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The developmental promise of information and communications technology in India

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ABSTRACT *How do developing nations react to rapid conversion into information societies? This article examines the growth of information and communications technology in India, with the state's universal internet access policy (part of its 'IT for All' initiative) at the center of its investigation. The rapid development of technology and access to telecommunications over the next decade is inevitable in India, and what the universe of 'universal access' will be is open to speculation. India's human development, especially the geographic structure of education and economic opportunities, threaten to create a divisive threshold. Since the organization of the information society is reliant principally on skill and knowledge networks, the benefits system may exponentially increase, and perhaps entrench, the gap between the haves and the have-nots if the speed of basic development does not catch up with that of technology spread. Will the factor of relative disempowerment outweigh the benefits of 'IT for All' in India?*

India presents a unique case among developing nations. While continuing to hug the lower rungs in most United Nations (UN) developmental indicators,[1] India has managed to maintain a more than respectable rank in the world-wide technology race ever since information technology (IT) became a popular economic development buzzword. Alternating policy phases of *laissez-faire* and active government support coupled with an excellent training infrastructure and strong international expatriate networks have given the country a strong industry in software exports. This was facilitated and made time-efficient by the entry of internet technology, which first penetrated major research centers, then technology corporations and technical universities, and then the lives of upper-class urban Indians.

A taste of rare affluence in global comparisons, after a lack lustre tryst with industrialization, has created an attractive theory of an *IT panacea* that holds the key to all of India's chronic developmental problems. Egged on by remarkable

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growth and modernizations in several urban sectors in very short periods of time, this quick success and quick solution theory has been eagerly lapped up by the Indian elite and the dominant media as a proxy affirmation for India as a whole.

The media's and the Indian government's hard-sell of an IT-savvy India has dominated the top-down development discourse. This has often been aided by the internationalization of the economic growth issue into foreign lands of expatriate riches and international demands for inexpensive communications and software technology exports. The growth potential of the sector notwithstanding, this ascendancy of the IT panacea forms a worrying study in contrast next to the uneasy reality of a majority of Indians not having access to blackboards or clean water, and barely keeping over the poverty line. Is information technology a solution for development across the board? If not, then is it possibly a vehicle for the entrenchment of inequalities?

The internet is the major communications medium of the IT-enabled economy, and one of the most significant ways in which end-users find their lives changed by technology in their daily lives. The effects of the spread of the internet among the various strata of the Indian populace—mostly the corporate and the upper and middle classes, to an extent school students, and in some cases even the village farmer—differ vastly on account of three characteristics.

- differences in location on urban and rural populations;
- differenced in education between higher educated English speakers, and middle school or lesser or uneducated non-English speakers; and
- differences in economic status between middle and lower income classes.

From the development perspective, the spread of IT can have two basic benefits: jobs and wealth created by the IT economy itself, and the use of IT as a welfare tool to decrease the inequality in distribution of wealth. Policy-makers studying the technological equity scrutinize how internet technology may be used either to reverse current levels of inequality or, failing that, to prevent a severe digital divide.

India in the information society

'Informationalism' was a relatively unknown term 10 years ago. With the rise and continued growth of information networks worldwide, this new phenomenon—sometimes companion, sometimes rival to the capitalistic economy—has left an indelible mark on global political, economic and social systems, completely changing concepts of productivity, growth and competitiveness.[2] Informationalism refers to the spread of information as the new parallel to capital in industry and the creation of an informational society, one in which information and its generation, processing and transmission become power, and thus capital. The phenomenal growth of the network society has made it evident that knowledge is becoming the undisputed centerpiece of global prosperity.[3] With more fluid 'capital' offerings, the information revolution is seen as the new

consolidator to the power of the most developed nations, and a new archetype for developing societies to aspire to.

The idea that the internet embodies a technocratic belief in the progress of humans through technology[4] has at its heart a faith in the higher education system, organized or otherwise. This is certainly true of the present, where the less-educated have an exponentially lower access to the benefits than those with higher education. This idea is countered (or at least conjectured as having an incomplete definition of 'humans' and 'progress') by the development economist's view that the development of higher education (and, correspondingly, IT), when unaided by a parallel growth in elementary education, leads to an overall detriment for the economy.

While any apprehension over the development promise of new technology is often easily trashed, the basis of this paper is that there is an essential difference between previous phases of development and the current era of informationalism. The key element is education, and the argument here is that there is a very strong exclusionary potential in the information economy where sectors like elementary education fall back while, contrastingly, higher education gets stronger and better, to a point where entire generations will grow up with severely reduced scope of access to the informationalism-led development. This idea is partially fueled by research that education in India has in the past grown at higher levels while the concurrent sluggish growth in elementary education has increased inequalities in the post-independence era.[5] This indicates that putting a college within access of every major town is a catalyst for inequality given that schools in the vicinity are clearly not good enough to export students to such colleges. This has inferable parallels to the technology revolution that places countrywide wiring and technology training at the vanguard of growth. What will the universal spread of information technologies do *for* the poor majority of the Indian population? What will this spread do *to* the Indian poor?

There is no real evidence that informationalism will culminate in a rigid class definition or a lop-sided development any different than the spread of capital-based entrepreneurship, nor is there an argument in this paper that this process should be checked. The doubt raised here is whether an illusory 'IT for All' myth has been created. If so, what are the possible consequences, and is there a possibility that 'All' can be re-defined by geography, economy and education?

With a modernization phase that left India lagging behind most of the nations that it started at par with in 1947, there is undeniably great hope to be drawn from the information economy. Despite the generally low human development indicators, India has shown a very significant rise in comparison with other nations during the late 1990s, when technological growth was highest on the national agenda. From 139th among 174 nations in 1998 on the United Nations Development Programme (UNDP) Human Development Index, India has risen to 124th among 173 assessed nations in 2002.[6] Indeed, this is a very persuasive argument in favor of informationalism playing a role in overall economic development rather than sectoral/net Gross Domestic Product improvement. There are shared qualities between capitalism and informationalism. Growth and

rise in per-capita productivity has been directly linked to technological progress in industrial societies.[7] Technological progress, guided here by the rotation of information capital, will spearhead growth in information societies. Do the rising human development indices signal a revolution that will spread in influence over all social?

With IT's splashy entry into the Indian economy, there was an expansion in jobs available in the high-skilled sectors. But, unlike industrialization, informationalism does not support a mass labour engine. Informationalism, therefore, is to be seen in a larger context as a change that permeates into social and economic life. Seeking the job-creating power of informationalism requires an inquiry into whether there is the kind of labour force that is equipped with the kind of skills that an information ecology will foster. Quickest to benefit has been the underemployed urban educated in India that suddenly found its English language skills and engineering training easily transplanted into promising IT positions. Paradoxically, the vast pool of under-utilized intellectual resource that was an asset in the entry of India into the information economy now presents itself as a new elite, as it is not very vast in percentage terms within the Indian billion.

It has been proposed that the shift to an information society can lead to middle-class economic insecurity and potential for crisis in the patriarchal state.[8] A strong case could be presented that India is both patriarchal and draws its political power primarily from its middle classes, making it a prime candidate for potential crisis. India promises two different digital divides: an urban/semi-urban middle-class divide, a *comparative* disempowerment that, due to lower levels of education and economic status, will be differentiated strikingly from the knowledge-empowered; and a potential schism in the rural–urban digital divide, that between the Indian poor and the rest. The first digital divide is the face of urban struggle for resources and power between the technology haves and the 'potential haves' in an environment of high pressure on people to educate themselves in technology and find ways of incorporating it into their lives and livelihoods. The second—the urban–rural schism—will form the new face of Indian poverty.

Proposing an 'IT for All' policy and, to some extent, implementing a number of programs at the rural level, has been the Government of India's plan of action for incorporating the disempowered into the information society. Whether these programs can actually reach significant numbers within the lowest two income brackets, comprising well over one-half of India's population, is very difficult to assess, but geographical and educational infrastructure give us a reasonably good idea of the blocks *en route*.

The city

The development of California's 'Silicon Valley' and the much-touted Indian 'Silicon Valley' in Bangalore raises another interesting theoretical point. What will the information society do to the Indian city? The example of the universal development of the Silicon Valley in creating one continuous suburbia inter-

spersed with technology parks[9] indicates that the concept of traditional metropolises as centers of economic growth is not completely congruous with the information society. Capital investment in real estate chosen locationally is being made redundant to the working of firms in the information society, and the example of Detroit as the 'death of a city' may not be an isolated instance relating specifically to the demise of one particular industry. [10]

This process may well be mirrored in India. Just as mills moved to the outskirts, entire corporate offices may see little sense in running large operations from inner cities. Hi-tech centers in Bangalore and Mumbai, which exist in extremely high-cost urban centers, are the opposite of what an information and network-based firm could function best in. Locating in urban areas due to the lack of progressive facilities in rural areas is ironic, since a self-confessed goal of these urban industries is to facilitate expanded universal access. Thus, with the goal achieved and universal development in place, the economies of locating in urban hubs will largely be obsolete. Judging from past research, this question about the future of the city centers probably holds its worst consequences for the largely immobile urban poor, possibly faced by an exponential loss of urban blue collar work as industries and economies to shift out of cities.[11] Can the information society bring about the death of the metropolis in India, or will its peculiar developmental conditions simply extend the geographic realms of urban sprawls?

An information society has the potential to change the character of Indian urbanity, migration and empowerment by giving a larger proportion of the country's population access to development. There is a Utopian school of thought that the internet revolution will resolve the problems of social inequality and poverty.[12] William Mitchell, another theorist with similar, although subtler, prognostications, believes that it is not necessary to first remedy social inequalities—a line of thought akin with the Indian state's faith in technology. Mitchell believes that there is no necessary dependence on any factor of a leveled starting point; development can come without the initial minimum educational equity.[13] The key to development will be what reactions to policies and new technologies will be, especially in the cities.[14] This is exactly where India poses such a complex problem; not only is the city not the center of its society, but that minimum educational equity is non-existent, making a comparison with industrialized societies uneven.

Perhaps there is more cause for cynicism. It has been argued that evidence showing poor communities to have significantly benefited from major technological change is very weak and extremely slow.[15] It is difficult to present a reasonable argument that students in rural Indian schools will have, in the short–medium run, the same potential for inclusion into the information society as those from poor urban schools, even if the two sets of schooling situations show similar economic characteristics, both in terms of the mean income of parents (which is a reasonable possibility) and in terms of the per-student expenditure undertaken by the school (which is highly unlikely considering the dismally low per-student expenditure in rural areas).

One of the promises of informationalism is development aided by the death of distance, but how far is distance in India measured purely in terms of miles? In industrialized nations, a key factor is the spread of IT into the rural space aided by the universality of education. India, on the contrary, has its best-educated almost completely clustered in cities, and the concentration of people and resources is so centralized in a few urban hubs that moving any facilities outside of those vicinities is equivalent to building new cities. The apparent absurdity of IT firms locating in high rents hubs of Bombay and Bangalore is only theoretical; in reality, it makes a lot of sense.

The internet user benchmark for 2008 in the 'IT for All' program was defined by the Ministry of Information Technology as 100 million.[16] Using demographic data on the percentage of Indians with economic buying power in excess of US$2500 per annum juxtaposed alongside the percentage of Indians with school education or above sets a threshold of between 90 and 145 million Indians as the Indian upper and middle classes.[17] Who will these users be, and how will this elite interact with the remaining non-users?

The village

Since the late 1990s, as it became clear that the internet would play a large role in development, governments and international agencies started exploring ways in which it could be made accessible and relevant to underprivileged populations. The UN set up a pilot model for internet access in developing nations in March 1999 in rural Egypt.[18] This model provides a cost-free introduction to communication technology to rural people, focusing on arousing curiosity among the youth and cultivating a new generation of users. A group of workers set up a browsing center, sent out word and then introduced surfing to clients. Following this, computers were left open for anyone to gain skills or experiment with. Besides being a basic introduction to IT, the UN project also aimed to use the internet as a skill-enhancing and therefore job prospect-improving mechanism. This model, commonly used in pilot projects all over the world (by the UN and individual countries, including India) to examine the employment and 'connection-making' abilities of the internet, has one major caveat on the employment front: it considers the internet to be a solution for *underemployability* as opposed to outright unemployment or, more specifically, unemployability in skilled sectors. It implies that jobs are not present for people with a certain level of education, but may be found for those at a slightly higher level of education.[19]

In an Indian context, there are broadly three classes of potential rural users that might find their way to these internet access booths: first, those with some university education; second, those with a high school degree (Class 10); and, third, those users with primary schooling or lower. Assuming the availability of, if necessary, a mediator between the user and the computer, this model of using the internet for opportunities is clearly relevant to those with college education, and perhaps in a limited fashion to those with some secondary schooling. But,

Table 1. Gender-wise calculation of possible users at a rural internet center by level of education

	Percentage possibility		
Possibility that the rural user is:	**General**	**Male**	**Female**
X (high-school)	6.9	10.1	3.4
Y (college)	1.2	1.9	0.4
Z (less than high school)	91.9	88.0	96.2

Source: Computed from the average national rural literacy rates, Tables C2 and C2-A, *Census of India 1991*. The figures for Y include illiterates as well as all those with less than a basic school degree. The computation is on the basis of 1991 rural district literacy rates (gender, 44.2; female, 30.6; male, 57.0) adjusted with the attainment rates of rural literates reaching college, passing the basic school degree or quitting prior to that.

I would argue, there is practically no direct application of the internet for those in the third category.

Data on literacy and educational attainments in India show that the average user would overwhelmingly have less than a basic school degree. Based on the density of colleges in India, the numbers of college degree holders are likely to be rare enough in the village to make any program for that group in villages economically unviable. The data on the number of possible high-school graduates in villages is also likely to be very low (see Table 1).[20] Furthermore, these figures are averages for the entire rural population, itself highly diverse. Demographics will be even more unfavorable in smaller villages or in villages in the Hindi belt (from Rajasthan in the west to Bihar in the east) that house the bulk of Indian rural residents.[21] This suggests that providing internet connectivity for development is not only divided in approach by urbanization, but also across cultures by the level of human development within a country.

There is a constant grappling with ways in which IT can be made directly relevant to the disempowered masses in India. Setting aside derived benefits, there is a desire to see a participatory benefit where the end-user, whether rural or urban poor, is tangibly gaining. Yet, a developmental paradigm of seeing the internet as a 'value addition' to a population with an assumed base competency writes off most of India from the information and communications technology revolution without explicitly saying so. To add value, there must be perceived value to begin with. Perceived value in rural India is a completely subjective question—an internet connection as it is under the circumstances serves the purposes only of those with a certain degree of educational attainment with an interest in furthering their skills.[22] A 'highest numbers possible' access goal is purely cosmetic.[23]

The role of language

Andhra Pradesh State Chief Minister N. Chandrababu Naidu, seen as one of the

pioneers of the technology revolution in India, announced at an Internet Technologies conference in April 2000 that India had the second largest pool of English-speaking manpower in the world.[24] This coincided with a projection by the National Association of Software and Service Companies (NASSCOM) that India would have 100 million internet users by 2008, as well as in the Ministry of Information Technology Information Technology Action Plan (Operation Knowledge).[25] Naidu's statement has an unusual connection to the 100 million figure. The issues of potential internet users in India and of potential English speakers in India are not unrelated.

India's large and growing size of internet users[26] has ironically led to little or no Indian-language content growth on the web.[27] There may be e-zines and a number of entertainment and localized information sites, but there is no focus on access to services for the regional languages. This lack of Indian languages indicates a general belief that numbers are not enough for profitable translation of services into most Indian languages.[28] This lack of pressing demand for Indian languages suggests that pertinent rates of literacy and exclusive fluency in these languages (whether Hindi, Telugu or Bangla) within the net-enabled communities is currently low. More importantly, there is a very credible suggestion herein that the increase in written fluency in scattered regional languages is somehow connected to a universal bilingual rise in English. The onus, therefore, is not on providing the internet in regional languages (as it is in China, for instance), but instead on setting the knowledge of English as criterion for membership into the internet club in India.

The projected figure of 100 million internet connections in India can be seen as a linguistic threshold. The number of Indians who can read or write English with a degree of fluency falls well within the projected figure of Indians to whom 100 million internet connections can provide access, assuming the basic high school degree as the threshold for understanding.[29] About 90 million Indians had a basic high school degree and above in 1991;[30] that is, about 25.1% of Indians were considered literate. Assuming an unchanged ratio of high-school attainment, from the total of 567 million literates in India in recently released figures from the 2001 census,[31] at least 142 million can be assumed to have basic school degree or above. (There appears to be little recognition of the English paradox in any of the official literature. Neither the NASSCOM reports, nor the policy papers of the Ministry of Information & Technology nor even the Ministry of Education's *Policy Paper for 2000* deal in detail with the inapplicability of internet content to non-users of English. Indeed, two of the above three have no Indian-language versions of their internet websites.)

The language issue opens up an apparent paradox of a seemingly highly proficient work force, despite an otherwise poor state of affairs within the Indian education system. A surprising fact offers an explanation; India has a very high percentage of people going on from high school to college, proportionately six times that of China.[32] Investment in higher education as contrasted with primary schooling is continuingly high in India, and interest in it is growing very fast, especially with the promise of creating an information society. Subsequently, the

already empowered English-speaking high school graduate has a good probability of going on to higher educational achievements.

Taking education as the key qualifier then, Indian literacy and language proficiency conditions imply that the 100 million total of internet users would mark the saturation threshold, after which there would no longer be justifiable demand for the web in the immediate present. This threshold implies that those left out of ever making gainful direct use of the internet today are likely never to make any direct use of it. This is a shocking fact; that the human development of the country is so low that even if everyone were able to access the internet in their homes, not more than 100 million connections would be of any real use. This 'threshold theory' means that the definition of a formal target of internet users by government policy will ensure that most political effort will be directed only towards the already-educated Indian. This is where the empowerment debate begins.

Elementary education in India

The channels of delivery in spreading the Internet outside Indian cities will be a determining factor in what sections of rural populations find themselves empowered by a broader communications network.[33] In the village, the two most important points of convergence to be considered are markets and schools.[34] Despite enrollment statistics, schools remain the most powerful points of access into the lives of the rural and urban poor. Since the school would be a far more malleable means where the state would be in control of ensuring the dissemination of technological knowledge, the education system becomes the most pivotal point from which technology can effectively permeate the entire social fabric.

But will there be a demand for internet access and education in village schools in the foreseeable future? Past experience has shown that schooling as a desirable stepping stone has not appealed at all to the poorest, whereas those in the lower middle classes have quickly bought into and invested in schooling and personal technology training. A study of primary education data figures for India shows that over 50% of school children drop out before the completion of the equivalent of the US eighth grade.[35] Reasons vary from state to state and by gender.[36] A commonly found reason is that the parents feel the children have 'nothing to gain'[37] from being at school against the comparative gain of additional hands to contribute to family resources. Literacy rates for the lowest per-capita expenditure quintile of Indian society (below the poverty line) is surprisingly greater than the literacy rates of the second-lowest quintile, which is above the poverty line.[38] This indicates that poverty plays a lesser role than other demand factors. Poverty, if anything, provides a convenient answer for the government because, once the causes for non-enrollment and, subsequently, child labour are blamed on the poverty rather than the poor education system, there is a virtual absolution of responsibility, whereby neither the Department of Labour nor the Department of Education are directly responsible for what

appears to be a systemic failure.[39] Real per-capita expenditure on education, instead of increasing or even remaining stable, has reduced since the 1970s.[40]

Compounding the problem of rural education is the extremely difficult task of getting good teachers[41] in villages, the high absenteeism of teachers,[42] and the traditional lack of an effective monitoring system within the villages where the schools are located.[43] Paradoxically, the growth of an information society in India, aided by a very poor branding for the teaching profession, itself creates a vicious circle by offering exponentially better opportunities in urban hubs for the educated elite. Also, even the better rural schools, hundreds of thousands in number, commonly do not have basic facilities such as electricity and running water.[44]

It is the lack of outrage that seems most surprising. It is not true that there is no interest in education whatsoever, just that it is so poorly sold in the rural space. There is more of an ideological recognition; a preference for the usefulness of education rather than a pressured political demand, and thus the failure of India's village education provision does not lead to the kind of political upheaval one might otherwise expect. On one hand, everyone who knows about the internet, or might in the reasonable future be a user, make up the core socio-political demand articulators, and therefore benefit from a universal access policy. On the other hand, those that are outside of this realm and who universal internet access is intended to benefit are the poorest and least educated. Their severe disempowerment has not managed to create the political agitation that should logically follow, and they have no demand articulation for any of that basic infrastructure and development needed for them to be internet capable.

Given the knowledge that large sections of rural Indians do not send their children to school due to its apparent futility, it is useful to examine what those sections that do invest in education see as their key motivations. This, quite often, is mobility, often migration to urban areas[45] or even abroad.[46] The notion of educating a child by sending him/her to the city is common in India. Attitudes relating to what kind of jobs are socially acceptable after a certain degree of education can also influence demand. Consequently, education or development as brought to the semi-urban and village levels would need to be self-sustaining to the effect that it is useful to the client in his/her current location. The internet needs to be understood in the village space as a communications empowerment tool rather than as a direct educational experience or as an immediate job-prospect enhancer.

Village kiosks and other approaches

The 'IT for All' program attempts to deal with the threat of a digital divide by providing internet access through dedicated kiosks. Assuming that, at the initial stage, there is no demand, the internet kiosks are likely be provided free of charge or subsidized for a stipulated period by the government at village focal points, possibly markets or village meeting places. These may not necessarily be within the direct access of the entire rural population, but may nevertheless

provide a demonstration effect of bringing knowledge of new technology and, possibly through a go-between, a number of e-governance services.

Given the English language issue as already discussed, is it possible to make present internet content relevant to Indian villagers?

The Government of India unveiled its 'IT for Masses' program in May 2000. In Kerala, a joint project of the IT department, Kerala State Library Council and Kallara Panchayat plans information centers in libraries, word-processing facilities and counseling/guidance for citizens. While the project assumes a very high level of education and proficiency among users, it defines itself as being a project for 'lower middle classes and the poor'.[47] More ambitious is the Maharashtra's plan, in association with WorldTel and Reliance Infocom, of internet community centers, called *Cyber Dhabas*. Similar projects are in the pipeline for Tamil Nadu, West Bengal and Andhra Pradesh. The aim of Reliance Infocom, which will lay the fiber optic lines for this project, is to start an efficient backbone network of internet access throughout India. These are not to be welfare projects. The *Cyber Dhabas* are to function like public call offices and provide a variety of services including health-care information, crop prices, public distribution and grievance redressal.[48] In contrast, in Madhya Pradesh, the government's Computer Access for Farmers of Madhya Pradesh project, initiated in May 1999, not only addresses some of the major concerns of farmers, but also acts as a social justice mechanism whereby local level grievances and administrative matters can be handled via a manned Internet connection.[49] Interestingly, the state government got much of the funding for this project from the *gram panchayats* (local level administrations), far preferable to self-propelled government initiative aimed at disinterested and skeptical farmers.

Yet, in their current forms, these projects do not present any significant bringing of the internet to the lowest classes of rural India. The closest these projects get to reaching the rural poor is connecting the small farmer. The farm labor class, or indeed, practically all of 'below poverty line' India, is excluded. Most of the services provided by government internet services (such as land deeds) are of little or no consequence to the landless. Even in the more successful projects, there is no currently implemented mechanism that undertakes the huge task of ensuring that everyone within the coverage space of a kiosk or information center is explained the technologies, given demonstrations, and convinced of the benefits it may hold for them.

Nonetheless, within the given framework of what can or cannot be done, some projects have contributed to selective empowerment. The overall policy of the Madhya Pradesh government has been moderately effective, with some specific projects showing remarkable success. Significant among these has been the *Stockholm Challenge IT Award* Winner for 2000, *Gyandoot Soochnalaya*, a scheme tested in Dhar district of Madhya Pradesh. With a network of manned information centers throughout the district, *Gyandoot* lays emphasis on using the internet to bring peoples' concerns to the government. Dealing with government officials in India is universally recognized as a demanding proposition. *Gyandot* attempted to eliminate the crop middleman and the *patwari* (land rights sur-

veyor); saving time, effort and a lot of money for villagers who otherwise deal with them for sales or land surveys. A large part of the success of the project was the building demand and selling the idea of internet information centers, including very extensive marketing to popularize the project, encompassing audio-visual campaigns in villages, pamphlets, specially convened *gyansabhas* (village information meetings), scholarship schemes, visits from schoolchildren from across the district to the information centers, and giving demonstrations and hands-on training for individual kiosks and their operators.[50] Interestingly, the success of *Gyandoot* suggests that addressing a complaint or an official request to a computer seems more comforting because of the impersonality and apparent incorruptibility of online access of information.

Contrasted against the success of *Gyandoot* is the failure of the Rajasthan e-governance project, RajNidhi, set up in early 2000 in an attempt to cover villages across the state. Its first internet kiosk became fully functional in Nayla in March 2000, timed exactly with US President Bill Clinton's visit.[51] The day after Clinton left, the telephone connection provided for internet access was removed, and the center is currently unattended and the computers locked away. The problem in Nayla was not simply one of motivation; it was probably clear even to the locals, who saw their village vacuumed to perfection, that the important American's visit was the driving force behind the project. Nevertheless, this was public money spent on rural development. If villagers in this case were educated about the medium, the demand would have been generated from below. When the center shut down, there was no protest about it reported, nor has the Rajasthan state assembly opposition raised a motion of dissent against the neglect of the RajNidhi project. Technically, the project is underway and purports to bring internet access to every village in Rajasthan. In point of fact, the sole browsing center has shut down.[52] The project started as a state government effort, and it ended as a state government failure. The people never got involved, unlike the *Gyandoot* project in Dhar where the 'people' not only knew about it, but contributed and demanded the computers (see Table 2).

Affordable teledensity?

Can the Government of India hook up every school and every village on the internet by 2008? Teledensity (the number of telephones per person) in 2000 was in the region of 2.7 per 100 persons, and is at about 4.4 in mid-2002. Rural teledensity in 2000 stood at 0.4 per 100 persons, and is approximated at 0.93 per 100 persons in 2002,[53] a figure that includes villages ranging from 15,000 down to 500 residents. The majority of villages with phones are either larger in size or near urban centers. Official estimates in 2000 place the number of connected villages at 58%,[54] although the figure does not show a clear picture on rural telephony. As of 1 January 2001, 376,000 of India's 660,000 villages had telephones, although outdated technology and equipment plagued 211,000 of them.[55] The *National Telecommunications Policy 1999* aims for a rural teledensity of 4.0 by 2010. Conventional technology makes it very capital-heavy to

Table 2. Comparison between *Gyandoot* and RajNidhi

Gyandoot Project (Madhya Pradesh)	RajNidhi (Rajasthan)
Similarities	
Rural district	Largely rural state
Very low education district (34.4% literacy in 1991)	Very low education state (38.6% literacy in 1991)
Very low development (least-developed category in *Census of India 1991*)	Low development state
Dissimilarities	
Small-area concentration (initial phase planned only for Dhar)	State-wide area coverage (at least on paper, RajNidhi was meant for the entire state, not just the Nayla district)
Initiated with some participation from villagers	Initiated and installed by the state
Responsibility/control at district level	Project controlled centrally from the state
Exclusive project, operates on its own, although is connected to the larger state access project	Includes entire state initiative, including placing kiosks at markets and hubs, and state-wide intranet

connect the last mile in reaching a village, maintenance is also expensive and low returns make it economically non-feasible, considering the extremely low traffic expectation. Privatization was once seen as a possible solution to low rural teledensity, but heavy initial investment requirements and revenue-sharing burdens ensured that private companies went cherry picking in the urban telecom sector, guided by a need to consolidate good markets as quickly as possible.

Affordability poses another stumbling block in providing internet access for everyone in India. Professor Ashok Jhunjhunwala's TeNeT group study argues that a household spending 7% of its annual income on information and communications technology would allow access to the internet (see Table 3).[56] Jhunjhunwala assumes that the 7% telecommunications expenditure of the top two earning brackets would be affordable in the same proportion down the line to lower income brackets. Yet, even if a 7% communications expenditure were not considered too high at lower levels where spending is more needs oriented, the statistics deny the most important facet of connectivity; that is, capital expenditure, both at the user (computers) and provider ends (telecommunications lines). In rural areas, the per-line costs for last-mile rollout vary from US$500 to 800. Using the current price levels of telephone and internet usage, it is clear that only that 7.9% of the population (1.6% of households with an annual income of more than US$5000 plus 6.3% of those with income US$2500–5000) can actually afford telecommunications today. (Perhaps with the fall of per-line costs to $300, the market may be extended to 30% of all Indian households.) Yet, the current figure, calculated for a population growth of just over 1 billion, curiously returns us to a number very close to the that 100 million internet connections envisaged over the next 10 years. As such, the internet will remain

Table 3. Percentage of Indian households that can afford certain yearly expense on communications

Household income (yearly)	% of households	Affordable expenditure on communications (yearly)
> $5000	1.6	> $350
$2500 = N5000	6.3	$175 = N350
$1000 = N2500	23.3	$70 = N175
$500 = N1000	31.8	$35 = N70

Source: A. Jhunjhunwala, 'Towards enabling India through Telecom and Internet connections', in R. Dossani (ed), *Telecommunications Reform in India* (Westport: Quorum, 2000).

the presevre of the top 7.9% of population that can afford a minimum yearly expenditure of more than $175 on communications.

Further weakening the demand side argument is that the information presumed to benefit villagers through internet access does not require such access at all. Dependable market prices of agricultural products, healthcare information and political issues can all be addressed far easier using radios and telephone information lines rather than introducing a complicated technology that has otherwise no perceptible benefits given the profile of the average rural Indian.

Conclusion

It is the state's responsibility to develop alternatives to remedy the immense inequity between India's urban and rural spaces. Thses include a rapid and urgent investment in primary education, and the development of new semi-urban hubs to break away from the current state of economic imbalance that concentrates almost all non-agricultural opportunity in one or two major urban agglomerations in every Indian state. The Madhya Pradesh government had its basics right in its attempt to create a functional network for farmers, but this is not implementable all the way into the village of less than 1000 population. Consequently, micro-projects like *Gyandoot* do not attempt to set up shop at the smallest villages possible; instead, they create economic hubs at market places, bus stations and meeting points of selected larger villages. Developing hubs is then not a companion to grassroots development, but can be an indirect route to it, when coupled with a strong education system. It might mean a slower path to telecommunications entering the smallest villages, but such entry would be accompanied by the demand for these services, and thus enjoy a localized support structure. Technology does not take productive effect immediately; cultures, institutions, business and other factors of a society need to undergo significant chances before that. The suggestion here is not that the same world available through the internet should not be made available, just that the entry point be such that the medium be made convincing first.

Finally, there is the issue of social networks. It has yet to be studied what

percentage of India would naturally object to using the internet, al though similar studies in the United States have shown a high degree of resistance of people to technology.[57] It can be reasonably assumed that the socialization of the internet will be a far more difficult among Indian adults.[58] However, evidence that people who themselves resist using technology would pass on that resistance to their younger generations is very weak. It is the schools that will either make the Indian workforce a technologically proficient one, or retard its development for another generation.

The lack of interest in educating the masses has been a feature of the short-sightedness of the Indian state and industry. Technology cannot replace the relevance of schools. The lack of a reasonable minimum education will negate the turn of the perceived benefits of technology, impede the growth of markets and further perpetuate inequality, perhaps for a generation or more. The information society is not a remedy for a failed tryst with human development

Notes and references

1. Website: *UNDP*, http://www.undp.org/, accessed 29 September 2002. The UNDP Human Development report has rated India in the 124 (from 173 assessed nations), including in its most recent publication in 2002.
2. Manuel Castells, *The Rise of the Network Society: The Information Age: Economy, Society and Culture: Volume 1* (Oxford: Blackwell, 1996), p 19.
3. Jeffrey Sachs, 'Helping the world's poorest', *Economist*, Vol 352, No 8132, 14 August 1999.
4. Manuel Castells, *The Internet Galaxy. Reflections on Internet, Business, and Society* (New York: Oxford University Press, 2001).
5. Jean Dreze and Amartya Sen (eds), *Indian Development: Selected Regional Perspectives* (Delhi: Oxford University Press, 1996), p 14.
6. *Op cit*, Ref 1.
7. Robert Solow, 'Technical change and the aggregate production function', *Review of Economics and Statistics*, No. 39, August 1957.
8. Manuel Castells, 'The informational city is a dual city: can it be reversed?', in Donald A. Schon, Bish Sanyal and William J. Mitchell (Eds), *High Technology and Low-Income Communities: prospects for the positive use of advanced information technology* (Cambridge: MIT Press, 1999).
9. Referring to the Greater San Francisco Bay area from San Francisco in the north to Palo Alto in the West Bay, San Jose and the Silicon Valley in the south, and up around the bay to Berkeley-Oakland in the north-east.
10. Peter Hall, 'Changing geographies: technology and income', in Donald A. Schon, Bish Sanyal and William J. Mitchell (eds), *op cit*, Ref 8.
11. Julian Wolpert, 'Center cities as havens and traps for low-income communities: the potential impact of advanced information technology', in Donald A. Schon, Bish Sanyal and William J. Mitchell (eds), *op cit*, Ref 8.
12. Nicholas Negroponte, *Being Digital* (New York: Alfred A. Knopf, 1995).
13. Donald A. Schon, Bish Sanyal and William J. Mitchell (eds), *op cit*, Ref 8, p 7.
14. William J. Mitchell, *City of Bits: Space, Place, and The Infobahn* (Cambridge: MIT Press, 1995).
15. Leo Marx, 'Information technology in historical perspective', in Donald A. Schon, Bish Sanyal and William J. Mitchell (eds), *op cit*, Ref 8. In his essay, Marx argues that technological changes such as the railroad, electricity and automotive technology did not have significant beneficial effects on the poorest in the past, and uses this historical perspective to assess the potential effects of the current IT revolution.
16. The Government of India Ministry of Information Technology, in its policy paper *Information Technology for Masses* released in 2000 by the 'Working Group on Information Technology for Masses' states in its summary that it targets 100 million internet lines by the year 2008. At that point, the population of India should be in the region of 1129 million people.
17. Website: *Census of India*, http://www.censusindia.net/, accessed 31 August 2002. Based on census figures, exact explanations of computations seen later in this paper where these figures are discussed extensively.

18. The test phase comprised three internet centers in Sharkeya, Egypt. Q2
19. Mona Afifi, a policy specialist at the Information Technologies for Development Programme at the UNDP, said in an interview with CNN online, 6 June 2000, about the community center at Zagazig, Egypt, that: 'People who are educated but have no work can now get training that will enhance their chances in the job market'. The statement implies the unavailability of jobs at a certain level, touching upon the central problem of difficulty in employability in developing nations.
20. Website: *Census of India*, http://www.censusindia.net/, accessed 29 September 2002. In 1991, less than 20% of the Indian rural population was located in villages of more than 5000 residents. Only about 7% of the total population was in villages with more than 10,000 residents. The total rural population with educational attainment of higher secondary and over was 18.2%, with the all-India figure for college graduation among rural populations being 2.7%. See Table C-2 and C-2A, *Census of India 1991*, Part IV—Social and Cultural Tables.
21. *Ibid.* Of the Indian rural population, 88.1% lives in villages of less than 5000 residents. See Table A3, *Census of India 1991*, Part II A (i)—General Population Tables. High schools and colleges are rarely situated in villages of such small sizes, often requiring students to travel to neighboring villages for schooling.
22. *Ibid.* 36.9% of the Indian urban literates and 25.1% of the total Indian literates have above high school degrees. See Table C-2 and C-2A, *Census of India 1991*, Part IV—Social and Cultural Tables.
23. The term 'access' refers to how many people actually have access to the internet. Technically, therefore, if one worked in a building that had internet access, the person would be said to have access. Similarly, if 7% of an individual's monthly income (seen as the amount one is willing to spend on communications; discussed later in this paper) is in excess of the monthly charges for internet access AND if there is a cyber-café in the vicinity of the individual's place of residence, he/she would be said to have internet access. This disregards completely whether or not the individual actually uses the internet.
24. The Seminar, 'Get connected—an Indo-British Initiative', was held in New Delhi, 8 April 2000. Chandrababu Naidu's statement was recorded in a bureau report in *The Hindustan Times*, 9 April 2000.
25. From a speech on IT goals in India delivered by K.C. Pant, Deputy Chairman, Planning Commission, at the meeting with The Ind-US Entrepreneurs, 10 November 1999, Silicon Valley, USA.
26. Website: *123 India*, http://www.123india.com/, accessed 4 August 2001. An Indian Market Research Bureau survey that only counts core users—those who use the internet at least once a week for 30 minutes and for more than just sending an e-mail—says there are 2.2 million internet users in India. Other surveys report 3.1 million (Gartner (India)) and 4.8 million NASSCOM users. See website: 'Number of internet users in India is anybody's guess', 123india.com, accessed 10 December 2000.
27. This can be related to Indian university education being almost entirely in the English language. It would be impossible to find a holder of a master's degree in Telugu who had no knowledge of English. Yet, importantly, a major portion of the Indian population is literate in regional languages yet non-college-educated, and uneasy or unqualified in English.
28. Upon being asked, a content developer from Hungama.com, one of the largest Indian internet ventures, stated: 'It is not worthwhile making a big investment with Hindi on the Internet, most people who are that good with Hindi can read and write English already'.
29. By Class 10, students in India, even in regional school, have had some exposure to English. It could be argued that, in Class 10, graduates have only surface competency in English, but that is balanced by the number of dropouts from English-medium schools. However, both numbers are very small; the dropout rate in English-language schools is very low. Another implicit assumption is that everyone without schooling has no English-reading-skills.
30. Website: *Census of India*, http://www.censusindia.net/, accessed 10 September 2002. Computed from Table C-2 and C-2A, *Census of India 1991*, Part IV—Social and Cultural Tables.
31. *Ibid*, as per the data on literacy in the 'Provisional Population Totals' released by the Office of the Registrar General & Census Commissioner of India. More precise figures are expected to be released later this year. Website: http://www.censusindia.net/results/statedata.html/, accessed 10 September 2002.
32. Jean Dreze and Amartya Sen (eds), *Indian Development: Selected Regional Perspectives* (Delhi: Oxford University Press, 1996), p 14.
33. This study is superficial to the extent that it does not take into effect the problems of social dynamics within the rural space. Issues such as caste, economic status, and political empowerment are not taken into consideration, even though these could potentially have effects on the usage of an internet kiosk set up in a village. This is a weakness that provides a more detailed subject for another paper.
34. Wells could be a very important point of convergence for women since they are less prominent in markets.
35. Website: *Department of Education, Government of India*, http://www.education.nic.in/htmlweb/edusta.htm#a9, accessed 10 July 2001. Education Statistics (1997–98), Sub-table XXX (Dropout rates at Primary and Middle stages).

36. See Jaireth, Sushma, 'Dropout girls in India—a case study', NCERT paper presented at 9th World Congress of Comparative Education 1996, Sydney, Australia. Q3
37. Website: *Children Data Bank, of the Institute of Psychological and Educational Research*, http://www.childrendatabank.com/india/education/education.html/, accessed 15 September 2002. Thirty-eight percent of Indian children do not make it past Class 5.
38. Jean Dreze and Amartya Sen, *The Martya Sen and Jean Dreze Omnibus* (New Delhi: Oxford University Press, 1999), p. 81.
39. Shanta Sinha, 'Child labour and education policy in India', *CSD Papers*, Series 1 (Mussoorie: Center for Sustainable Development, Lal Bahadur Shastri National Academy of Administration, 1995).
40. Q2
41. Another point worth adding here is that teaching is very low on the social esteem ladder. Despite being white-collar workers, teachers earn less than urban blue-collar workers. Additionally, there is a growing urban association of teaching with female workers, teachers are overwhelmingly housewives who take up teaching out of an interest in staying occupied, thus the incentive to excel is limited. Even in the marriage markets, teachers have among the lowest draw, in dowry terms, among all white-collar workers. Q2
42. This can largely be attributed to the fact that government jobs are very difficult to lose, therefore very well insulated. Also, government job appointments are often politically motivated, especially those related to job 'disbursements' by incumbents. It is widely believed in India that lower-level government jobs are often impossible to land without political connections or bribes. See Lloyd Rudolph and Susan Rudolph, *Education and Politics in India: Studies in Organization, Society and Policy* (Cambridge: Harvard Press, 1972).
43. *Ibid*.
44. In 1991, just 18.7% of Indian villages had access to electricity and safe drinking water. See website: *Census of India*, http://www.censusindia.net/, accessed 13 July 2001. Source of data: Table H-5, *Census of India 1991*, Part VII—Tables on Houses and Household Amenities.
45. Website: *UNESCO*, http://www.unesco.org/courier/2000_03/uk/somm/intro.htm, accessed; and 'India's barefoot college generation', *UNESCO Courier*, March 2000. Q4
46. Urvashi Sahni, 'Postcards from India: new workplaces and literacies', *Journal of Adolescent and Adult Literacy*, Vol 43, No 2, 1999.
47. Q2
48. Similar arrangements have been discussed by WorldTel with six more state governments in India. There is yet to be any official launch on the proposals. There was no follow-up available to the initial memorandum of understanding signed between WorldTel and Maharashtra. The project at its most advanced stage of completion is the Tamil Nadu project, which does not provide free services; instead, operating like a cyber-café.
49. The details of the policy that includes the project providing internet access to farmers is available online. Website: *State Policy on T*, http://www.mpgovt.nic.in/it/ITpolicy.html, accessed. Q4
50. Sumeet Chatterjee, 'Digital divide: compelling governments to act', *India Abroad*, 24 November 2000.
51. Clinton, impressed by the fact that illiterate village women could get information on neo-natal care from the internet, later stressed at a national conference on building prosperity the need for similar community computer centers all over the Mississippi delta. Q2
52. K. P. S. Yadav, 'Rural infotech: virtually there', *Down to Earth*, Vol 9, No 18, 2001.
53. Website: *Department of Telecommunications, Government of India*, http://www.dotindia.com/, accessed 10 September 2001.
54. See '58 pc villages have public telephones', *Business Line (The Hindu)*, 8 April 2000. The Department of Telecommunications state that there are 3.53 *lakh* (1 *lakh* = 100,000) village public telephones, covering 58% of the total 6.07 *lakh* villages in the country. The report does not specify whether there are cases of more than one telephone in a village.
55. '660,000 villages untouched by India's economic reforms', 18 January 2001; website: *Rediff India,* http://www.rediff.com/money/2001/jan/18reform.htm, accessed 30 September 2002.
56. Ashok Jhunjhunwala, 'Towards enabling India through Telecom and Internet connections', in Rafiq Dossani (ed), *Telecommunications Reform in India* (Westport: Quorum, 2002).
57. Website: *UCLA Center for Communication Policy*, http://ccp.ucla.edu/pages/StudyDescription.asp, accessed 29 September 2002, Section: 'The Internet Project, Surveying the Digital Divide'.
58. Amy Poftak, 'Technology and rural education', *Technology and Learning*, Vol 19, No 7, 1999; Lisa Roberts, 'Sleepy little town turns High-Tech', *Home office Computing*, Vol 19, No 1, 2001; and Jo Ann Wilcox, 'Technology for rural America', *Successful Farming*, Vol 98, No 3, 2000.

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