Chapter I

INTRODUCTION

“All truths are easy to understand once they are discovered; the point is to discover them”

- Galileo Galilei
CHAPTER I
INTRODUCTION

Background

This research is a critical Study of e-governance in Gujarat. The specific area chosen was an e-governance initiative of technology enhanced learning in Gujarat. The National Program of Technology Enhanced Learning or NPTEL is the specific effort that has been studied.

To appreciate the context and aims of the study better, this chapter begins with a statement of the research problem. This is followed by an introduction to Governance. Electronic Governance or e-governance is then explained and described in the context of various initiatives and projects carried out in Gujarat. Since a critical mass or sufficient pool of technically competent human resource is essential for a good climate of e-governance to be available, the sector of technical education is selected from the realm of education. The aim of the research is to study the use of technology as a means to enhance education. The possibilities that this opens up, particularly in technical education, has therefore been studied in detail in this research work.

NPTEL is a program that has been operational for over ten years now by IIT, Madras\(^1\) with a group of IITs and the IISc\(^2\). Given the age of the initiative and the involvement of these premier institutes of excellence in the country, this initiative has a fair level of maturity and quality standard for being studied from various dimensions.

Based on the study of NPTEL, the possibility of evolving a sustainable model to make the proposition of ‘technology enhanced education’ a

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\(^1\) Indian Institute of Technology, Madras - [http://www.iitm.ac.in/](http://www.iitm.ac.in/)
\(^2\) Indian Institute of Science Bangalore - [http://www.iisc.ernet.in/](http://www.iisc.ernet.in/)
fruitful one that not only addresses issues of access, equity and quality but the more basic issue of the very aim of education is addressed in this study. In the following paragraphs of this chapter, these aspects are addressed sequentially, after describing the research problem, to build the base for the study to proceed.

1.1 RESEARCH PROBLEM

In the domain of e-governance, the sector of ICT in education was chosen as education is acknowledged as an important component of governance. Secondly, higher and technical education also leads to creation of skilled and competent professionals and knowledge workers who constitute the workforce in a knowledge society, who, in turn, contribute to governance. It was thus felt that a study of an e-governance intervention in higher and technical education sector should be taken up. Further exploration of this landscape revealed that a program of the size and scale of NPTEL is already being rolled out across the country, including the state of Gujarat. Since, this is a program implemented by the IITs and IISc, their pedigree and quality would automatically lend NPTEL a good standard and brand. The age of the project, which is nearly 12 years lends the project a fair level of rigour and maturity. The large content pool that it has already created is a huge national resource and asset. Therefore, a study of a project of these attributes, which is at the cutting edge, is chosen.

The interactions with the team at IIT, Madras also clearly showed their openness to learn from such an evaluation and a study. The need for the basic aim of education to be integrated into every aspect of learning and education was shared by the committed team headed by

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3 As laid down in the constitution as a Fundamental Right, Fundamental Duty and a Directive Principle of State Policy.
the Director, IIT, Madras. The fact that NPTEL would soon be moving on to the next phase of its implementation of a ‘virtual university’ was also considered. At this stage, an evaluation of the project could throw light on the strengths and weaknesses. The findings of this research could possibly be ploughed back into an actual, real life implementation program rather than just be an academic exercise. From a practitioner’s perspective, these were some of the points that went into ‘zeroing in’ on the research problem. Having delineated the research problem, the next section starts with an introduction to governance and e-governance.

1.2 GOVERNANCE AND E-GOVERNANCE

As communities, institutions and societies grow from simple to complex organisations with inter-relationships and involved processes, governance, or the manner of conducting the policy, action and affairs with authority, has come to gain tremendous importance. In the context of various countries and nations, governance has come to be recognised as one of most important factors that determine the development trajectory. It has also been recognised as one of the key factors in transforming the quality of life of the people constituting a country.

The nature and purpose of Governance is described by Sri Aurobindo in the following words, “The business of the State, so long as it continues to be a necessary element in human life and growth, is to provide all possible facilities for cooperative action, to remove obstacles, to prevent all really harmful waste and friction,—a certain amount of waste and friction is necessary and useful to all natural action,—and, removing...

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4 The Oxford dictionary defines Governance as the action or manner of governing a state, organization; and to govern is to conduct the policy, actions, and affairs of (a state, organization, or people) with authority. This, in turn, is original from Latin gubernare 'to steer, rule', and from Greek kuberman 'to steer'

avoidable injustice, to secure for every individual a just and equal chance of self-development and satisfaction to the extent of his powers and in the line of his nature.

Governance is the process of putting in place policies, structures, methods and processes for transacting and providing various services and facilities that help to enhance the quality of life of citizens. The term governance includes organisations and structures, institutional mechanisms, systems and processes as well as interactions and inter-relations across wings and agencies of the government, markets, public and private organisations, civil society and citizens. Governance, in this sense, subsumes government, which refers to the transactions, work flows and processes that happen within the government offices and agencies. As the volumes of transactions and numbers of services and their complexity increase, the need for efficient management of these has led to a great deal of dependence on Information and Communication Technology, ICT, to build systems and remove drudgery. The use of ICT also provides a great opportunity of making the governance processes more transparent, merit based, accountable, simple, efficient and responsive.

In recent decades, people across the world are increasingly depending on the deployment of ICT for Governance and this domain has come to be called E Governance. As discussed above, this refers to the leveraging of ICT for various functions, services and utilities relating to Government offices and organisations, their inter relations and transactions as also the facilitation of markets, public and private institutions and citizens.

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6 From the book “The Inadequacy of the State Idea” by Sri Aurobindo- Page 301
1.3 E-GOVERNANCE IN GUJARAT

Gujarat, a leading State of India, located on the western side, has demonstrated great commitment to E-Governance. A state with a focused IT policy since the nineties, Gujarat has emphasised the development of systemic infrastructure and processes to facilitate the growth and development of e-governance in various sectors and fields.

The vision of e-governance in Gujarat ranges from infrastructure development on one end to application development that integrates various nodes of Government and touches the lives of citizens. Gujarat Informatics Limited is the nodal agency which orchestrates e-governance in various sectors and carries them across districts, talukas and villages.

The three fundamental principles of e-governance in Gujarat, as in many parts of the world, have been responsiveness, transparency and accountability. It has initiated the process of putting in place an e-governed environment by networking and leveraging ICT in key functions like education, revenue, development, finance, judiciary and transport.

For instance, the e-governance project, Mahiti Shakti\(^7\) implemented by the State in 2001 has won national awards and recognition for citizen empowerment. Other projects of e-governance implemented by the State include VATIS (Value Added Tax Information System), HMIS (Hospital Management Information System), IFMS (Integrated Financial Management System), e-Dhara, e-Nagarpalikas, e-Gram, e-Procurement, SWAGAT (State-Wide Attention on public Grievances by Application of Technology), Jan Suvidha Kendras in all District Collector offices, City Civic Centers (Municipal Corporations) etc. With these projects at

\(^7\) [http://www.apdip.net/resources/case/in13/view](http://www.apdip.net/resources/case/in13/view) viewed on 27th April, 2011. This was conceptualised and rolled out by the researcher in 2001.
different stages of roll out and implementation, e-governance in the state is enhancing the capability of Governance towards better delivery of services to the citizens and stake holders.

1.4 GOVERNANCE AND EDUCATION

Needless to say, governance, in order to achieve its goal, would have to have the enabling resources in the form of skilled human resources and technically trained and qualified manpower. Further, of the various services and activities that define development and governance, education is a key area as this can directly impact the quality of life of the citizens. Education empowers citizens and is acknowledged as a key indicator that determines the Human Development Index, as shown in the figure below:

**Fig. No. 1.1 : The HDI-Three Dimensions and Four indicators**

Much before the emergence of the institution of the Human Development Index, Jawaharlal Nehru in his speech, ‘A Tryst with Destiny’ has given the emphasis needed for education in the country. In his words, “The

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service of India means the service of the millions who suffer. It means the ending of poverty and ignorance and disease and inequality of opportunity.” The need for education has been enshrined in the Indian constitution as a fundamental right, duty and directive principle of state policy. Given this tremendous importance of education, the next section goes on to address the aim of education.

1.5 AIM OF EDUCATION

The perennial aim of education is that it should lead to self knowledge as well as knowledge of the universe and enable one to relate oneself to the universe, as effectively and harmoniously, as possible. This relationship between oneself and the universe is brought out by means of Arts and craft, Science, Humanities and Technology. All education is a deliberate attempt to accelerate the harmonization between the individual and the universe. It is to fulfil this aim of providing a deliberate attempt that ICT becomes very important. After stating the perennial aim of education, the aim of education in today’s time is now to be understood. An understanding of the aim of education of this epoch is very important to proceed further.

The present epoch is marked by an exponential explosion of knowledge. In this context, accelerating the understanding of the self with the universe would have to happen with full emphasis on harmony for the development of the individual. This would, in turn, lay the basis for the creation of humane individuals. ‘Humane’ (the original spelling of human, and since 1700 restricted in meaning) takes into account only the nobler or gentler aspects of people and is often contrasted to their more ignoble or brutish aspects. A humane person is benevolent in treating

10 As given in articles 21A, 51A (k) and 41 of the Constitution of India.
11 This is reproduced from http://dictionary.reference.com/browse/human seen on 20th April, 2011
fellow humans or helpless animals; the word once had also connotations of courtesy and refinement (hence, the application of humane to those branches of learning intended to refine the mind)\textsuperscript{12}.

If both the ends are to be fulfilled, namely, facilitating the individual's understanding of the universe and harmonious development of the individual, in the context of knowledge explosion, ICT becomes indispensable. The epochal aim of education ought to have special means of accelerating the learning process and ICT can play a major role in this. It is in this context that the individual and the universe get related to each other effectively and harmoniously, by which the progress of civilization is enhanced.

As humans progress and the world increasingly turns into a knowledge society and a learning society; spreading, sharing and creating knowledge become very important. This then leads to a basic understanding of what constitutes knowledge. Knowledge requires a knower. Further, information or inputs that have been tested on the anvil of rationality and experience of a knower come to be a part of his or her knowledge. In other words, assimilation of the inputs into one's own universe of known and owned constructs and ideas with a personal signature is a must for it to become knowledge. The starting point and continuously persisting and extending line for this would be a process of understanding one-self to be able to absorb, assimilate, internalize and digest whatever inputs, experiences, information and thoughts one acquires from the world.

The aim of an educational institution, particularly of higher learning ought to be primarily of nurturing this capability in the students and teachers as they collectively partake of knowledge and individually

\textsuperscript{12} http://dictionary.reference.com/browse/human seen on 20th April, 2011.
construct and create more knowledge. This process of constructing knowledge, which is accompanied by constructing and culturing or developing one-self, is probably one of the main aims of higher education which will lead to humane, skilled and competent citizens and professionals. This, in turn, can be approached in a variety of ways.

These include processes of self reflection, dialogue, discourse and micro level dialectic, which are some of the western processes in vogue for what has come to be called the technology of the self. In this context, it may not be out of place to state that Indian tradition and culture, perhaps, provide a greater deal of diversity and freedom in the methods and approaches to address this quest for knowledge. Since this basic character ought to be the defining DNA of a Higher Education Institute, an attempt has been made to address this issue.

1.6 AN INTRODUCTION TO HIGHER EDUCATION

The issue of providing a healthy environment and mechanism for flowering of knowledge of the self becomes a starting point and continuing line for assimilation of all further knowledge towards creating educated and skilled human beings, who can be the creators and constituents of a knowledge society. If this is the aspiration, the methods and strategies of nurturing the teaching, learning processes must be in synchronization with this objective.

Higher education is also extremely important for a country and the community as it is where the professionals, thinkers, future teachers, researchers, economists and knowledge professionals are created, who will be both inhabiting and creators of a Knowledge Society. It also has a direct
correlation with GDP, health indicators and many other indicators of development.

The challenges facing higher education are mainly in the areas of curriculum, faculty development, evaluation and institutional climate, research, innovations and international partnerships, among others. Along with this comes the challenge of reach or access. The total population in the age group of 18 to 24 in India is 124 Million. If a gross enrolment ratio or GER in higher education of about 20% is to be achieved by 2015, this would translate to providing for higher education to the tune of about 26 million students.

The main objectives of the higher education policy ought to relate to revamping the curriculum, bringing about a qualitative improvement in infrastructure, especially IT infrastructure and building the capability, competency and knowledge of faculty members. Issues of providing employability to students, connecting them with their local communities and their problems, providing a climate for research and enhancing the educational ecosystem in an equitable manner are some of the other objectives.

While grappling with fulfilling these objectives and the core issues of access, achievement and equity in higher education, ICT comes as a possible silver bullet which can address all these issues.

ICT has made it possible for educational e-resources like lectures, notes, presentations, books, films, tutors and experts to be available for students in online and offline mode to access from anywhere, anytime.

14 GER is defined as (number of students enrolled in Higher Education Institutions) divided by (Population in age group of 18 to 23).
15 source: prorata basis based on E&Y Report 2011
However, the two core issues, viz. "are we doing this currently in the right manner?" and "is the current system of education what we really want to spread on a large scale" need to be addressed first. It would be important to avoid the error of leveraging the power of ICT to disseminate and provide more of the faulty system fraught with many concerns and problems.

A celebrated talk by Sir Ken Robinson\textsuperscript{16} questions if schools kill creativity. A study\textsuperscript{17} by Howard Gardner’s Project Zero at Harvard University involved developing intelligence tests for babies. The project also tested older subjects. The researchers found that up to age four, almost all the children were at the genius level, in terms of the multiple frames of intelligence that Gardner talks about – spatial, kinesthetic, musical, interpersonal, mathematical, intrapersonal, and linguistic. But by age twenty, the percentage of children at genius level was down to 10 percent, and over twenty, the genius level proportion of the subjects sank to 2 percent. Given these findings, the current systems of education obtained in schools and colleges may not be the ideal system that ought to be spread far and wide leveraging the power of ICT.

This then may be the right opportunity and time to address the issue of what needs attention for change or correction with the education system, try to address the ills with all humility and then leverage the power of IT to set right various ills \textit{and} universalize the availability and quality of education with great care for equity too. While the penetration of ICT, be it computers or mobiles is phenomenal, there is yet to be an attempt to systematically harness it and leverage it to provide an effective and

\textsuperscript{16} \url{www.ted.com/talks/ken_robinson_says_schools_kill_creativity.html}
\textsuperscript{17} Peter Senge and others, 'PRESENCE: Human Purpose and the Field of the Future", Doubleday, New York, 2004 page 30.
simple instrument of complete transformation of technical education at all levels. Such a change process can be initiated without creating sudden chaos and turbulence or disturbing the current system which is in place as this may have serious implications due to the vested interests that have high stakes in education.

However, in the backdrop of the world today, it is felt that anything that is really stimulating and invigorating, from the learning and knowledge acquisition point of view, will probably find a great following. The advantage that is obtained now is the unmet, desperate need, on the one hand and the readiness in terms of abilities and capabilities on the part of students to readily accept new technologies. Students are conversant with a host of computer and mobile skills, which seem so natural and easy for them. In that sense, soil preparatory work is already done and they are ready and eager to soak up the new education.

In the domain of e-governance, the term Business Process Re-engineering (BPR) refers to the setting right of the basic fundamentals of the system, in which considerable time is spent so that the exercise does not become one of merely increasing the speed and spread of what was a system with limitations and distortions in the first place.

For implementing BPR in the education domain, a review of the various Reports on Higher education is made, starting with the Wood’s Dispatch, the Kothari Commission report up to the latest Yashpal Committee report. Most of these reports talk of the dimensions of teacher quality, examination reforms, curriculum reforms, skill orientation, research orientation, regulation, autonomy with accountability. These reports do mention the need to roll in spiritual and value education; but, a tangible, integral way of weaving these into the curriculum and teaching learning
methods and processes and such fundamental issues still loom large. The questions which arise here are, “should regular technical college teaching or E-content like NPTEL or any other such content not address all these dimensions; or should they not aim at holistic education? The education provided by the system so far has predominantly been supply driven. This research makes a sincere attempt to gauge and assess the demand and enable the provision of education actually needed and demanded by the students. Any ICT driven system, in business or education has to be need based and customer driven. These are some of the questions addressed by this research. Issues related to the need for holistic and integral education are taken up in the next section.

This study thus, attempts to understand the perceptions of students and faculty members on various aspects of the current system and the needs and changes that are articulated. The study then proposes a new way of delivering education. This proposed way explores the possibility of leveraging the powerful tool of ICT to transform education in a systematic, sustainable way and develops a framework for this.

Speaking of our great nation, Pandit Jawaharlal Nehru says:\[^{18}\] “Accepting life and its joys and burdens, it was ever searching for the ultimate and the universal. It built up a magnificent language, Sanskrit, and through this language, its arts and architecture, it sent its vibrant message to far countries. It produced the Upanishads, the Gita and the Buddha...... Gradually deterioration set in. Thought lost its freshness and became stale, and the vitality and exuberance of youth gave place to crabbed age. Instead of the spirit of adventure, there came lifeless routine, and the broad and exciting vision of the world was cabined and confined and lost in caste divisions, narrow social customs and ceremonials”. This,

[^{18}]: Excerpts from Pandit Jawaharlal Nehru’s Azad Memorial Lecture (February, 1959)
possibly, poignantly describes the scenario and paradigm in which education is found today. In this scenario, ICT could be a major transformation agent in bringing about access, achievement, equity and, most importantly, bringing back the life and soul of education in the country. The next section describes various aspects of holistic education.

1.7 NEED FOR HOLISTIC EDUCATION

In a world ridden with conflict at various levels, which in modern day manifests as stress, discord at family levels, conflicts and divisions at community levels, fighting at the national levels and wars and battles fought over land, commodities, trade and various resources, the basic issue of peace requires greater attention.

However, the quality that makes our communities and society move back to equilibrium after every such incident is, perhaps, the force of compassion and harmony.

This is seen even in the most humble of homes and communities of India and almost stands for the soul and spirit of India. This has been articulated, stated and celebrated time and again by various leaders, seers and sages of modern India. Even against feelings of hate, fear and narrow mindedness, what has kept the fabric of homes, families, communities, societies and the country at large is faith and presence of the forces of love, harmony, compassion, empathy of suffering and sacrifice. These probably constitute the load bearing structures that keep people together, despite their differences and many other divisive forces. Further, in numerous cases of outstanding men and women who have inhabited the earth across time and space and strode in almost all walks of life, they are driven to act and work by angelic and divine forces, aspirations of the
highest kinds which inspires them to seek excellence, truth, beauty, joy
and make difference in the lives of their fellow men and the world.

This has, in recent times, found expression in the efforts of agencies like
the United Nations Educational, Scientific and Cultural Organisation
(UNESCO) which has acknowledged ‘learning to know, learning to do,
learning to live together and learning to be as the four pillars of
education. Equally significant is the move by the government of UK to
include spirituality as an important component of education. The concept
of spirituality quotient coined by Dana Zohar and Ian Marshall, following
the coining of the term Emotional Quotient by Daniel Goleman assumes
great importance as it has facilitated the incorporation of a very important
dimension of education and human development into our present day
discourse, which is greatly influenced by and primarily based on the
western method of education, prevalent globally. The next section
presents the contours of the research in the research plan.

1.8 RESEARCH PLAN

A critical study of e-governance in Gujarat by specifically focusing on an
evaluation of the NPTEL initiative in the technical education domain was
the research problem. Having formulated the research problem, the
research plan was chalked out.

A literature survey of various aspects of governance was first undertaken.
Definitions of what constitutes governance and what are the basic
principles that have come to define good governance were understood in
depth. e-governance and its various aspects with special focus on the
projects implemented in Gujarat were then studied. Along with this,
many reports such as the e-readiness report\textsuperscript{19} were studied to get a clearer understanding of e-governance in Gujarat with its strengths and weaknesses.

Since the research was related to technical education in Gujarat, it was decided to conduct focus group discussions with students and faculty members of engineering colleges to get an insight into the issues and concerns of technical education. Equipped with the context of technical education, discussions were carried out with experts from the government, the team from IIT, Madras, faculty members from IIT, Mumbai as well to get a clearer idea of the NPTEL program, its aims, objectives and all its dimensions.

A literature survey of various initiatives carried out in the open education space was then done. These included efforts in India and countries like the US, China as well as European studies. These helped consolidate an understanding of 'technology enhanced learning' in terms of the cutting edge projects and studies with their challenges and opportunities across the world.

Now, the issue of transforming the quality of education into holistic education was understood in some depth by studying about various experiments and efforts of this kind. The gaps in the mainstream education along the dimensions of diversity and differentiation that characterizes the demand scenario today were also studied. This refers to the breadth and depth of various knowledge domains. From what used to be the teacher driven education also referred to as the \textit{Gurukula} system in the days of yore, today's new paradigm which is marked by students being central and demanding and having access to a variety of teachers

\textsuperscript{19} R. Venkatesan, INDIA: E-readiness assessment report for States/UTs, NCAER, New Delhi, January 2010.
on a variety of topics right at the click of a mouse. This may well be referred to as the *Shishyakula*, as remarked once by Prof. Ananth of IIT, Chennai.

Based on this background, a detailed questionnaire was prepared and pilot tested with several beta users, many of which were connected to the domains of governance, education, administration, ICT and even eminent citizens from different walks of life like a senior philosopher, a member of the judiciary and a senior corporate executive. Their feedback was incorporated and the toolkit was frozen.

The questionnaire would cover aspects related to student choices of curriculum, faculty availability for teaching, mentoring, research, collaboration possibilities, heterogeneity of students, employability, extension and industry related linkages, among other issues.

In order to get a complete picture of various aspects of the program under study, it was decided to conduct a quantitative and qualitative study. An online survey was planned to be administered to students and faculty of engineering colleges across the state, representing various geographical backgrounds; national as well as state institutions located in Gujarat were also included. The survey of the respondents was undertaken *online*, in keeping with the spirit of this study! This was accompanied by a qualitative study by structured and unstructured interviews and discussions.

It was decided to analyse the data thus collected using various quantitative techniques as well as qualitative methods, which have been detailed in Chapter IV. Based on the data collected, various tests were carried out and inferences made.

Finally, the preferences and needs of students as articulated in the survey were studied and the possibility of incorporating these into a model was
explored. These were understood in the context of the opportunities that ICT opens up.

Nowadays, there is a great possibility of leveraging the large number of collaborators who can co-work in knowledge space creating new knowledge across different domains and specializations. Given all these, it was thought that a Service Oriented Architecture (SOA) could be well suited to address such needs. An SOA framework may facilitate the students to find, bind and invoke the educational services and resources which are platform independent.

1.9 CHAPTER PLAN

This study is divided into six chapters. The first chapter is an introduction. The second chapter is on e-governance and the rationale behind transforming e-government into e-governance. It also gives an overview of e-governance in Gujarat, along with some policy level analysis. Based on the literature review for studying the objectives and desired impact of e-governance, this chapter includes critical challenges and gaps for effective implementation of e-governance strategy. The third chapter deals with an outline of the research agenda, including a study of the National Program of Technology Enhanced Learning (NPTEL) being implemented across the engineering colleges of the state. Chapter four addresses various aspects of the research methodology. Propositions and hypotheses are validated to generalize the framework suggested and assess its fitness. Various statistical tools like mean, standard deviation, 't' test, factor analysis, etc. have been used for analysis. Data analyses and interpretation are carried out in the fifth chapter and hypotheses tested through primary survey. Quantitative and Qualitative methods are used for the purpose. The sixth chapter deals with the evolution of the
SOA model based on the findings of the research for Open Higher Education. Chapter VII presents the summary, conclusion and areas of further research. It goes on to describes the proposed model for implementation in detail, with the various tasks, functions, organs and agencies empowered for various roles in the proposed model. It concludes with the identification of scope of further research and also enumerates the limitations of the research.