Digital Study Hall (DSH) is an operational and delivery network providing education to low-income students in slums or rural villages in India and Bangladesh. DSH is a grassroots network to eliminate educational disparities by leveraging low-cost technologies and a network of teachers, schools and computer professionals to improve the lives of traditionally under-served inhabitants of remote villages and provide them with access to some of the advantages of a digital information age. DSH supports training of local teachers and increases communication between all stakeholders in the educational system, using technology to share best practices.
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Digital Study Hall (DSH) is an operational and delivery network that delivers education to low-income students in slums or rural villages in India and Bangladesh via lectures and lesson plans on DVD. Described by its founders as the educational equivalent of “Netflix meets YouTube,” DSH films India's best teachers as they teach the local state curriculum in their local languages, and then distributes the DVDs to schools in need across the country. Founded in 2005 as a local non-profit in India, DSH now works with more than 6,000 students in 70 schools and has recorded more than 2,000 video lessons. Its success has attracted international partners such as the Human Development Foundation, the University of Washington and the Better Education through Innovation (BETI) initiative, and sponsors such as Intel Labs, Microsoft, Google and the National Science Foundation.

DSH represents a model of a grassroots network to eliminate educational disparities by leveraging low-cost technologies and a network of teachers, schools and computer professionals to improve the lives of traditionally underserved inhabitants of remote villages and provide them with access to some of the advantages of a digital information age. In addition, DSH supports training of local teachers and increases communication between all stakeholders in the educational system, using technology to share best practices.
Addressing Educational Disparities in India

While India is home to Indian Institutes of Technology and other world-class universities, the education system in many poor and rural areas is underfunded and inadequate. These underserved areas suffer from an overall teacher shortage – and those who are there are often ill-equipped to teach their assigned subjects. Even those who are skilled and qualified are spread too thin; some rural schools serving five hundred students may have as few as six teachers (see Figure 1). In fact, “Many of [the poorest, most disadvantaged schools in India] are single-teacher schools in rural areas and urban slums,” says DSH co-founder Dr. Randolph Wang. “They lack knowledge and training. They have to cope with difficult social economic issues such as child labor, child marriage, gender bias and caste bias.” A high level of teacher absenteeism exacerbates these problems. So too do prohibitively expensive communication costs and expansive geographic distances that isolate rural schools and make it difficult for teachers and students to share experiences with their peers in other schools.

“Digital Study Hall is basically ‘Netflix for poor kids.’ We find good teachers, film them preparing lessons and organize them in a database. We then ship the DVDs to schools and instruct the teachers how to mediate the lessons.”

Dr. Randolph Wang
co-founder, Digital Study Hall

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Fig. 1 – Digital Study Hall’s service mandate
These problems lead to unacceptable levels of illiteracy amongst the Indian population, particularly amongst female students aged 14 to 18 (discussed in greater detail below). Attempts to address these disparities and the systemic inequalities they create have so far failed. The leaders of DSH believe that official attempts to address disparities were not only inadequate, they argue that the Indian government is simply not interested in serving these disadvantaged schools.

As for solutions, simply “wiring the schools” and piping in standardized content, as some have proposed, is not the most prudent path to take to address these challenges. Not only would doing so be prohibitively expensive, it would also not address the lack of pedagogical training in the classroom that leads to highly inconsistent standards and results across India’s school system. Nor would wiring the schools address the fact that India contains many distinct cultures and languages, a fact that renders the use of standardized, pre-recorded material less effective than teaching methods that reflect India’s cultural and linguistic diversity.

Digital Study Hall Methodology

DSH develops and deploys low-cost, practical and effective technologies to help improve education for disadvantaged schools in some of the poorest areas in India. The project, a collaboration between computer scientists and education experts, is a user-generated video sharing system. It helps local schools and NGOs make videos of the best teachers in actual classroom settings and distributes them to local schools. In addition to sharing videos of lessons throughout the network, children from urban slums are invited to participate in afternoon classes at partner private schools.

The Main Goals of DSH

- **Build a “People’s Database of Everything.”** DSH builds a video database that shows organized and logical lessons that are presented in the local language based on the official curricula of state educational boards and makes this database openly available.
- **Develop a System of Hub and Spokes.** The network operates as a Hub and Spoke system. The Hubs develop content (generally in the local language) and training methods, and then evaluate and interact with the spokes, which are usually poor rural or urban slum schools. According to Dr. Wang, “The Hub and Spoke
The lessons are excellent and students benefit a lot by discussing the pedagogical principles shown in these videos. The use of role plays, blackboard work and various interesting activities make the lessons very interactive. These videos have infused new energy into the trainee teachers. It washes away any hesitancy on their part. The students have participated in the group discussions on these video lessons with great enthusiasm.

Leveraging Simple, Pervasive Technologies

Technology plays an important role in the future of education – for example, many universities such as MIT and Harvard make course material freely available on the Web, in some cases even providing credentials for completed courses. Digital textbooks offer improvements with respect to accuracy, updatability, and use of multimedia. Digital platforms allow students, faculty and authors to share information and collaborate. And educational alternatives such as Coursera and even TED talks are open to anyone with Internet access. Compared with these initiatives, the technology DSH deploys is rudimentary.

“The lessons are excellent and students benefit a lot by discussing the pedagogical principles shown in these videos. The use of role plays, blackboard work and various interesting activities make the lessons very interactive. These videos have infused new energy into the trainee teachers. It washes away any hesitancy on their part. The students have...

• **Promote Mediation-Based Pedagogy.** DSH makes it clear that its goal is not to replace teachers with video but rather to coach them how to supplement instruction with recorded lessons. The program is designed to have the teachers mediate between the lesson and the students and supplement the video with individual tutoring and instruction.

• **Provide Technology for Sharing Community-Generated Video.** Although technology is a major driver and enabler, DSH is foremost a “people system” as opposed to a computer system. Videos are recorded with low-cost equipment (in many cases mobile phone cameras), and distributed via the postal system. These videos fall under a Creative Commons license and can be freely copied. Since each school will be able to own a copy of each lecture, students with spotty attendance records can catch up at their own pace.

For the populations served by DSH, broadband and even reliable electricity are often unavailable. (DVD players come equipped with lead-acid batteries and a DC-to-AC inverter). While production standards fall far below Western standards, it is important that local teachers are featured as they understand the students’ language and culture and their participation reinforces teacher knowledge and pedagogical skill.
participated in the group discussions on these video lessons with great enthusiasm.”

Dr. Shubhi Pandey
Lecturer, DIET Kanpur Dehat

According to Program Leader Dr. Urvashi Sahni, the emphasis DSH places on simple, pervasive technologies is deliberate and consistent with the realities in India. “The e-learning landscape is littered with misguided and expensive “wire-the-schools” projects that have little to show in the end,” says Sahni, who has no intention of retracing those missteps and insists that “cost realism” be among the core principles guiding the project. Sahni cites a recent survey of schools in Bihar, Madhya Pradesh, Uttar Pradesh and Rajasthan. It shows that 63% of the schools have leaking roofs, 58% have no drinking water, 89% have no functioning toilet, 27% have no blackboards and 8% have none of the above! Sahni adds that “The high cost of a large-scale conventional ‘wire-the-schools’ attempt must be carefully weighed against these basic needs.”

In addition to technology pragmatism, DSH addresses the soft racism of low expectations from these disadvantaged schools and the general apathy that builds up over many years. Dr. Wang explains, “One would be naïve if he expects that dropping a video device housing a good content library in such a school should have magical effects overnight in transforming such a culture that has been built up over generations. However, one will be equally mistaken if he concludes that this problem is intractable and beyond the scope of technology-based solutions.”

Role of Partnerships

Over the years, Digital Study Hall has built an international network of partners in academia and the private sector that play complementary roles in delivering, evaluating and publicizing its work. Specifically, these partners participate in or support four aspects of DSH’s mandate and operations: program delivery, academic and technical leadership, outreach and training, and financial support.

Program Delivery
Digital Study Hall works within the Indian and Bangladeshi school systems to target disadvantaged teachers and students with its programs. “We do not build schools from scratch,” Dr. Wang describes on the DSH web page. “Instead, we work with existing schools, organizations, and teachers: they get to do what they have always wanted to do, but with the aid of a “digital pipe” that DSH helps them set up, they can now hopefully reach a larger population of under-served children more effectively.”
Academic and Technical Leadership

DSH benefits from its partnerships with academic institutions such as the University of Washington and the University of Toronto. Co-founder Randy Wang (who founded Digital Study Hall while in the computer science department at Princeton University) and colleagues provide academic leadership to DSH as well as performing extensive audits and analysis on the program’s effectiveness (see details in Societal Impact and Gender Empowerment below). Now at the University of Washington, Dr. Wang’s team continues to work tirelessly to build exposure and raise grants for DSH. Dr. Kathleen Gallagher at the University of Toronto works with a team of graduate students to measure the success of DSH’s programs. In addition, Microsoft Research supports DSH through its India Lab in Bangalore and its Digital Inclusion Program. Specifically, Microsoft researchers help videotape lessons, conduct experiments to assess DSH techniques and publish results about best practices including peer mediation and inter-school competition.10

Outreach and Training

Given its ambitious mandate and relatively modest operating budgets, DSH amplifies its scope and impact by collaborating with larger organizations to expand its operations into new areas and spread the word about its accomplishments. For example, the pilot project “Empowering Adolescent Girls Using Critical Dialogues Videos” illustrates the success stories of DSH schools in the Lucknow district. Programs in that region were designed to raise self-esteem in young girls as well as educate them on issues such as gender equity. The official goal of the dialogues is to help students “develop a sense and resistance against the unequal structure which helps them fight for equality...[and]... become aware of their rights and responsibilities and the program is helping to build strong selves that see themselves as equal persons.” 11

In collaboration with UNICEF and the Study Hall Education Foundation, DSH has since expanded its program from Lucknow to other underserved areas of India including Jaunpur, Mirzapur, and Sonebhadra.

Financial Support

DSH receives financial backing from various organizations and NGOs including the Mona Foundation, a group whose mandate is to alleviate poverty through universal education and gender equity. Financial partners also provide funding for alumni from DSH to pursue post-secondary education. According to Dr. Gallagher, the group that she followed enjoyed tremendous success. “There were surprisingly few casualties – all the students in the class we studied were funded so that they could go to university.”12
Societal Impact and Gender Empowerment

In some parts of the world, disruptive technology generates significant controversy and resistance from teachers unions and other groups. But DSH is mostly entering green space; it operates from a neutral point of view and presents its message in a positive and supportive light. In fact, most of the students that DSH reaches would otherwise not be educated since they are typically members of a low caste, impoverished and responsible for generating income.

Sonali Thaker, a former primary and middle school teacher in the city of Ahmedabad believes that families often need an incentive to send children to school, especially after the eighth grade. Thaker says “this age is the most important time since there is pressure especially for girls to get married and leave the education system.” When Thaker did volunteer outreach in a “street school,” she and her colleagues specifically targeted older students who were already married. DSH helps to resolve the tensions between academic pursuits and domestic pressures by encouraging schools to offer flexible hours.

One of the goals of DSH is to provide flexibility to students who infrequently attended or dropped out of school because of cost or having to contribute to family activities (typically household or agriculture-related). This situation most affected female students who are often the primary caregivers for younger students and sometimes the main breadwinners of the household. The partner schools closely target these students and adapts schedules so that they can be available for classes outside of hours where they are required to tend to other children or work (often as domestic servants). In addition, DSH created a “Gender Empowerment” program referred to as Kasturba Gandhi Balika Vidyalaya (a program introduced by the Government of India in August 2004 to provide educational facilities for girls belonging to scheduled castes, scheduled tribes, minority communities and poor families). In 2012, the program reached 3,800 adolescent girls in underserved communities via interactive seminars.

“Our vision is to democratize education. There are huge inequalities in India. On the one hand you have schools that have resources and infrastructure. On the other hand there are many more that do not have resources. By resources, I mean, quality of teachers, infrastructure and basic amenities. So the idea is to share resources that can be exchanged digitally with the use of technology by including as many people as possible in this process. Fundamentally, the vision is to improve the quality of education, to equalise the education and to include more people in the whole educational process.”

Dr. Urvashi Sahn
Founder & Director, Digital Study Hall
Jaunpur teacher Sony Upadhayay reflects on the impact this work is having on women’s empowerment. “We learned from this training that if women are to unite, they can break shackles of orthodox and conservative society. They can change the society from a patriarchal one to one which is equal in rights and responsibilities for women and men. Going back to my school, I will try and instill the same spirit of awareness and self-pride in my students.” Her colleague Anju Lata Srivastava agreed. “Through this gender awareness programme we came to know about the crimes which are happening against women, the details about the laws and how we can take legal help to stop the crimes. How we can identify the problems of children and help them solve it. [The] following topics were discussed – child marriage, Eve-teasing, dowry, right to education and domestic violence.”

Increasing the availability of educational opportunities for young females represents a challenge for families who have traditionally relied on young women family members for domestic labor or income. DSH has found that breaking the status quo requires some diplomacy. Dr. Gallagher of the University of Toronto is impressed with how well they deal with these issues. She tells us, “[Dr. Urvashi Sahni’s] expectations are enormous and she realizes that education will not be able to happen if the girls’ well-being and general needs are not met.” She has worked to set up a catering company with one of Lucknow’s hotels that is staffed by the girls’ mothers. Young female students can work there to meet some of their family’s income-generating demands, but their fathers cannot access their wages. Also, since claims of domestic abuse are often ignored, Dr. Urvashi “often shows up at the girls’ homes accompanied with police officers to reinforce that the girls reports will be supported.” Since this type of intervention requires the personal input of a strong personality like Dr. Sahni, actively publishing the type of results it achieves will inspire other people to take up similar roles.

“Our vision is to democratize education. There are huge inequalities in India. On the one hand you have schools that have resources and infrastructure. On the other hand there are many more that do not have resources... So the idea is to share resources that can be exchanged digitally with the use of technology by including as many people as possible in this process. Fundamentally, the vision is to improve the quality of education, to equalise the education and to include more people in the whole educational process.”

Fig. 2 – A female empowerment session
Performance Metrics

DSH regularly audits schools to check how effectively and regularly the content is being used, the impact on pedagogical improvements including teacher engagement and performance, as well as other items such as how regularly and completely the log book is checked. The audit report describes how many students participate and the nature of how the material is used (e.g. are the videos played straight through or paused and complemented with input from the teachers as intended). In most cases, the target students would not receive audits from an official ministry, so the responsibility of quality control remains with DSH.

Dr. Wang collaborated with a group of academics to evaluate the quantitative impact of the program, measuring English and Math scores for 100 children in three rural schools and one non-formal setting over a three month period. Their study concluded that the program was a success, as illustrated in a review Wang conducted with a group of academic colleagues:

“Specifically, the data show gains in test scores of subject matter knowledge; children in classes that were part of the intervention scored almost 400% higher in English and almost 300% higher in math than did children in a comparison school. There were changes as well in classroom interactional patterns, suggesting that teachers became more student-centred in their approaches. The qualitative data illustrates how one teacher used and learned from the model lessons over time – for example, acquiring pedagogical strategies for interacting with the children and learning to connect classroom topics to the children’s local social worlds. Most generally, the data demonstrates how a network of teachers, schools, computer professionals, and teacher education can reconfigure flows of information, tools, people, and texts, creating a band of geospatial opportunity within which the educational and social spaces of inhabitants of remote villages can be improved, allowing them hopeful entry to some of the advantages of a digital information age.”

As of August 2013, DSH was working with more than 6,000 students in 70 District Institutes for Education and Training (DIETs). It has installed intervention programs in 41 KGBVs and more than 2,000 video lessons have been recorded (See Figure 3). The DSH YouTube channel has more than 33,000 views and the view rate grew more than 170% during the last six months of 2012.
Other macro metrics that DSH evaluates are improvement in scholastic achievement, improvement in teaching ability, total number of lessons reproduced, and school attendance level (particularly amongst female students). Dr. Urvashi Sahni, another co-founder, illustrates the impact that DSH has had on the life chances of students who have benefited from the program; “For example, the girls at Perna (a DSH initiative) who have spent their childhood cleaning homes, looking after a drunk father and bringing up their younger siblings are now interning at five-star hotels, computer labs and libraries. These girls now dream of becoming teachers, doctors and entrepreneurs.”

**Future Plans**

Digital Study Hall still faces significant obstacles and challenges including how to best allocate financial and human resources. Since the program operates in resource-challenged areas, it is difficult to operate even the simple TV/DVD set-up due to unreliable power and a dearth of qualified repair technicians. In addition, the physical discs fail due to scratches and overuse. Nevertheless, DSH plans aggressive growth with respect to both reach and mandate. The DSH 2012 Biannual report includes the following goals:

- **Increasing outreach through the Web**
  DSH is making new and existing content available on the Web as the internet penetration increases in its operating areas.
• **Engaging additional schools in more regions**
  DSH is in the process of expanding its partnerships with schools in other districts to localize and customize the content material.

• **Developing resource materials for teacher trainees and educators**
  DSH will digitize its curriculum in order to standardize delivery within each cultural and linguistic group in some areas and address India’s faculty shortage.

• **Increasing collaborations**
  DSH is actively seeking collaboration with organizations such as Microsoft Research India in order to meet technological and execution challenges.

### Implications for Network Leaders

Digital Study Hall presents a compelling case where a clever program can deploy technology not only to improve a current situation but also to enable transformative development. A less thoughtful program might tackle the same problem in a simpler way without attention to long-term benefits. The key takeaways for global solution network leaders are as follows:

**Technology-enabled solutions must be appropriately targeted and contextualized in order to maximize their impact.** Technology can improve education, but technology alone is not a panacea. Simply delivering lesson plans via video is relatively easy, even given the complications of poverty and remoteness. While video-only instruction can be effective for some students with the right kind of learning style, generally it is inadequate for students below the post-secondary level. Students at elementary levels require more personal attention and close individual interaction. DSH specifically designed its video lectures so that the teacher’s role was still primarily that of an educator, not merely a facilitator of a virtual lecturer.

**Local cultures and traditions can still be respected, even by national and international solutions.** The world-view of elementary students in general, and poor Indian students in particular, is still being formed. DSH recognized that students respond better when educators (even those who appeared only by video) speak their language and dialect, come from similar backgrounds and use relevant examples while teaching. This concept underlies the decision to feature local teachers rather than more experienced educators from outside the community. Again, cultural specificity and sensitivity should trump the efficiency of one-size-fits-all programs or solutions when designing a high-impact network.
**Transformative programs must have a long-term strategy.** One of the most salient problems addressed by DSH is that many of the teachers in the target areas were under-skilled, under-trained and under-motivated. Simply replacing them with virtual educators would be short-sighted. Instead, DSH designed a program that ensured that existing teachers received better training, peer support and additional motivation. Such long-term strategic planning boosts the resiliency and sustainability of the initiative by ensuring that local skills and capacity are strengthened in order to solidify the hard-won educational improvements that DSH has put in motion.

**Technology solutions do not need to be cutting-edge to be effective.** Sometimes GSNs put the technology first and design a program or solution to fit the delivery method. DSH does the reverse, building a program and pedagogical approach and choosing an appropriate technology platform to deliver it. As a result, the technology deployed by DSH would be considered obsolete, even quaint in most parts of the world. Streaming video is replacing DVDs (and all physical media) and basic mobile handsets are ubiquitous, even in impoverished areas. Still, the mandate of DSH is better served with simpler technology given its mission, infrastructure and cost limitations. Basic handsets and limited wireless bandwidth, after all, will not yet support video-based content delivery. DSH will only consider switching to more advanced delivery platforms once economics and infrastructure have evolved sufficiently to ensure that its pedagogical approach will not be compromised.

**Technology-enabled platforms can be multi-purposed.** Once the DSH network and operating methodology were developed, they were re-purposed to meet other needs. Specifically, the program (along with some key alumni) established similar ventures to support innovation in agriculture, healthcare and entrepreneurship. Spreading the DSH methodology to other countries facing educational deficits could further increase the impact of the network.

*by Mike Dover for Global Solution Networks*
Endnotes

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4 Speech by Dr. Randolph Wang delivered to Google employees January 31, 2008.

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8 Randolf Wang, “BitTorrent TV+Netflix for Disseminating Lesson Videos to Disadvantaged Rural Schools in India.”


10 Paul Javid, “Lessons and Experiences in DSH Bangalore, July-December 2006.”


12 Interview with Dr. Kathleen Gallagher conducted by Mike Dover, July 23, 2013.

13 Interview with Sonali Thaker, conducted by Mike Dover, August 19, 2013.

14 Scheduled castes and scheduled tribes refer to people who were historically disadvantaged. This term is recognized in the Constitution of India.


16 DSH 2012 Biannual Report, ibid.

17 Eve-teasing is a euphemism used in India for public sexual harassment or molestation of women by men, with use of the word “Eve” being a reference to the biblical Eve, the first woman.

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21 Ibid.

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23 Digital Study Hall website.

24 DSH 2012 Biannual Report, ibid.


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Global Solution Networks is a landmark study of the potential of global web-based and mobile networks for cooperation, problem solving and governance. This project is a deliverable of the research program, offered through the Martin Prosperity Institute at the Rotman School of Management, University of Toronto.

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Ten Types of Global Solution Network