental colleges graduate over 50,000 professionals each year. But even then, a general shortage of medical faculty exacerbates the problem. Increasing the capacity and productivity of the medical education system and ensuring it is developing highly competent medical professionals is essential to increasing the overall capacity of the healthcare system.
Harnessing ICT’s Proven Capabilities in Education

It has become clear, over more than two decades of educational experience worldwide, that information and communications technology (ICT) has remarkable potential to improve the delivery of education. Numerous studies from settings across the globe have shown the positive impact of eLearning tools such as digital education content and curriculum, multimedia teaching methods, access to the Internet, and PCs in the hands of teachers and students:

- The use of technology helps instructors access and develop better instructional materials and conduct research related to their teaching assignments – resulting in more effective lessons.
- Large majorities of instructors surveyed say that eLearning tools increase their ability to conduct project-based learning.4
- eLearning supports the shift from teacher-centered to student-centered teaching, increasing teachers’ effectiveness and reach by enabling them act as facilitators more than lecturers.4
- The use of personal PCs by teachers increases teacher productivity. 31 percent of surveyed instructors report that they perform additional preparation and planning, while 47 percent perform new tasks or performed existing tasks to a higher standard.5
- A meta-analysis of dozens of studies has found students who used technology are on average at the 66th percentile while students without technology are on average at the 50th percentile.6
- A meta-analysis of over 500 studies indicates that students receiving computer-based instruction tend to learn more in less time.7

Many leading medical colleges in India have taken note, and are incorporating appropriate ICT tools in their strategies. “The need for qualified medical professionals is ever increasing, especially in a country like India,” says Dr. V. D. Patil, dean at Jawaharlal Nehru Medical College in Belgaum. “But most colleges are struggling to make progress towards better meeting this need. The only way to bridge the gap is to use ICT effectively to increase the productivity of medical schools.”

A number of leading medical colleges in India are making the deployment of innovative ICT solutions a central part of their strategy to increase their capacity to meet the substantial need for qualified healthcare professionals, as well as to continually improve the education received by their students. Their graduates enter the workforce with better skills and higher productivity. This increased flow of highly qualified graduates into the professional healthcare ranks is essential to meeting the needs of 1.1 billion Indians, as well as preparing the graduates for the increasing use of ICT in healthcare settings.

Catalyzing a Comprehensive ICT Solution for Healthcare Education

With a substantial track record of establishing programs and solutions that tackle tough societal and economic problems with appropriate technology, Intel knows the power of driving such programs through public/private partnerships. Intel often takes a leadership role in these partnerships to accelerate education and healthcare transformation worldwide through technology, programs, and policy leadership. Getting the right ICT tools in the hands of both teachers and students is proving to be a catalyst for better, more immersive education that develops graduates who have broader skill sets and are better prepared for the evolving challenges of today’s and tomorrow’s healthcare settings. “Through our joint work with colleagues in medical colleges, government agencies, and Non-Government Organizations, we could see that there was a significant opportunity to increase the capabilities of Indian medical colleges to better meet the needs of the country,” says Ashok Chandavarkar, regional manager for Intel’s Asia Pacific Healthcare Sales and Marketing Group.

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– Dr. V. D. Patil, Dean, Jawaharlal Nehru Medical College in Belgaum
Working with partners in the industry (including Dell, HP, HCL, and Tata), the India Department of Education, the Medical Council of India, the Dental Council of India, and the Medical Education Research Centre for Education Technologies, Intel identified an opportunity to design and build a comprehensive ICT solution, specifically for medical colleges, that could both improve the education received by medical students and increase the capacity of the colleges. (See Smart Partnerships Yield Better Solutions.) "We have seen that ICT can serve to enhance education by more effectively engaging students and enriching teaching options," says Brian Gonzalez, worldwide director for education in the Intel World Ahead Program. "Communities that have implemented ICT in classrooms are achieving an overall improvement in 21st century skills readiness for their citizens."

The resulting solution, the Digital Healthcare Education Model, is a comprehensive, standardized, repeatable model that medical colleges can use to deploy proven ICT tools in their environment and evolve them over time. It is currently being adopted by 12 leading medical colleges, four of which are profiled in the following pages. The solution focuses on five key elements:

Digital Healthcare Education Content: Extensive, expert curriculum materials adapted and optimized for eLearning via PCs.

Digital libraries: Vast resources made available in digital format through online libraries and easy Internet access.

Instructor PCs: Laptop PCs that make instructors more effective and productive.

Easier access to personal laptop PCs by students: College-led and college-approved programs that make PC ownership easier for students, thus extending the benefits of personal computers to more students.

Wi-Fi infrastructure campus-wide: Anytime access to learning materials, colleagues, and collaborative tools from more places across the campus.

Digital Healthcare Education Content and makes it available to participating institutions across India.

• Medical Council of India, Dental Council of India, and the state government Medical Education Department approved the implementation of the Medical Education Units comprising of digital library and digital classroom within medical and dental colleges.

• Intel provided necessary technology support for setting digital libraries and computer labs, and also aligned the necessary technology partners including hardware manufacturers, connectivity partners, system integrators, training providers, and Wi-Fi service providers.

• Tata VSNL and Microsense enabled networking by providing broadband and wireless connectivity within the campuses.

By helping connect medical school faculty and students to appropriate technology through the Digital Healthcare Education Model, this partnership is helping to improve healthcare, stimulate economic development through a healthier society, and enrich lives across India.

SMART PARTNERSHIPS YIELD BETTER SOLUTIONS

Digital technologies provide exciting opportunities to improve access to quality healthcare in areas of the world where poor health and poverty often go hand in hand, resources are limited, healthcare workers are scarce, and a trip to the doctor can mean difficult and expensive travel. Through its World Ahead Program, Intel regularly collaborates with local and national governments, technology companies, banks, telecommunication operators, service providers, health authorities, and universities to implement practical solutions that promote better healthcare delivery and ensure sustainable long-term improvements.

The Digital Healthcare Education Model is an excellent example of the power a public/private partnership can bring to bear on challenging problems. By aligning the interests of multiple parties and utilizing their broad combined skills, the resulting solutions are better designed and integrated, have fewer obstacles to overcome, and are easier to sustain and grow over time. In this case:

• The Medical Education Research Centre for Education Technologies created, operates, and maintains the

Digital Healthcare Education Content of the highest quality – expert knowledge on demand. It essentially outsources the development of eLearning infrastructure and content, supplying a self-sustaining model that reduces administrative costs and increases operational efficiency. For an institution’s faculty, the model gives them the tools and time to impart deeper skills rather than simply rote teaching.
For medical students, the solution gives them access to a network of eminent medical educators and an entire digitized curriculum available on demand. It eliminates traditional time and space constraints on the learning environment and enables multiple interactive and self-paced learning styles. Interactive courseware engages learners more effectively and results in deeper understanding of the material as well as higher retention of knowledge. At the same time, interactive methods make maximum use of limited faculty and give the students access to imminent professionals. In addition, it trains students with a level of technology proficiency that is on par with the rest of the global community.

“There is no doubt that IT plays a major role in today’s medical education,” says Mr. K. Ravishankar, administrator at Mahatma Medical College in Puducherry. “ICT solutions such as digital libraries, e-Learning curriculum, and telemedicine provide a platform for better interaction and understanding. Exposing students to the latest knowledge and medical trends is very essential – and is possible only through the use of ICT.”

- Mr. K. Ravishankar, administrator, Mahatma Medical College in Puducherry

**Digital Healthcare Education Content.**

The Medical Education Research Centre for Education Technologies (MedRC EduTech) developed the content for the Digital Healthcare Education Model based on the curriculum prescribed by the Medical Council of India (MCI), the body that governs medical education curriculum for the first and second years. Renowned medical educators – a dream team faculty from across India and abroad – supply video lectures enhanced with presentations, graphics, and animations. An entire curriculum of the highest quality for the Bachelor of Medicine and Bachelor of Surgery (MBBS) degree, as prescribed by the MCI, is available in digital format for access and use anytime and virtually anywhere. Instructors now have access to the leading experts in their field to supplement and enhance their own teaching methods and increase the amount of teaching they can produce and deliver.

Digital Healthcare Education Content makes use of the SmarTeach e-Learning* platform, which delivers the exhaustive library of digital lessons to students at various medical colleges. In all, over 50,000 hours of rich medical learning content including over 2,000 eLectures are available. Participating colleges access the content from one central database and avoid the significant maintenance activities required for online content.

**Digital libraries.** The Digital Healthcare Education Model includes best practices on converting existing college library assets into digital libraries. Long term, this can reduce total library operational costs for colleges while increasing students’ access to library materials. When combined with a Wi-Fi networking infrastructure, students and faculty have anytime, anywhere access to their library’s key learning tools.

**Instructor’s PCs.** With their own Intel-based personal laptop PCs, instructors have access to tools and capabilities that fuel more effective teaching. Multimedia
presentations help faculty to arrange teaching components in new ways, using video, animation, and interactive exercises to increase the students’ understanding. Using personal or departmental web sites, instructors can deliver lessons in small packages and in interactive or collaborative ways both inside and outside the classroom. Lessons are easier to comprehend, more organized, and better illustrated in specific, concrete situations. New techniques, such as self-paced learning, immediate feedback, and spot testing become possible. In addition to giving instructors more effective teaching tools, the solution also makes them more efficient by reducing lesson preparation times and allowing them to access the latest content from anywhere on campus.

**Increased student ownership of PCs.**
A key element of Digital Healthcare Education Model solutions are student PC purchase programs that make it easier for students to own a laptop PC. As of late 2010, over 24,000 medical students in India have procured laptop PCs through this program, which connects school administrators with PC vendors offering special financing arrangements and offers guidance on possible subsidy arrangements—all to help more students to afford this strategic tool. With a laptop PC, students have access to a broad range of learning tools and material that previously were not available to them. Collaboration with instructors and fellow students is increased; access to web-based content vastly expands the educational and research material available; and for the first time, students have the ability to incorporate the most up-to-date information in their studies. Combined with campus-wide Wi-Fi networking, the student’s PC allows them to study virtually anywhere on campus, which can take learning into new settings and contexts.

In addition to enhancing their education during their normal course of study, a student’s PC also means that they will enter the workforce with technology skills that match the expanding use of technology in clinical healthcare settings. Their ability to deliver tomorrow’s healthcare and take full advantage of tomorrow’s healthcare innovations translates directly into better healthcare.

**Campus-wide wireless networking.**
Because wireless networking unlocks many of the capabilities of student and teacher computing, blueprints and best practices for deploying Wi-Fi infrastructure are important elements of the Digital Healthcare Education Model. “Anytime, anywhere” access expands learning activities that were once limited to the classroom or the library. Students can learn and review at their own pace, and collaborative activities and assignments are easier to employ. The student/teacher relationship is also enhanced, as both have greater access to the other for updates, questions, and tutoring. To date, over 38 Indian medical colleges have implemented Wi-Fi networking on campus.

**Success Story: Jawaharlal Nehru Medical College**

A strategic move towards ICT tools.
The leadership of Jawaharlal Nehru Medical College, located in Belgaum in the state of Karnataka, has recognized the role that ICT must play in their efforts to be competitive going forward. “Information technology has the potential to revolutionize the way medicine is learned by students and healthcare professionals,” explains Dr. V. D. Patil, dean of the college. “Just as it is transforming the delivery of healthcare, it is also transforming healthcare education.”

The college has adopted many elements of the Digital Healthcare Education Model in order to improve the education being delivered. “We want to provide a student-focused learning environment which can be tailored to meet the needs of individual students,” says Dr. Patil. “We’ve created an environment that promotes an active approach to learning and supports increased communications between staff and students and among groups of students.”
Overall, Jawaharlal Nehru Medical College’s adoption of ICT is a strategic move, one that they believe is essential to staying competitive and graduating fully qualified medical practitioners. “Our institution is focused on providing excellent medical education to students through the continuous improvement of our systems and processes,” say Dean Patil. “The wide adoption of ICT tools plays a major role in helping us achieve that mission.” Students seem to agree, according to second-year student Mr. Vikas. “Our school is among the top 20 medical colleges in India,” he says. “We’re provided with better facilities compared to many other medical colleges. Our ICT tools make us better prepared for our future roles as medical professionals.”

Success Story: Sri Devraj Urs Medical College

Capacity and competitiveness requires ICT tools on campus. “ICT infrastructure has become a quintessential part of modern day education – especially medical education,” says Dr. A. V. M. Kutty, registrar and head of the Anatomy department at Sri Devraj Urs Medical College in Tumkur in the state of Karnataka. His school sees ICT tools as already essential to an adequate medical education and they have deployed most elements of the Digital Healthcare Education Model. “By providing access to digital information, we encourage students to learn subjects in-depth and increase the capabilities of our faculty.” Dr. Kutty also sees ICT as part of the answer to the nationwide shortage of qualified faculty.

“Technology extends the productivity of faculty and allows medical schools to reach students in more efficient ways, such as self-paced and distance learning.”

The college developed an extensive digital library with 100 desktop PCs, and supplies laptop PCs to its undergraduate and post-graduate students. Many other students purchase their own laptops. Overall, 55 percent of the 2,000 students on campus have a personal laptop PC. Students use their laptops to access digital content and course materials, review lessons, watch lecture videos, do research on the Internet, and review international medical journals. The graphical nature of these multimedia tools makes learning easier and faster. “Our technology tools have definitely changed the learning process and make understanding our subjects easier,” says student Pradeep Kumar. “It makes lessons easier to comprehend, and I can access digital information at anytime and review it at my own pace.” Students also access a web-based alumni portal to benefit from career networking with previous graduates.

Faculty use of laptop PCs and multimedia tools in the classroom is central to the college’s strategy for ICT-powered education. “In this generation, ICT is a must in the classroom setting,” says Dr. Kutty. “Medical education is transforming, and we need to keep pace. The graphical presentations and ready access to information mean that students learn topics more quickly.” Dr. Kutty is pleased with the ways that ICT improves teaching capabilities. “Before, I had books and a chalkboard. With a laptop, I can make the classroom experience more interactive. I can show videos of surgeries, rather than flat slides. It’s much clearer.” According to Dr. Kutty, PCs make instructors more productive. “With multimedia tools in the classroom, our faculty spend less time teaching the basics – since the basics are being grasped by the students more quickly – and more time building their practical skills.” Since the Sri Devraj Urs Medical College campus is enabled with Wi-Fi wireless networking, students, faculty, and staff have access to content, coursework, research facilities, and collaborative tools from virtually anywhere on campus. “Sharing material and collaboration, both teacher/student and student/student, has become seamless,” notes Dr. Kutty.

By deploying the Digital Healthcare Education Model, Sri Devraj Urs Medical College is better preparing its graduates to deliver 21st century healthcare. “We’re better equipping our students,” says Dr. Kutty. “They’re better trained and have greater exposure to the latest global medical information and developments. For the institution, it helps us to improve our reputation and ranking year over year, as well as increase our capacity and cater to the growing needs of the healthcare industry in India.”
Success Story: the Mediciti Institute of Medical Sciences

ICT tools for lifelong medical education. As a teaching hospital, the Mediciti Institute of Medical Sciences in Hyderabad strives to develop an attitude of self-learning in its students and give them the tools to both succeed immediately as students and continually extend their expertise in their chosen medical fields. The school’s use of ICT tools helps both parts of that mission. “India is gradually building a nationwide digital infrastructure that supports the delivery of better healthcare,” says Mr. Hrishikesh Chitneni, director of administration at the Institute. “As a part of that trend, more and more medical schools – including ours – are adopting ICT into their teaching and learning processes.” As basic infrastructure, the school has established a digital library that includes self-paced learning modules for first-year classes. Students can access the contents of the digital library with desktop PCs in the library or by using their own laptop PCs in combination with the campus’s Wi-Fi wireless access. “The digital library improves our delivery of education by making higher-quality material more readily available to students anytime they need it,” notes Mr. Chitneni.

Many students purchase their own laptop PCs to access the available digital resources. First-year student Mr. Vishnu Roop Ravula explains the advantages: “My PC helps me to utilize the latest available material in my studies,” he says. “It’s easier to prepare for exams, work on case studies, prepare presentations, and complete assignments.” His laptop also gives him access to a wider world of experts. “Through the Internet, I have access to a network of eminent medical educators and healthcare professionals,” he notes. Instructors note that student PCs increase teacher/student interaction. “Student and faculty interaction has increased as they stay in touch outside of class through e-mails and chats,” says Dr. K.V. Raghava Rao, principal at the Institute. “In addition, online assessment and correction of assignments is now possible.

In the classroom, instructors find that ICT tools have a significant impact on the quality of instruction. “ICT has played a major role in improving the teaching experience,” explains Dr. K.V.L.N. Sharma, professor and vice-principal at the Institute. “Using laptops, digital content, and Internet access, we can deliver real-time case studies, video, and animations to enhance the learning process.” Longer term, the Institute is planning to digitize the entire course curriculum and offer it as on-demand web-based eLearning modules. “We have an opportunity to standardize medical education and use these tools to produce more physicians,” says Dr. Rao.

Success Story: Mahatma Medical College

ICT makes modern medical education possible. For the leaders of Mahatma Medical College in Puducherry, ICT is more than an educational strategy – it forms the backbone of the modern institution. “There is no doubt that ICT plays a major role in today’s healthcare and medical education,” says Mr. K. Ravishankar, administrator of the College. “ICT solutions such as the digital library, eLearning tools, and telemedicine provide a platform for better interaction and more effective teaching. In addition, it’s essential that students are exposed to latest knowledge and trends, which is only possible through the use of ICT.” In adopting elements of the Digital Healthcare Education Model, the College has a strong foundation to build on. It starts with comprehensive digital content and a robust digital library. The school’s digital content today includes recorded seminar videos, routine lectures, and surgeries presented as podcasts, so students can review key teachings repeatedly. The school also has plans to implement a curriculum-based eLearning system in the future. “This digital content makes it easy for students to access what they need individually, when they need it,” says Dr. Palanivel, head of the Pulmonary Department. The digital library, serving both the College and its associated hospital, includes 400 desktop PCs for easy access to comprehensive research and reference material.
Students’ personal laptop PCs, combined with campus-wide Wi-Fi wireless networking, connect them to digital content, myriad learning opportunities, and their instructors and fellow students. “Our students are empowered through access to information at the click of a button from anywhere on campus,” says Mr. Ravishankar. “They experience greater interaction with their instructors and are more engaged in their subjects.” Selva Raj, a second-year student, agrees. “I can easily access all the medical content on campus as well as faculty lectures and medical case videos. This makes it much easier to prepare assignments and thesis papers.” In the classroom, instructors are taking full advantage of ICT tools including laptop PCs and interactive panel boards. “We save time preparing lessons on our laptops,” explains Dr. Palanivel. “Then in the classroom, since we’re using digital multimedia, we can present the concepts in numerous ways – pictures, illustrations, videos, and animations – and repeatedly, if needed.”

The College views their ICT strategy as fundamental to their success. “I think ICT actually reduces the divide between the teacher and the learner, bringing them closer together,” notes Mr. Ravishankar, “and the result is better education.” As an instructor, Dr. Palanivel agrees about the role of ICT in today’s – and tomorrow’s – medical education. “ICT is a boon for a medical college,” he says. “As we incorporate additional ICT tools, it will continue to open new frontiers for teaching and learning.”

The Proven Impact of ICT Tools in Medical Education

The four medical colleges profiled above are proving the ability of ICT tools to improve teaching and learning processes. They’re also experiencing increased efficiency as ICT tools help them deliver education to more students. Both parts of the “double effect” – increased quality and increased quantity of medical professionals – are helping the Indian healthcare industry meet the challenges of serving the country’s large and diverse population. By leveraging the Digital Healthcare Education Model, they’re taking advantage of a well-designed, comprehensive solution that represents a proven blueprint for the gradual deployment of effective ICT tools.

For More Information

Improving healthcare promotes human happiness and citizen satisfaction. Since poor health and poverty are tightly linked, better healthcare also expands economic opportunity and reduces income inequality. What is your vision for healthcare in the world ahead? Talk to Intel and let’s start now for a healthier tomorrow.

Contact your local Intel representative, and see the world ahead: www.intel.com/worldahead.