CHAPTER VI

SUMMARY AND CONCLUSION

6.1 Summary

6.1.1 Development Theories and Models

6.1.2 ICT and Governance

6.1.3 ICT and Education

6.2 Findings

6.2.1 Findings on the basis of the students’ opinion

6.2.2 Findings on the basis of teacher’s opinion

6.3 Limitations

6.4 Justification, relevance and contribution of the study

6.5 Conclusion
SUMMARY AND CONCLUSION

6.1 Summary

6.1.1 Development Theories and Models

Development conceived as a multi-dimensional process involving major changes in social structures, popular attitudes, and national institutions, aims at acceleration of economic growth, reduction of inequality, and eradication of poverty. This view of development was identified by Amartya Sen, when he argued that the ‘capability to function’ is what really matters and development has to be more concerned with enhancing the lives we lead and the freedom we enjoy.

In the context of the fast advances in technology, particularly the ICT enabled activities and also on the basis of review of literature on development theories and growth models from the period of Adam Smith to the present, it is possible divide those theories and models into Old and New.

New Growth Theory incorporates two important points. First, it views technological progress as a product of economic activity. The previous Old Growth theories treat technology as given or exogenous, or as a product of non-market forces. New Growth Theory is often called “endogenous” growth theory, because it internalizes technology into a model of how markets function. Second, New Growth Theory holds that unlike physical objects, knowledge and technology are characterized by increasing returns, and these increasing returns drive the process of growth.

A useful way to contrast the new (endogenous) growth theory with traditional neoclassical theory is to recognize that many endogenous growth theories can be expressed by the simple equation $Y = AK$, as in the Harrod-Domar model. In this formulation, $A$ is intended to represent any factor that affects technology, and $K$ again includes both physical and human capital. But there are no diminishing returns to capital, and there exist the possibility that investments in physical and human capital can generate external economies and productivity improvements that exceed gains by an amount sufficient to offset diminishing returns. The net result is sustained long-term growth.
The endogenous growth theory shows that the determinants of growth variables are explained within the model. The development of human capital can be explained through the endogenous growth theory. The technological change is a prime mover of economic growth. As the economy shifts from lower to higher stages of development there is also change in the technique of production. This shift requires higher skills on the part of human resources, targeted to achieve efficiency in production or service delivery system.

The centerpiece of the new or endogenous Growth Theory is the key role knowledge plays in making growth possible. Knowledge is subject to increasing returns because it is a non-rival good. Non-rival goods are very different from those considered in most economic textbooks. Two key properties of ordinary goods and services are rivalry and excludability — only one person can use them at a given time (often established in law) and can exclude others from using the goods that are used by one. In the New Theory the non-rival quality of ideas is the attribute that drives economic growth. We can all share and reuse ideas at zero, or nearly zero cost. With the accumulation of more and more ideas, knowledge about how the world works, and how to extract greater use out of the finite set of resources with which the world is endowed, firms compete with one another, not based on the price of similar products, but, based on their monopoly position with a particular differentiated product or service.

The increasing returns associated with the non-rival aspect of ideas have a number of important implications for economic theory and how economies work. Some of these implications are the following.

- **Opportunities for Growth May be Almost Limitless.**

- **Knowledge-Based Economies Tend Toward Monopolistic Competition.**

- **Economic Outcomes are Indeterminate and Multiple Equilibria are Possible.**

### 6.1.2 ICT and Governance

From the review literature and secondary data analysis, it is evident that the use of ICT transforms governance from ‘representative’ to a more ‘individual based’ form, and from being ‘passive’ to being ‘pro-active’. It does not require an individual to be based in the local constituency *in-situ* to influence or benefit from governance
delivery services. Further as use of ICT enabled governance leads to closer contact of individuals with decision-makers/officials in the government, the impact is immediate. On the whole, it puts greater access and control over governance mechanism in the hands of individuals, and the process leads to more transparent, accountable and efficient governance.

At present ICT sector is contributing a lot into Indian national economy in various ways. Almost all the states in India are targeting this sector as a vehicle for economic development. The study reveals that over the period of 1990-91 to 2006-07 there has been a huge development of ICT in India. There has been growth and investment in ICT and its components in India. ICT growth in different states of India is supported by the enormous growth in the human capital development. Moreover, the ICT development has made the rural people better informed about the market and the many Indian farmers have benefited with the reach of ICT in the form of mobile phone or internet in the remote villages.

The wide availability of enhanced computing power and the consequent ability of networked individuals, households, organizations and institutions to process and execute a huge number of instructions in imperceptible time spans can have revolutionary implications. Such a changed scenario has the potential to create and expand industries catering to the market for a range of computing devices, especially personal computers, which have now become accessories in the home and not just at the work place. This has already led to the burgeoning of the industry that produces the hardware and software needed to allow individuals, organizations, small businesses and corporations to directly exploit the benefits of the dramatic expansion in computing power. Finally, the computing revolution leads to a dramatic expansion of the size and scope of the services across a wide spectrum including finance, banking, trade, entertainment and education.

When all of these benefits are combined with developments in communication, individuals, organizations and corporations are able to both secure a presence on the web as well as easily traversed cyberspace. This creates the basis for establishing links among individuals, and between individuals and government agencies, individuals and business, business and government and business and business. The full consequence of this change is leading to compacting of economic
space. Thus the IT sector is an important source of growth for a country like India and can relate this growth model with the endogenous growth models. The variables in the acclaimed endogenous models include differentiated capital inputs, production of new inputs through R&D and ultimately increasing returns that allow sustained growth to occur.

6.1.3 ICT and Education

The new theories of growth state that education and technological innovations are two important factors that play a leading role in economic growth. Writers have emphasized the importance of the skills of the human resources and of the educational system in the discovery and adoption of the new technology. The simultaneous analysis of these two growth factors indicates that education and ICT are major areas of interest for both the economists and the decision-makers of the economic policy.

The new growth theory adopts an enriched view of the human capital. Accordingly, the basic idea is that the human capital plays the same role in production as the physical capital. In this sense, the accumulation of the years of studies comes to multiply the labor force, in other words, to increase the productive efficiency with a constant technology. This increased efficiency limits the falling returns on capital and therefore backs the growth in the long term.

Globalization and technological change have created a new global economy powered by technology, fueled by information and driven by knowledge. The emergence of this new global economy has serious implications for the nature and purpose of educational institutions. Access to information continues to grow exponentially, and educational institutions cannot remain mere venues for the transmission of a prescribed set of information from teacher to student over a fixed period of time. Rather, they must promote ‘learning to learn’, i.e., the acquisition of knowledge and skills that make possible continuous learning over the lifetime. The illiterate of the 21st century, according to futurist Alvin Toffler, will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn.
6.2 Findings

Based on literature review of various development models and analysis of secondary data, major findings with respect to the role of technology and human resources in development (*objective of the study*) are the following.

- The gap between those who have access to and control of technology and those who do not have them -digital divide- means that the introduction and integration of ICTs at different levels and in various types of education will be a challenging task. Failure to meet the challenge would mean a further widening of the knowledge gap and the deepening of existing economic and social inequalities.

- Endogenous growth theory, because it internalizes technology into a model of how markets function holds that unlike physical objects, knowledge and technology are characterized by increasing returns, and these increasing returns drive the process of sustained growth.

- ICT has contributed in shifting the focus from teaching to learning. ICT provides opportunity for the students to explore knowledge to learn the content through self study. Role of the teacher is to help the students by ensuring the right direction towards learning.

- The ICT infrastructure creation is not guided by a uniform national policy. Required networking and communication equipment is either nonexistent in government departments, or it does not serve any tangible purpose of e-governance. The use of connectivity options provided by government agencies are used in a very limited manner for data transmission purpose between various locations and is mainly utilized for e-mail and internet purposes only.

- There is need for a blended learning. Blending is prompted by the recognition that not all learning is best achieved in an electronically-mediated environment, particularly one that dispenses with a live instructor altogether. Instead, consideration must be given to the subject matter, the learning objectives and outcomes, the characteristics of the learners, and the learning context in order to arrive at the optimum mix of instructional and delivery methods.
• Although valuable lessons may be learned from best practices around the world, there is no one formula for determining the optimal level of ICT integration in the educational system. Significant challenges that policymakers and planners, educators, education administrators, and other stakeholders need to consider include educational policy and planning, infrastructure, language and content, capacity building, and financing.

• The effective integration of ICTs into the educational system is a complex, multifaceted process that involves not just technology but also curriculum and pedagogy, institutional readiness, teacher competencies, and long-term financing, among others. The policymakers in developing countries should formulate a framework for the appropriate and effective use of ICTs in their educational systems.

• In education, use of ICT has become imperative to improve the efficiency and effectiveness at all levels and in both formal and non-formal settings. It can be used for the following purposes.
  - To broadcast material, online facility or CD-ROM as sources of information
  - To use the online resource like, email, chat, discussion forum to support collaborative writing and sharing of information
  - To facilitate video-conferencing or other form of Tele conferencing to involve wide range of students from distant geographic areas
  - To blend learning by combining conventional classroom learning with E-learning systems
  - To process administrative and assessment data
  - To exchange and share ideas among teachers for the professional growth
  - To carry out internet based research to enhance, educational process
  - To facilitate communication for pupils with special needs
  - To use electronic toys by children to develop spatial awareness and psycho-motor control
• Advantages of the use of ICT in education include the following.
  ▪ Quick access to information
  ▪ Easy availability of updated data
  ▪ Connecting Geographically dispersed regions
  ▪ Catering to the Individual differences
  ▪ Widening the range of communication media in education
  ▪ Wider learning opportunities for students

Important findings based on the assessment of the present status of ICT enabled governance and education in the state of Kerala (objective), are the following

• The Indian ICT industry has witnessed an excellent growth in the past two decades. There are a number of projects and programmes in various stages of implementation at national and state levels to achieve ICT enabled governance and education.

• Constraints and challenges to ICT enabled governance are the following.
  ➢ Lack of IT Literacy and awareness regarding benefits of e-governance
  ➢ Underutilization of existing ICT infrastructure
  ➢ Unfavorable attitude of Government Departments
  ➢ Lack of coordination between Govt. Department and Solution developers
  ➢ Resistance to re-engineering of departmental processes
  ➢ Lack of national level Infrastructure for sustaining e-governance

• Kerala is leading in e-governance initiatives among Indian states with more than a dozen major projects and the people are fast realizing that logging on to a computer is better than queuing up before a government counter and dealing with a fussy employee. The
Government of Kerala has many citizen-friendly E-governance projects at various stages implementation to deliver high-quality citizen-focused services.

With respect to the effectiveness of one of the ICT project namely IT@School, implemented in the state, important findings of the study based on the analysis of primary data (objective) are given below under two sub headings: findings on the basis of students’ opinion and findings on the basis teachers’ opinion.

6.2.1 Findings on the basis of the students’ opinion

- Based on the mean percentage score, the effectiveness of the following variables - computer usage, use of ICT tools and ICT aided learning are good or medium since their mean % score is in between 50 to 75 %, whereas the attitude of the students can be marked as excellent since the mean score is greater than 75%.

- In a district wise analysis, scores of attitude and ICT aided learning and team work varies significantly.
  - The mean score indicate that Ernakulam has slight advantage over other district in the case of computer usage but the F test indicate that it is only a sample characteristic as the p is value more than 0.05.
  - Use of ICT tools in class room is high in Kottayam district, but not that significant since the p value of the F test is more than 0.05
  - Attitude of students is slightly high in Thrissur district compared to other district, which is significant since the p value of the F test is less than 0.05.
  - ICT aided learning and team work is high in Ernakulam district and the same is significant since the p value of F test is less than 0.05.

- Computer usage and use of ICT tools are significantly high for boys than girls, but a reverse trend is observed in the case of attitudes, benefits and ICT aided learning and team work. Girls have a more positive attitude or inclination towards ICT enabled learning and has a high mean score with regard to ICT.
aided learning and team work, which means they are enjoying ICT enabled classes more than boys.

- Computer usage, use of ICT tools, attitudes toward ICT enabled class, are high for professionally trained or those who are having some knowledge in computer application than the others.
- Measured variables like computer usage; use of ICT tools and attitudes of students has a positive impact on the level ICT acceptance. But the variable ICT aided learning is not influencing the level of ICT acceptance.
- Among the possible benefits emerging from the ICT enabled teaching-learning process, following are very significant
  - It improves or increases the self-esteem and confidence.
  - It compliments ideas and supply more inputs to make work more concrete and clear.
  - It helps in acquiring skills for career achievements.
- The correlation between the level of ICT Acceptance and the benefits is identified as 0.570, which indicate that there is a significant positive relationship between two variables.
- Another important finding is that the independent variables - computer usage, Use ICT tools, Student Attitude and ICT aided learning has a very positive impact on the dependent variable- benefit. Among the four the most important is the use of ICT tool is more important and proactive factor influencing the benefits.
- Students identified barriers to ICT enabled education in Kerala. Among them the most significant are the following.
  - It lacks of technical support.
  - Better teaching takes place without technology.
  - It is costly in terms of resources.
  - There are curricular restrictions.
  - Access to the computer lab is often limited.
6.2.2 Findings on the basis of teacher’s opinion

- High level of usage of computer exists among the students as its mean percentage score is greater than 76%. Similarly there is also a high level of acceptance to the various reasons for the use of ICT, student attitudes and the sub variables of possible outcomes of ICT enabled teaching-learning process.
- The Coefficients of variation of all the variables indicate a high stability in opinions raised by the respondents. Evaluation by the statistical tools also proved that whatever observed in the sample will hold good for the population.
- Independent variables - computer usage by students, reasons for the use of ICT and student attitudes has a significant positive correlation with the identified outcomes of ICT enabled teaching, which is the dependent variable.
- Since the regression coefficient is more than 0.4, independent variables positively influence the dependent variable possible outcomes of ICT enabled teaching.
- Since the regression coefficients are greater than 0.4, computer literacy of the teachers and ICT training leads to a better impact on the identified outcomes of ICT enabled teaching–learning process.
- Basic computer literacy, there exists significant difference in the case of gender, where male teachers are more computer literate than females. The teachers in the municipal area are more computer literate. Computer literacy varies significantly with regard to age, locality, area, and teaching experience.
- As per the table values, training differs in all the cases except in the case of District and educational qualification.
- ICT tools are used frequently for simulation of topics and concepts, which is considered as an important characteristic feature of the ICT enabled teaching process followed by the feature Voice & video and for Contests and Competitions. ICT tools for collecting variety of data for better Communication & interaction are also considered by the teachers.
- According to teachers following are the important factors, which restricts the ICT enabled teaching-learning process.
• Inflexible teaching methods
• Lack of technical support
• Better teaching takes place without technology
• High cost in terms of resources, time and effort
• Time gap in solving technical problems

6.3 Limitations

Limitations of the study include a rapidly changing amount of technical and market information, lack of available propriety information, and the necessity of providing confidentiality to background sources. The lack of time series and econometric data is hardly surprising in such a new and developing industry, but are limitations nonetheless.

6.4 Justification, Relevance and Contribution of the Study

The study aimed at explaining the information and communication technology, its uses, its strengths and weakness and also its application in various fields like education, governance, agriculture, and health. The study made a detailed review of the role of ICT in governance and the possible areas of its use for the making the governance more fruitful and effective. It has listed all the major ICT governance programs of the Kerala state. Many of these programs are new and highly useful, but have not earned public patronage due to lack of awareness. This study is an effort to make it known to others. The study can help in substantiating the view that ICT enabled learning has a big impact on the way we learn and teach. It also identified the various barriers in the effective implementation of the ICT in education. So it can provide necessary inputs in the policy formulation exercises at the highest level.

The study - made in the era of globalization, rapidly changing technology and the presently running ICT revolution contexts - an empirical review and assessment of the role of ‘IT @ School’ project in overhauling the education scene of Kerala is relevant. The empirical study conducted at the backend of the endogenous development theories is a humble contribution of the researcher to the body of knowledge falling in development economics. Being first of its kind, the present study
can promote future researches in the area. The study is a new area of knowledge to students of economics and so the study has enough potential to expand its scope to various other sectors since ICT is influencing every sphere of our life. So it opens a new horizon for research.

6.5 Conclusion

The significance of ICT is now a recurrent theme in the global economic literature. They are having an enabling role in the era of globalization, since it is a means for the compression and transgression of time and space barriers. It has freed the economy of the constraints of distance and the scarcity of resources. ICT is thus ensuring equality by ensuring that distance or other factors no longer matter and illiterate or the excluded populations now have easier access to knowledge.