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Widespread Awareness about Quality in Education – WAQE Up India

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***Abstract* - The current government in India is aiming for a "Digital India", the vision of the project being: *Digital Infrastructure as a Utility to Every Citizen; Delivering Governance & Services Digitally; Digital Empowerment of Citizens[1].*In severe contrast comes in the following statistics (as per the data released by National Sample Survey Organization in 2015):Nearly 6 per cent of rural households and 29 per cent of urban household possessed computer. Among households in the country, with at least one member aged above 14 years and above, nearly 27 per cent had internet access in the survey year, 2014. The proportions were 16 per cent among rural households and 9 per cent of urban households. Among persons of age 14-29 years, nearly 18 per cent in rural areas and 49 per cent in urban areas were able to operate a computer. With the literacy rate of the country at 75%, computer literacy goes down to a mere fraction of that, which is indeed a cause for concern [2]. Apart from this we would like to consider the knowledge demographic as well as the age demographic. In the current education system, are the students (even degree holders) really knowledgeable and dependable? What part of this 75% of literate people can really be called learned? Will digitization not go waste on a person who can barely sign his/her name? Also, with reference to schemes like "JeevanPraman" - a biometric enabled digital service for pensioners to submit their life certificates, what percentage of the current population of senior citizens in India would be proficient in using a smart phone or tab and accessing a finger print scanner app?This paper deliberates on:1) If India is as yet ready to go digital, with the current level of a) Literacy and b) Infrastructure 2) What measures can be taken to ensure that this drive reaches out to the masses and is able to enrich their lives in ways intended. We propose to include computer education as an integral part of the literacy movement, and introduce it from the primary level, through basic undergraduate education and extendable to adult and continuing education. We shall also try to project and align principles and tools used in Software Quality Analysis in the sphere of Indian education to streamline the current system. India needs to WAQE (Widespread Awareness about Quality in Education) up, so as to achieve e-literacy from illiteracy, and ensure maximum cognizance, appreciation and benefit of a digital way of life.**

***Keywords* - Digital India, Digital Empowerment of Citizens, Literacy, Infrastructure**

I. THE DIGITAL REVOLUTION

The Digital Revolution[3-4] or the third Industrial Revolution is the transformation from the analog era to the digital era via mechanical, electrical and electronic inventions. It has started from late 1950 to 1970s. In 1947 the transistor was invented that led to the more advanced computer. The concept of internet was developed from requirements in US defence where messages had to be sent through packet switched network such as ARPANET using a variety of protocols. From 1970s the computer started becoming a household device and could be used in a shared mode. The first video games were conceptualized. In the next decade i.e. 1980s, computer went on to bring about an extensive change in development of science and technology. Automated Teller Machine, Industrial Robot, digital music etc. came into vogue. Motorola, the renowned telecom company created the first mobile phone. In early 1990sthe first HDTV broadcast was done for FIFA world cup. Cell phones started gaining popularity by the early 2000s. By 2010 the cell phones had transformed into smart phones, tablets etc. The widespread use and interconnection of mobile networked devices and mobile telephony, internet websites and resources, and social networking have become a remarkable standard in digital communication. In the recent days cloud computing and internet of things has added another step to digital revolution. Commerce is nowadays better known as e-Commerce. Artificial intelligence is taking the world by storm.

If we study the progress of digitization in India, we'd find that initially computers were limited to renowned educational and research institutions - IITs, ISI, TIFR and to a much smaller scale in major business houses, e.g.an IBM 1401 was installed at Esso Petroleum Company in 1961. The first business venture in the Information Technology space was through the incorporation of the erstwhile Patni Computer Systems

Private Limited on February 10, 1978. However, Computers didn't become household equipment until the 90s. The government policy was guarded in the initial days. One of the very initial attempts at automation was in 1986 when a passenger reservation system was implemented by CMC for the Indian Railways. With the initiation of economic liberalization in India in 1991 the pace of progress became much expedited. The advent of public internet in 1995 and subsequent policies conducive to growth, particularly after 1998 when the government declared "IT as India's tomorrow", and took a number of proactive measures to promote software companies, helped the country to reach new heights and become a formidable global power in computer sciences and application. International Monetary Fund (IMF) Managing Director Christine Lagarde has mentioned that with young workforce and continuing policy reform, India has not only emerged as the fastest-growing economy, but its stars also shine bright amid the current global gloom.[5] Hence neither talent and skillset, nor financing would be the issue for the vision of a digital India being fulfilled. The major challenge is reaching out to the whole of the Indian population, which would be discussed in the next few sections.

II.THE DIGITAL INDIA MOVEMENT

The following initiatives have been identified as the nine pillars of Digital India, which proves that the current government is extremely serious about this movement and wants it to reach out to every aspect of governance, administration and business.

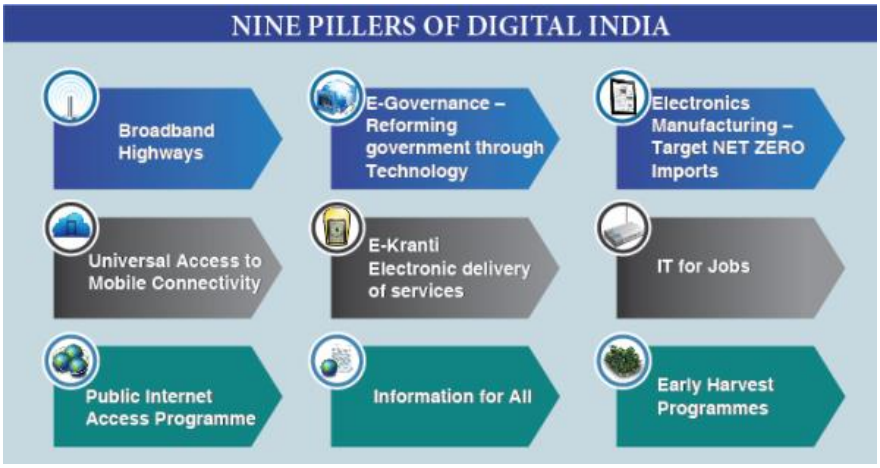

Fig.1. Nine Pillars of Digital India [6]

The present Union Minister for Communication & Information Technology has articulated the 'Digital India' initiative of the government to transform India into a digitally empowered society. He has also mentioned that Digital Literacy Mission is a key component of Digital India initiative. [7] The government is extremely prompt in uniquely identifying the population, and in addressing grievances and issues (e.g. regarding passport or Aadhaar card issuance [8][9]), which will facilitate this movement to reach out to the masses. The industry stalwarts are also hopeful about the future prospects, e.g. IT industry veteran and Infosys co-founder Narayana Murthy said that the benefits of the government's ambitious Digital India programme will take three to five years for citizens to derive full benefit out of it. [10]

There are incredibly inspiring stories from common people that give us hope that the Digital India Movement will be a success. Some such examples are described below:

- 52 free educational apps prepared by a primary school teacher Imran Khan – the present Prime Minister of India has praised this attempt during his speech at Wembley, UK. [11]
- 24-year-old quits IAS to turn free e-tutor - Roman Saini has resigned after two years as assistant collector of Jabalpur and ventured into the space of digital education. He uploads lectures on his Unacademy platform on YouTube which are extremely popular. [12][13]
- Techies turn 3 villages of MP into free Wi-Fi zone - Four techies from Madhya Pradesh's Rajgarh district have turned three remote villages into first free Wi-Fi hamlets in the country without government

funding.ShakeelAnjum, TusharBarthare, Bhanu Yadav and Abhishek launched the service at Shivnathpura village on October 4, 2015 and later extended the facility to BawadikhedaJagir, Devria on January 1, 2016. [14]

- One-teacher virtual school has 68,000 students – the story of how a young lady called Roshni Mukherjee found a way to teach tens of thousands of school students for free through her web portal [15][16]. Moreover, some government initiatives have been extremely fruitful in reaching out to the masses:
- Project Akshaya was initiated by the government of Kerala, which started with the noble intention of making at least one member in each of the approximately 64 Lakh targeted families e-Literate. 100% e-Literacy was achieved in eight districts in Phase 1 and the project has been roaring success. In the initial phase, the Akshaya e-centre imparts basic training that not only familiarizes people with the basics and the scope of IT, but also ensures hands-on-skill in operating a computer, using the Internet etc. to at least one person in the 64 lakh families in the state that makes it the largest rural e-literacy training project worldwide. So far around 33 lakhs beneficiaries have been trained [17].

In spite of these positive points, there are still several challenges which need to be overcome

- Rate of Computer Literacy needs to be significantly improved.
- Pre requisites, gadgets and aids (e.g. mobile device with fingerprint sensor for JeevanPraman).
- Deployment of volunteers and a dedicated workforce with digital skills is essential
- The job market is highly saturated. [18] It was once thought that advent of computers would be damaging for manual labour. In India, the "Dandekar Committee on automation" had prescribed in 1972 strict controls on introducing computers in industry and government departments. Subsequently automation has, on the contrary, led to more job creation, better organization and efficiency. Similar apprehensions are being garnered nowadays about Artificial Intelligence. We need to give technology a chance in order to reap its benefits.
- A major percentage of the graduates, even those graduating from professional courses like engineering have been declared unemployable. [19]

III. ANALYSIS OF THE CURRENT SITUATION USING QUALITY TOOLS

There are a host of Quality Tools that help in troubleshooting issues related to Quality. In the 68th year of independence, given the data points that have been discussed above, it is evident that Education in India is omnipresent but not all-encompassing. Probably quality is the parameter that is lacking – from the planning stage to the execution stage. We have attempted to use some quality tools to identify where this very essential parameter can be applied in order to make a difference.

A) Fish Bone Diagram

The fishbone diagram identifies many possible causes for an effect or problem. It can be used to structure a brainstorming session. It immediately sorts ideas into useful categories.

India has a diverse population. To address the requirements of the entire country and to transform it into a full-fledged Digital India, it is not sufficient to introduce computers in the education curriculum. The changes need to be more radical and should reach out to the every strata of the society. We have done a fish bone analysis in order to identify the hindrances in the current education system in India.

The present day education scenario in India was extensively analysed through a Fish Bone Diagram. Several major issues were identified:

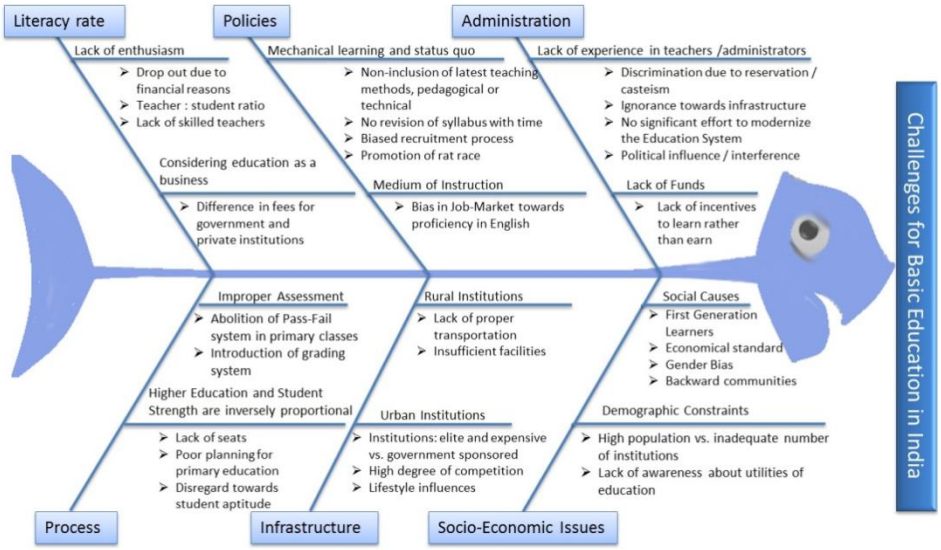

Figure 2. Fishbone Diagram [20]

a) Low Literacy Rate:

○ *Lack of Enthusiasm:*There are a lot of drop out for financial reasons, particularly in the low-income zone, a problem which the government is struggling to deal with, despite introduction of schemes such as mid-day meals. In most schools the teacher: student ratio is far from being adequate, an even worse problem is the lack of skilled teachers. Though a teacher is required to clear government mandated tests nowadays in order to be able to teach in government funded institutions, the efficiency of a major fraction is not up to the mark.

○ *Considering Education as a business:*Education is a thriving business in India. Talented but poor students might not be able to afford their education in private institutions which have far better infrastructure and educational aids than government institutions. Very few private institutions offer scholarships. Also in case of professional courses such as medical and engineering degrees offered by private institutions, several seats are offered in exchange for huge donations and capitation fees. Merit takes a back seat and the repercussions to the society is terrible - e.g the extreme irregularities in medical education as discovered byDr.Anand Rai led to the investigation of the Vyapam (Vya-PA-M: VyavsayikPariksha Mandal – the Madhya Pradesh Professional Examination Board) scam. [21]

b) Lack of Proper Educational Policies

○ *Mechanical Learning and status quo:*The style of education in India has assumed a mechanical form of note and coaching centre based studies for a long time now. The focus is on getting marks instead of gaining knowledge. Syllabi are not updated on a regular basis, and there is not much enthusiasm towards inclusion of latest teaching methods, pedagogical or technical. The ultimate goal is to win the competition; neither the means nor the final impact seems to be important. Apart from this apparent promotion of rat race in all spheres, from primary school to the job market, the recruitment process itself is often politically and socially biased.

○ *Medium of Instruction:*In a country like India with 22 officially recognized languages, it is surprising that most official work is done in English. As a contrast to this, the medium of instruction in government schools is mostly vernacular, a fact that directly restricts entry of such students in the white collar jobs. One more concern is that the language of the digital world is also English – most online materials are being made in English, which by default restricts its entry into the lesser privileged class. If relatively difficult languages like Mandarin could be used in Digital Media by China, we can definitely look into other Indian languages as a medium of instruction and knowledge dissemination.

c) Administrative Inefficiencies

○ *Lack of experience in teachers/administrators:*The educational space severely lacks dedicated and well-qualified administrators. This task is often assigned to teachers over and above their existing duties of taking classes, conducting examinations etc. Hence they struggle to find time to efficiently do this additional work. Moreover there are social problems related to reservation and casteism, and political influence and interference which further

deteriorate the possibility of administrative reforms. Ignorance towards infrastructure management and no significant effort to modernize the Education System further adds to the problem. In absence of proper rail and road ways, travel to and from remote locations is a nightmare, and the interior districts and still devoid of good educational facilities.

- *Lack of Funds:*The overall government funding for education was decreased by 2.02% in the union budget of 2015-16 as compared to 2014-15. [22] Also the salaries of personnel associated with education are on the lower side when compared to people of same educational qualification engaged in other professions.

d) Absence of an Effective Process Map

- *Improper Assessment:* Policies are introduced based on popularity and the vote bank, without creating and effective process map for follow through. Abolition of pass-fail system in some states, introduction of grading system have proved to be ineffective and have been subsequently withdrawn in several cases.
- *Higher Education and Student Strength are inversely proportional:*The number of students opting for higher education is on a decreasing slope. The dearth of seats is just one of the reasons. Proper planning is not done in the primary school level and the students are not encouraged enough on the basis of their individual aptitude.

e) Inadequate Infrastructure

- *Rural Institutions:*The educational institutions in the interior regions of India are not well equipped. Usually only a primary school can be found in remotest villages, the students need to travel towards the city in order to pursue higher education. Transportation facilities are inadequate.
- *Urban Institutions:*The situation is a bit different in the urban areas. There is a huge gap in standard of education as well as facilities if we compare elite and expensive institutions with the government sponsored ones. Also the fast lifestyle of cities is somewhat detrimental to learning. It is difficult to motivate students, particularly those in the lower-middle class, who are more bent on earning rather than learning.

f) Socio-Economic Issues

- *Social Causes:*In a country like India there are various social causes at play, which cause serious hindrances to progress and reform. In the educational space we can find several instances such as lack of motivation and guidance for first generation learners, poverty, gender bias and communal and religious reasons that work against scholastic developments. Besides, there are taboos about caste and class hierarchy, or higher education and education after marriage with regard to the female population, not only in the rural or underdeveloped areas but often in more progressive areas.
- *Demographic Constraints:*It is extremely difficult to sensitize the ever-growing Indian population about the utilities of education. Reaching out to the masses is a major challenge, and even if people get convinced, in actuality the country doesn't have adequate number of institutions to cater to the entire population.

B) 5 Whys Root Cause Analysis Technique

5 Whys [23]is an iterative interrogative technique used to explore the cause-and-effect relationships underlying a particular problem.In this paper, we have used it to tackle the challenges for Basic Education in India, analysed from the perspective of Digital India:

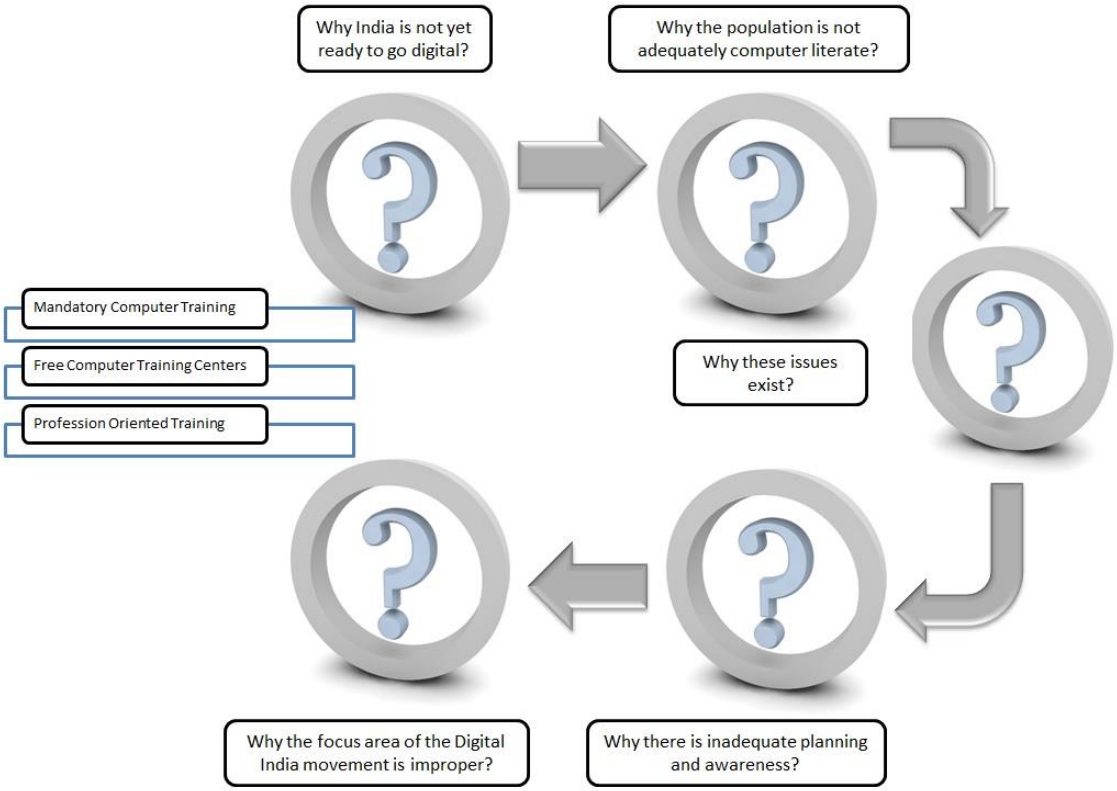

Fig.3. 5 Whys

- Why India is not yet ready to go digital?
  - The population is not adequately computer literate.
- Why the population is not adequately computer literate?
  - There are several issues with policies, funding, infrastructure and general mind set of the masses.
- Why these issues exist?
  - The advantage of a digital way of life is not made obvious enough at a grass root level as there is inadequate planning and awareness in this regard.
- Why there is inadequate planning and awareness in this regard?
  - The focus area for the digital India movement seems to be improper.
- Why the focus area for the digital India movement seems to be improper?
  - The digital India movement is aiming at glorification of government strategies and plans and reaching out mostly to the affluent class, business houses, NRIs but not to the general masses. Government should concentrate on
    - ✓ Mandatory computer training at school and college level
    - ✓ Free computer training centres
    - ✓ Specific profession-oriented training for the working class, e.g. GPRS based navigation for cab-drivers

C) Continuous Improvement through PDCA (Plan-Do-Check-Act) Cycle

The plan–do–check–act cycle [24]is a four–step model for carrying out change. The PDCA cycle should be repeated again and again for continuous improvement.

Educational Issues are often multi-dimensional. The underlying causes are deep rooted and range from socio-economic to political and psychological to anthropological reasons. There are several interesting surveys and studies conducted in other countries, e.g. the identification of the summer vacation problem in the USA was instrumental is abolishing the popular myth that the coloured population generally has lower IQ levels. [25] Such ventures in the Indian scenario might lead to the discovery of crucial data points that govern

the educational dynamics in India. We propose to apply PDCA to the two core areas being discussed in this paper, e.g. the Knowledge Demographic – Basic Education and the Age Demographic – Senior Citizens to facilitate adaptation to Digital India.

i) Knowledge Demographic – Basic Education

Plan:
Decide to improve the computer literacy level of the underprivileged class
Do:
Action 1: Update policies as required
Action 2: Secure financial assistance from government and NGOs
Action 3: Provide appropriate text books, laboratories and educational aids
Action 4: Include basic computer education as a mandatory component for initiatives related to adult and continuing education
Check:
Compare the skill levels of the same set of people before and after Actions 1, 2, 3 and 4 mentioned in the Do Stage
Act:
If there is no significant improvement in skill levels then the root causes can be analysed and corrective measures be taken accordingly. E.g. the following ideas can be tried out, based on the RCA findings.

a) Motivate the learners
   - Teach the parents – Children of educated parents can never stay ignorant. If the parents are educated, learning for the child will start right at home, and from infancy. Moreover the parents will be aware of the value of education and hence encourage the child to pursue further studies.
   - Provide free, round the clock library / laboratory access – This can effectively combat non-attendance due to other engagements during the regular classroom sessions

b) Change the aids
   An hour of practice with a shared desktop computer once a week might not yield desired results. An alternative solution can be deployment of low cost tablets or second hand personal computers for individual families or a group of houses in a particular locality.

c) Improved pedagogy
   The training material can be made more learner-centric using improved pedagogy and the training can be more friendly and interactive. A train the trainers program will sensitize trainers about the modern day pedagogical advancements.

ii) Age Demographic – Senior Citizens

Plan:
Decide to enable the senior citizens of India to adapt to a digital way of life
Do:
Action 1: Secure financial assistance from government and NGOs
Action 2: Commission and conduct a survey to understand the problems faced by this age group
Action 3: Brainstorm to solve those problems
Action 4: Provide doorstep assistance as and when required
Check:
Compare the willingness and acceptance of Digital India tools and services among the senior citizens before and after the Actions 1, 2, 3 and 4 in the Do stage. Check the percentage increase in utilization of such services by this age group
Act:
If there is no significant improvement do a root cause analysis and predict appropriate solutionsto the identified issues.

IV. CONCLUSION

This research depicts that the ground reality is not in line with elaborate plans for Digital India. To improve the quality of education in India we need to initiate the transformation right from the grass root level of the society. Computer literacy should be mandatedfrom the primary stage of education. The majority of the studentpopulation in India come from the below average income group. Hence, students can be motivated through different vocational courses rather than professional courses in order to cater to the financial needs. One way to ensure computer skills among this segment is to provide a mandatory credit solely based on their computer knowledge in the final evaluation of their courses. A dedicatedquality assurance team can recommend more quality tools to ensure and monitor the improvements in quality of education in India. Surveys may be conducted for comparative studies and rectifying actions may be taken accordingly.

V. FUTURE SCOPE

The methodology suggested in this paper can be seriously brainstormed and debated by academicians and policymakers and deployed on a large scale with an aim to reform the present day educational scenario in India.Also, this research has not taken into consideration the ever-increasing mobile phone and smart phone

penetration in India. The mobile phone is a both personal and cheaper tool for digital learning – further analysis in this area can add new dimensions to this research. The evolving area of mobile learning is in itself an area for separate research and deliberation.

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