

CHAPTER I

INTRODUCTION:

Of all the great educators *Mahatma Gandhi* holds a very distinctive position. He upholds a continual process of growth and development of every human being. His main concern in education is development of inner-spirit of the child, which is more important than mere rules and method. Mere literacy as an aim in education for the child has, as Gandhi categorically states, no meaning and therefore no significance. True education always indicates whatever is best for him for fullness of personality: Gandhi's own exposition to this end in view of education for the child as followed: "By education I mean an all around drawing out of the best of education nor even the beginning. It is one of the means whereby man and woman can be educated. Literacy in itself is no education. I would therefore begin the child's education by teaching it a useful handicraft and enabling it to produce from the moment it begins its training. The every school can be made self-supporting, the condition being the state taken over the manufacture of this school". (*Harijan*, 31st July, 1937)

Webster (1984) eminent sociologist has viewed the importance of education in this way: "The Principal thesis that has dominated the literature, in the literature in this area is that education is a crucial factor (or pre-condition) for 'development' since it promotes economic growth....."

Thus education is related with work, product i.e. with economy. When a person became literate, this person will enjoy a higher lifetime consumption path, according to statistics. Others will also benefit if the country has a more literate population – through lower transaction cost than if they were dealing with illiterates, for example- many educated female may choose not to participate in the labour force. This does not mean, however, that such females are not productive (relative to their less educated counterparts) in a variety of goods and services produced within the household that are not readily marketable. For example, they may provide better sanitation condition for all members of the family and more nutritional meals.

However, 'education' is a labour intensive, knowledge based industry, characterized by four-fold inter-sectoral linkage. It is universal supplier of knowledge and know-how to all sectors of the economy. The contribution of education is not on material terms above in the form of manpower inputs but is also in the imperceptible form of:

- Providing consultancy and advice to the industry
- Providing scientific research output to industries for innovation
- Social Science research output plays a key role in management of organizations in the form of managerial techniques, organizational behavior, formulation, implementation and evaluation of policies and strategies, and
- Education supplies and absorbs educated manpower endowed with the required skills, knowledge and aptitude.

Education is universal intermediary providing technological manpower, managerial reasoning and advice to each and every sector of economy. Besides, creation of awareness about the products produced advertisement and publicity, which lead to increased efficiency and value added in the economy. It also supplies manpower endowed with inherent abilities as well as knowledge acquired from the industries.

Expenditure on education is a kind of investment leading to the formation of human capital, either for individual or for society at large. If investment in education yields returns at the individual or social level, this must be reflected at the level of economy. It has been established that bouts of long term economic growth were preceded by increases in the population's literacy level. The example of Japan and Korea are classic in which an educated population base has provided the necessary infrastructure for industrial advances to take place at a latter date.

Beyond the monetary impact of education, investment in human beings also has many other social values. Some come under the holdings of externalities- namely, values captured by persons other than the individual investor.

Eminent educationist *Rabindra Nath Tagore* depicted that education is always a look within to find out the best of one's efflorescence. In his own words: "Our life gains what is called 'value' in those of its aspects which represent eternal humanity in knowledge, in sympathy, indeed in character, in creative works, and from the beginning of our history we are seeking, often at the cost of everything else, the value of our life and

not merely success in other words, we are trying to realize in ourselves the immortal man so that we may die but not perish. This is the meaning of the utterance in the Upanishad: 'Tam vedyam, purusham veda, yatha ma mrityuh parivyatyah' Realize the person so that thou mayst not suffer from death." (*The Religion of Man, George Allen & Unwin, London, 1953*)

Thus most Economists would probably agree that it is the human resources of a nation not the capital or its material resources, that ultimately determine the character and pace of its economic and social development. The principal institutional mechanism for developing human skills and knowledge is the formal educational system. Most third world nations have been led to believe or have wanted to believe that it is the rapid quantitative expansion of educational opportunities which holds the basic key to national development: the more education, the more rapid the development. All countries have, therefore, committed themselves to the goal of universal primary education in the shortest possible time.

Externalities and diminishing returns as the important issues related to role of education and human capital in the process of economic growth. Very recently, the great majority of studies on the economic benefits of education used what is called as 'Cost-Benefit' analysis.

The role of formal education is not limited to imparting the knowledge and skills those enable individuals to function as economic change agents in their societies. Formal education also imparts values, ideas, attitudes and aspiration which may or may not be in the nation's best developmental interests. Primary education should be designed to serve the need of the countryside; secondary education should fulfill the dual role of preparing young men for vocational and higher education. University education should be available for all those who possess the fitness for it. Mere vocationalising education would not provide the solution for the problem besetting us.

Reasonably, 'Literacy' is a reliable index of socio cultural and economic development. It is essential for economic growth and eradicating poverty. Literacy influences the different attributes like fertility, mortality, mobility, occupation etc. The trends in literacy are considered as an index to determine the socio-economic condition of a society. 'A person aged seven years and above who can both read and write with

understanding in any language has been taken as literate' according to Indian Census(2001). A distinction is usually made between 'level of literacy', which is the condition of literacy at a single point of time and 'progress of literacy' which is the change in condition over a period of time. The level of literacy is usually measured by the literacy rate, which is the number of literates expressed as a percentage of total population.

1.1: Problem:

The study address the problem of low level of literacy in the region is one of the most important contributory causes of its backward economy. This region is comparatively backward in West Bengal in terms of certain important socio-economic indicators of development. High density of population (673.76/km²) per square kilometer shows that the pressure of population of the region is comparatively higher. Large percentage of the population (S.C. - 29.97% & S.T. - 9.88%) of the region belongs to the backward classes. This high concentration of backward population affects the socio-cultural problem and socio-economic structure of the region in general. Only 49.31% of the population of the region is literate. The reason behind the low rate of literacy is due to low level of availability and accessibility of educational facilities. The percentage of total workers to total population in the region is only 38.90%. The condition further deteriorated due to high rate of growth of population and lack of large scale industries. The region is predominantly rural where only 14.16% of population lives in urban areas. 53.15% of the workers of this region are in primary activities. As a result, the economic condition of the region creates a number of problems. The road density, rail density, per capita income, low level of urbanization, percentage of irrigated area to total area, % of electrified villages to total villages, consumption of fertilizer & high yielding seeds in all respects of economic indicators the region represents lower condition than the state average.

After all, West Bengal's economy is characterized by sharp dichotomy in respect of development. There is a juxtaposition of most and least developed regions. North Bengal belongs to the latter group.

1.2: Review of Literature:

A number of papers and books published through the time relevant to the present study: 'the study of literacy and economic development in North Bengal' have been studied and the review of those literature have been discussed here.

Bagchi K.K.and S. Sarkar (2003) made a study on inter-district disparity in respect of development of social sector in West Bengal. They have emphasis on educational sector considering the following parameters: literacy, primary schools per ten thousand populations, high school & higher secondary School per ten thousand population, teacher-student ratio in primary schools, S.C. & S.T. literacy rate and availability of drinking water in schools. The authors (2005) also made a study on the relative backwardness of North Bengal and strategies for its development based on the following indicators: per capita income, total literacy rate, number of primary schools per ten thousand population, teacher-student ratio and percentage of schools having drinking water facilities.

Bhat, A.B. (2006) in his book 'Quality Concerns in Education' a product of extensive research work carried out by the author, discusses in detail the fundamental question about the quality in education. The author has identified some factors to improve quality in education and has operationally defined and measured them objectively. The important factors are teaching learning material, teaching strategies, examination and evaluation system, extra-curricular activities, talent appraisal system to identify and promote talent above all a process of counseling and guidance services etc.

Bhote, A. in her work 'Women Employees and Rural Development' discussed on the type of economy and its impact on developmental schemes, As a part of developmental schemes, various educational institutions and healthcare and family & child welfare programmes were planned and this introduction of schemes created various kinds of employment opportunities for women.

Borooah, V & Iyer K.S. (2005) in the article 'Religion, Literacy and Female to Male Ratio' propose a new explanation for religious difference in fertility in India by incorporating the issue of gender bias into the debate.

Chanana, K. (2007) in the article 'Globalisation, Higher Education and Gender (Changing Subject Choices of Indian Woman Students)' has argued that globalization has

meant privatization and increased individual cost of higher education. This paper looks at these myriad issues and asked how women have been affected by the increasing individual cost and change in the subject options offered by higher education.

Das S. (Roy) and H.R. Betal (2005) studied the role of educational institution on literacy in Hugli District of West Bengal applying multiple regression modeling.

Dasgupta, P. in the paper 'The Population Problem' published in edited book 'Population – The Complex Reality' wrote on the economic analysis to rural households in poor countries to see what one may mean by a 'Population Problem'.

Dube (1974) in his paper 'Modernisation and Education' pointed out that through modern education the motivation of the people may be changed. He emphasized on the psychological aspect of education. Further education may help in the formulation of new set of values. Finally, education will help in the development of complex organisation. To run the government, to recruit people etc. education is very essential. Commenting on the role of education he stated that it is essential in building the personality structure of individual.

Dube, R.S. & Mishra, R.P. (1981) made a study at all India level of the level of education as a versatile indicator of regional development. The educational development has been determined with the help of composite score and ascertained the degree of correspondence between education and development.

Dutta, G. (1982) made an attempt to find out the role of socio-economic variables in explaining variation in literacy as well as in explaining the differences between the literacy rate of males and females in southern districts of West Bengal with the help of multiple regression analysis.

Forbes, G. (1998) in the book 'The New Cambridge History of India: Women in Modern India' discussed on the education for women, the emergence of women's organizations, the movement for women's rights, role of women in the Independent India etc.

Gautam, V.K. (1999) in the article 'Human Resource Development in India' discussed on the human resource development policies of India – both pre and post independent period. The article also deals with the human resource development through education, health and health care facilities with some emphasis on women.

Ghosh, M. in the article 'Economic growth and Human Development in Indian States' (2006) evaluates the relative performance of fifteen major Indian states on Human Development, and examines the two-way nexus between economic growth and human development.

Ghosh, S.C. (2000) in the book 'The History of Education in Modern India: 1757 - 1998' discussed on the history of education. It depicts the educational development in the country since Independence is based upon a paper on the 1986 National Policy on Education. The book is written in the light of the 'New History of Education' that has emerged in the past two decades in Europe and America.

Gosal, R.P.S. (2002) made an attempt on spatial dimension of literacy in India referring male-female, rural-urban differential in literacy. He divided India in five zones of different literacy rates.

Guha, M. and Dutta, S. (2008) in the paper 'Development, status of Women and Demographic Outcomes in Madhya Pradesh: A Regional Analysis' examine the regional variation in Madhya Pradesh in terms of socio-economic conditions, cultural traits, family welfare programme and demographic characteristics using data from Census of India 1991, NFHS-2 (1998-'99) and CMIE (1993). A number of variables were considered to represent each dimension of socio-economic development, status of women and family program.

Gurumoorthy, T.R. (2000) in the article 'Self Help Group Empower Rural Women' argued that the self-help group disburses micro credit to the rural women for the purpose of making them enterprising women and encouraging those to entrepreneurial activities. Credit needs of the rural women are fulfilled totally through the self help groups enhance equality of status of women as participants, decision-makers and beneficiaries in the democratic, economic, social and cultural spheres of life. Self-help group encourages women to take active part in the socio-economic progress of our nation.

Jacobson, Donanne and Susar S. Wadley (1999) in the book 'Woman in India: Two Perspectives' wrote on socio-economic status of women in some villages of north and central India.

Kundu, M. (2003) in the book 'Tribal Education' deals with five major sub-themes of tribal education- general problem and their solutions, non-tribal culture biases in education, tribal culture as positive educational resources, implication of researches and educational program abroad for tribal education in India and preparation of materials of tribal learners.

Majumdar, P. (1998) made a study on the spatial pattern of literacy in West Bengal.

Jones, H.R. in the book 'A Population Geography' (1981) discussed about fertility patterns, mortality patterns, pattern of growth rate, population policies, literacy, internal as well as international migration for both the genders.

Karuna, C. (1998) edited the book 'Socialisation, Education and Women: Explorations in Gender Identity' which deals with the various aspects of social structure like education, religion etc. and their relation with gender.

Kundu, A. and Niranjana S. in the article, namely, 'Migration, Employment Status and Poverty – An Analysis across Urban Centre' (2007) analyse the pattern of both male and female migration in urban areas and its socio-economic correlates and suggests that the probability of being poor is much less among the migrants compared to the local population in all size classes of urban centers.

Pruthi, R. and Sharma, B. R. (1995) in their book 'Women Education and Culture' discussed on various aspects of status of women through education, religion, employment pattern etc.

Raj, Maithreyi Krishna in the book 'Women and Development: the Indian Experience' discussed on the women's relation to development. The improvement of the status of women requires changing in the attitudes and roles of both men and women. She also argued that the development process for rural areas has some implications mainly on the women's participation in labour force and the marriage and kinship system which place women in a subordinate position.

Rajeev P.V. (1999) in the article 'Towards Universal Literacy' stated various purposes of education for mass. The article also deals with the introduction of relevant curriculum for school children along with way of conducting examination in school level.

Rustagi, P. (2004) in the article 'Significance of Gender Related Development Indicators: An Analysis of Indian States' illustrates the complexities of gender-related development through an analysis of individual indicators covering issues of women's work, education, health, survival safety and participation in public and private decision making . State level comparisons based on selected individual gender-related indicators reveal divergent patterns of development, highlighting the problems that complexity and non-linearity pose for measuring gender development.

Sarkar. S. & Gupta, M.P. (1995) made a study on dynamic of educational Development in Chattisgarh region. Index of educational development has being calculated on the basis of following indicators such as male literacy rate, female literacy rate rural literacy rate, urban literacy rate, rate of literacy among S.C & S.T. population, number of students, number of teacher, teacher-taught ratio per institution and inter institution distance.

Sharma, K. (2002) in the paper 'Women Studies and Higher Education: The Troubled Journey' reviews the evolution and development of women's studies in contemporary India from the 1970s to the present. The essay concludes by recognizing new sources of crisis as well as fresh challenges at the turn of century.

Sur, M. (2004) in her paper 'Women's Right to Education –A Narrative on International Law' has underpins various legal and social constraints that deter the translation of the women's right to education into a experience. Drawing briefly on constitutional provisions, progressive judicial interpretations and people's movements for education, this article nevertheless cautions in that despite assertions to the country, India is still slotted at risk in not reaching minimal threshold in gender parity.

Tilak J.B.G. (1991) focused an attention on the educational distance between the various states in the country.

Tripaathi, T.S. (1993) studied the situation of literacy and concentration of non-agricultural workers in rural areas at micro level in Bundel Khand (U.P.) with particular reference to the impact of urbanization on it.

Ali Siddique G. & Nasser, Y. (2004) described the level of educational development and employment in Western Uttar Pradesh on the basis of district level secondary data obtained from the census of India 1991 & 2001. They used literacy rate of

total, male & female; % of primary, middle, senior secondary graduate and professional educations as the indicator using multiple regression method. The authors also calculated district wise z-score to identify regions of relationship between education & employment. In an other paper (2004) adjoining with Kazama Khan the authors made study on dimension of educational development and its co-relates using 36 variables, grouping into educational attainment, educational characteristic, health amenities & socio-economic development using composite score.

Berg, H.V.D. (1949) in the book 'Economic Growth and Development' takes a view that economic growth and development is a process that has common characteristics no matter where and when it occurs. It is from a global and historical perspective. It provides the reader of economic growth with a journey through time and to all parts of the world. The author addresses the different views of how education is related to the growth process. He also reviews empirical studies that will help us gain some insight into which potential channels of influence are most important.

Bhaduri, A. (2006) in the book draws out the connection between development and predominantly agrarian economy and unemployment.

Biswas N.B. (2008) in the book 'Education in North-East India' deals with an interactive analysis of education and development in North East India. It presents a decade-wise development of school education (Pre Primary, Primary, Secondary and Higher Secondary Education) which is followed by trend analysis. It also deals with Higher Education, Teacher Education, Adult and Non-Formal, Vocational and Technical Education, Women Education and Educational Management. It presents a brief review of Panchayatiraj and Educational Development in the region.

Borthakur, B.N. (2004) in the book 'Sociological Aspects of Economic Development' of the common masses who constitute the majority of population of most of the world economies is the prime agenda of the governments of those poor economies. Economic Development means the development of poor people.

Boserup, E. in the book 'Women's Role in Economic Development' discussed about the characteristics of economic development in terms of the division of labour. According to the author since primitive stages the main criteria for the division being that age and sex.

Chakrabarti, M. (1995) In the book 'Pioneers in Philosophy of Education' stated that education is always a means of what one should be from what one is. Right from Rousseau to Rabindranath Tagore all thinkers in philosophy of education in the East and in the West have pondered deeply over the most desirable and radical efflorescence of the child whose education should be christened with fullness. With Rousseau's child-centric education as the focal point, pioneering contribution of celebrated Eastern and western thinkers in the philosophy of education- Pestalozzi, Herbart, Froebel, Montessori, Dewey, Tagore, Gandhi and Vivekanand – have been discussed in detail in this book.

Chandra, R.C. (1992) in his book "A Geography of Population and Pattern" represented a very good picture of literacy its pattern and picture of literacy, its pattern and its determinants (pp 228-248). There is clear picture of the definition of 'literacy' with its changing criteria with time describing international comparison. However, according to him, among the factors that may be called as important determinants of literacy were - cost of education, political/ideological background, type of economy, standard of living, degree of urbanization, stage of technological advancement, degree of development of means of transportation and communication, religions background, medium of the females mobility and education, availability of educational institutions, general value system and public policies.

Ghosh, B.N. (1985) in "Fundamentals of Population Geography" give and conspicuous picture of Literacy and Quality of Population through treatment of theoretical and empirical facts.

Gupta N. L. & Gurjar R.K. (1993) The book 'Sustainable Development; vol.-1' emphasis on 'Environmental Facets' and 'Ecological and Planning Basis' for sustainable development. It attempts to enlighten sustainable development vis-à-vis geography of well-being, district planning, bio-technology, environmental management at global and holistic perceptions and changes, impact assessment, small island and coral-reef ecosystem

Joshi, H. (2000) made an attempt to study educational development of Rajasthan through Education Development Index and Literacy Development index. Both papers thrust upon on spatio-temporal appraisal of crude literacy rate, female literacy rate, index of deprivation and education development index. In another paper (2003) the

author made the same attempt of 'Gender related Educational Development Index' at block level in Rajasthan.

Kahn H. (1980) The book 'World Economic Development' deals mainly with the origins, process, dimensions and probably future consequences of the Great Transition, with special reference to the period from 1979 to 2000. The authors start from the premise that natural social, political and cultural forces are likely to slow the growth of both population and production long before the world encounters any fundamentally unmanageable problems of supply or environmental pollution. Kahn insets that rapid worldwide economic growth is desirable, indeed essential. He suggests tactics and strategies to facilitate the achievement of these major social and economic objectives drawing data from broad historical patterns of world economic development and from the narrower perspectives of the current problems and prospects of affluent, the middle income and the poor nations.

Mamoria, C.B. (1979) in "Economic & Commercial Geography of India" (pp 518 – 520) and presented a picture of progress of literacy in India during 1901 & 2001 with graphical representation.

Meier M. & Rauch J.E. (2000) in his book 'Leading Issues in Economic Development' depicted that the expenditure on education is a kind of investment leading to the formation of human capital, either for individual or for society. He also added that it has been established that bouts of long term economic growth were preceded by increases in the population's literacy level. The example of Japan and Korea are the classic cases in which an educated population base has provided the necessary infrastructure for industrial advances to take place at a latter date.

Myrdal (1968) in his book 'Asian Drama– an Enquiry into the Poverty of Nations' pointed out that education may help in economic development.

Pathak, C.R. (2002) in "Spatial Structure and Processes of Development in India" presents a regional literacy pattern with 'Rural Urban Differences' as well as a critical review of India's economic development process its spatial dimension and assess the impact of various regional inequality so as to recommend appropriate strategies.

The monumental work of Ashok Mitra (1967) on level of regional development with 1961 district-wise census data revealed the extent of regional disparity.

Ramkumar, R. & Y.S. Gopal in "Technical Demography" presents an attempt to provide mathematical framework for the study of demographic measurement and analysis. It introduced us with the basic principles of demographic analysis and the assumptions fundamental to them, and a clear understanding of the process of constructing measures that would really measure what is too measured.

Rob Moore (2004) in 'Education & Society – Issues and Explanations' highlights various important topics viz.- social control and support of schools, organization of schools. The school: its task and administration, socialized education, adult civic education, trends in parent education, workers education and social control, consumer research and consumer education etc.

Schultz T.W.(1961) in his book 'Education and Economic Growth' referred that the 'World Bank's education sector policy paper(1980) concludes that 'Studies have shown that economic returns on investment in education seem, in most instances to exceed returns on alternative kinds of investment, and that developing countries obtain higher return than the developed one.

Thirlwall A.P. (2003) The book 'Growth and Development- with Special Reference to Developing Economies' provide an excellent and insightful survey of the main theoretical models and empirical findings concerning economic development of poor countries. It addresses the subject matter of development economies, the meaning of development and the challenges of development economies.

Vyas V.S. and Bhargav P. (1999) The book 'Poverty Reduction in Developing Countries - Experiences from Asia and Africa' is an overwhelming concern in the development agendas of the countries of Asia and Africa and has attracted public intervention to alleviate poverty. It includes five countries from Asia v.z. Botswana, Ethiopia, Ghana, Kenya and Tanzania and three from Asia v.z. India Malaysia and Srilanka. It covers a set of themes to explain poverty reduction process in their respective areas, including the causes of poverty, rate and composition of economic growth, macro economic policies, design of the poverty reduction programs and critical review of their implementation.

1.3: Objectives:

This dissertation would like to explore the relationship between the 'Educational Development' and 'Economic Development' in North Bengal in terms of following issues:

- 1) To determine the spatial variation of 'literacy' in respect of to sex (male, female), residence (urban, rural) and age specific literacy in North Bengal to investigate reasons behind such spatial variation.
- 2) To ascertain the level of 'Economic Development' on the basis of some socio-economic indicators like per capita income, percentage of primary workers, percentage of urban population, road density, rail density, percentage of villages electrified to total village, percentage of irrigated area to net shown area.
- 3) To explore the relationship between the 'Level of Literacy' & 'Economic Development'.
- 4) Plan formulation for development of literacy.

1.4: Hypothesis:

In my present study I have tried to find out the answer of the following research questions or hypothesis:

- 1) *There is positive relationship between level of literacy and economic development.*

Rationale: Literacy is an alternative measure of economic development. High income economies provide their residents with much more education than do developing economies. Even, within the group of developing economies there are very large differences in literacy rate. The 'World Bank's Education Sector Policy Paper' (1980) concludes that 'Studies have shown that economic returns on investment in education seem, in most instances to exceed return on alternative kinds of investment and that developing countries obtain higher return than the developed ones.'

Highlighting the relationship between education and economic development Sarkar C. (2004) 'Poverty, Education and Economic Development', *University News, Association of Indian University; Vol. – 42, No. – 02*. States: "Education and Economic

Growth are both more a journey than a destination – a promise rather than a list of achievements”. There are ample evidences that economic growth of country is severely hindered for the lack of proper education of its nation particularly in lower income groups. This is because economic development means the development of the common masses that are generally in lower income groups and constitute the majority of population of most of the world economies. Education has the unique power to combat poverty and accelerate the pace of economic development.

Education may be viewed as investment, more clearly it can be said that education is production oriented. Education infuses creativity in the minds of individuals having problem solving abilities. In short, it creates situation congenial for innovations.

Education is not an end by itself; it is a means to get something or the desired goal. There is no denying fact that it can be a most potent mechanism of modernization. It seeks to enhance knowledge and develops skills which are required for the furtherance of the goals of modernization.

2) *The higher the growth of literacy, the higher will be the level of economic development.*

Rationale: From historical and global perspective it can be addressed how different views of education is related to the growth process. The first is to view education as an investment in human capital. This is the interpretation that *Paul Krugman* used when he analysed the ‘miraculous’ economic growth of the *East Asian Tigers*. *Krugman* attributed much of the *Tigers’* success to their rapid expansion of education. As quoted in ‘*The Economist*’ (1999); “No School, No Future” *March 27, p -45*. A different view of the role of education in the economic success of the *East Asian Tigers* is that education has positive externalities: “Educated part of the community and.... the whole of it benefits,” says *Amartya Sen* the *Nobel Prize- winning development economist*.

Like the externalities to physical investment, externalities to human capital can help the economy overcome diminishing returns and, therefore, generate economic growth. The idea that education generates positive externalities is by no means new. Over 200 years ago, many of the classical economists argued strongly for government’s active

support to education of the positive externalities that society would gain from a more educated labour force and populace.

Another way of modeling the role of education in the growth process is to view human capital as a critical input for innovation and 'Research & Development' activity. From this perspective, education is seen as an international effort to increase the resources needed for creating new ideas, and thus any increases in education will directly accelerate technological progress. Education is taken as an input into the international and costly entrepreneurial efforts to create new technology and new products. As a result, the countries that are at foremost of technology also have the most educated population.

1.5: Source of Data:

It is essential to have the data and maps and information system to monitor the program. For this purposes both qualitative and quantitative data are required. Qualitative data specifies the features and conditions of the study area describing geographical, historical, politico-economical problems which effects potential and limitations. This information has been collected from books periodicals, journals. Practical experiences, official and unofficial records. Quantitative data are the result of compilation and processing of collected information from various sources officials and un-officials. Two main sources for obtaining required data are the primary data collected from field survey, and the 'secondary data' collected from the Census of India, West Bengal, including District Census Hand Book 1961, 1971, 1981, 1991 & 2001; Districts Statistical Hand Books of West Bengal, Economic Review of West Bengal, Statistical Abstract of West Bengal, State map series of West Bengal, Topographical map of West Bengal, various records of educational institutions, news paper offices etc.

1.6: Methodology:

The research has been carried out on the basis of both primary and secondary data. The primary data has been collected through field survey with proper questionnaires. At the time of field survey, the Random Sampling Without Replacement method has been used. 1% of villages and 10% of urban centers have been taken for case studies and 2% - 5% of households of this urban centers and villages will be considered

for sampling. The data and information have been compiled and analyzed for the results. The standard score, multivariate analysis have been used for data compilation.

The distributional pattern of 'literacy' has been determined on the basis of secondary data with the help of literacy rate.

The distributional pattern of 'Economic Development' has been analyzed on the basis of secondary data collected from various Government records.

To determine the relation between literacy and economic development the Correlation-Regression Analysis has been used.

The traditional cartographic methods i.e. choropleth and isopleths technique have been used to prepare the maps.

The distributional pattern of 'Literacy Rate' has been performed at district level, C.D.Block level, village level and town level. However, the district level 'Distributional Pattern of Literacy Rate' has been demonstrated in six segments i.e. 'Total Literacy Rate', 'Male Literacy Rate', 'Female Literacy Rate', 'Rural Literacy Rate', 'Urban Literacy Rate' and Age-specific Literacy Rate'. All these analysis have been done with the data obtained from the 'District Census Hand Books' for the year of 2001 whereas the choropleth technique has been used to demonstrate the distributional pattern. Age-specific Literacy Rate has been displayed with the help of bar graphs. Beside these, the deviation map has also been prepared on the basis of former five variables to obtain the idea about the position of the six districts in respect of the state average.

The 'Distributional Pattern of Literacy Rate' at C.D.Block level has been analysed on the basis of five components of 'Literacy Rate', specifically, 'Total Literacy Rate', 'Male Literacy Rate', 'Female Literacy Rate', 'Rural Literacy Rate' and 'Urban Literacy Rate'. The statistics of sixty nine C.D.Blocks of North Bengal have been obtained from 'District Census Hand Books'. Once more, the choropleth technique has been used to demonstrate the distributional pattern. 18 DEC 2012

The 'Distributional Pattern of Literacy Rate' of 'selected towns' have been outlined for five selected Head Quarter towns of North Bengal i.e. ten percent of total urban centers of North Bengal. Two percent wardwise household of five towns have been taken under study and the wardwise distributional pattern of 'Total Literacy Rate', 'Male Literacy Rate' and 'Female Literacy Rate' have been demonstrated.

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Lastly, the 'Distributional Pattern' of villages has been analysed for eighty three selected villages of eight selected C.D.Blocks on the basis of data obtained from 'Village Directory of West Bengal' for the year of 2001.

At micro level, villages or mouzas have been selected for an in-depth study of the distributional pattern of literacy and economic indicators. The 2001 census data i.e. village directory amenities data and the PCA CD7 of West Bengal have been used to fulfill the objective of the proposed study. Three steps have been taken to get the final list of villages.

Firstly, ten percent of C.D.Block has been selected for further analysis out of sixty nine C.D.Blocks of North Bengal i.e. $(69 \times 10\%) = 6.9 = 7$ C.D.Blocks have been drawn out from the six districts. Considering the number of belonging C.D.Blocks of the districts that is to say one C.D.Block of each district except two of Jalpaiguri district have been taken out. It may be mention here that as all the C.D.Blocks are from plain, one namely Kurseong C.D.Block has been taken extra from the hilly region for a comprehensive analysis. Naxal Bari & Kurseong C.D.Blocks of Darjiling district; Jalpaiguri & Maynaguri C.D.Blocks of Jalpaiguri district, Mathabhanga-II C.D.Block of Koch Bihar district, Chopra C.D.Block of Uttar Dinajpur district; Kushmundi C.D.Block of Dakshin Dinajpur district and Manikchak C.D.Block of Maldah district have been drawn out randomly for detailed analysis.

At the next step, ten percent of villages of the above said C.D.Blocks, as for example, seven $(65 \times 10\%)$ villages of Kurseong C.D. Block has been selected. At this level, the selection of villages has been made by adopting the method of Simple Random Sampling Without Replacement method (SRSWOR) with the help of Random Sampling Numbers.

The determinants of the 'Literacy' under consideration has been divided into three groups i.e., 'Educational Infrastructure Indicators', 'Demographic Indicators' and 'Economic Indicators'. To state in detail, the 'Educational Infrastructure Indicators' have been furthermore divided into three categories – 'Density of Different Institution Per Ten Square Kilometers', 'Number of Educational Institution Per Lakh Population' and 'Teacher-Student' Ratio' for primary schools, junior high schools, secondary schools, higher secondary schools and colleges at district and C.D.Block level. The distributional

pattern of three 'Demographic Indicators' has been described for district level and C.D.Block, level. However, the indicators are - 'Percentage of Scheduled Caste Population to Total Population', 'Percentage of Scheduled Tribe Population to Total Population' and 'Percentage of Cultivators and Agricultural Labourers in Main Workers' whereas the 'Economic Indicators' have been portrayed for district level, C.D.Block level as well as town level and village level as for the name of my area under discussion. However, the indicators have been chosen on the basis of available data. The economic indicators taken for the district level investigation are 'Net District Domestic Product in Industry', 'Annual Per Capita Income', 'Fertilizer Consumption', 'Road Density', 'Rail Density', 'Percentage of Irrigated Area to Cultivated Area', 'Consumption of Electricity', 'Percentage of Electrified Villages to Total Villages', 'Number of Registered Small Scale Industry', 'Number of Commercial Bank Per Lakh Population', 'Urban Population to Total Population', 'Work Participation Rate in Secondary Activities' and 'Work Participation Rate in Tertiary Activities'; for C.D.Block level - 'Work Participation Rate', 'Work Participation Rate in Secondary Activities', 'Work Participation Rate in Tertiary Activities', 'Urban Population to Total Population', 'Road Density', 'Number of Bus Routes', 'Distance from Nearest Railway Station', 'Percentage of Electrified Villages to Total Villages', 'Percentage of Irrigated Area to Cultivated Area' and 'Percentage of Villages having Drinking Water Facility'; for town level - 'Work Participation Rate in Secondary Activities', 'Work Participation Rate in Tertiary Activities', 'Monthly Per Capita Income', 'Monthly Expenditure on Education Per Student', 'Land Owned Per Household', 'Number of Rooms Per Household', 'Monthly Consumption of Electricity Per Household', and 'Weighted Score of Telephone Used Per Household' as well as for village level - 'Distance from Nearest Phone Facility', 'Distance from Nearest Bus Stoppage', 'Distance from Nearest Railway Station', 'Distance from Nearest Commercial Bank', 'Distance from Nearest Co-operative Commercial Bank', 'Distance from Nearest Agri-Credit Society', 'Electricity Used for Domestic Purpose', 'Work Participation Rate', 'Distance from Nearest Town', 'Annual Per Capita Income' and 'Annual Per Capita Expenditure'.

'Multiple Correlation Regression Analysis' of the above have also been carried out to identify the relation of 'Literacy Rate' with those indicators i.e. 'Literacy Rate with

Educational Infrastructure Indicators' for district level and C.D.Block level; 'Literacy Rate with Demographic Indicators' for district level and C.D.Block level and 'Literacy Rate with Economic Indicators' for district level, C.D.Block level, town level and village level.

'Economic Development' has been computed by means of 'Z-Score' method for district level, C.D.Block level, selected towns and selected villages whereas the distributional pattern of it have been portrayed using 'Choropleth' technique. The correspondence of 'Total Literacy Rate' and its components have been evaluated with 'Economic Development'. To get the relationship between 'Economic Development' and 'Total Literacy Rate' and its components instantaneously the 'Multiple Correlation Regression Analysis' have been executed for district level, C.D.Block level, town level and village level.

The 'Educational Development' has been computed by means of 'Standard Score' in two ways – 'Level of Literacy' using different components of 'Literacy' for different stages as well as using the 'Educational Infrastructure Indicators' for district level and C.D.Block level. Moreover, the 'Composite Standard Score of Demographic Indicators' has been worked out for district level, C.D.Block level.

The correspondence between 'Economic Development and Level of Literacy', 'Economic Development and Educational Infrastructure Development' and lastly, 'Economic Development & Composite Z Score of Demographic Indicators' have been executed using 'Bi-variate Linear Regression Analysis'. To show the spatial correspondence readily of the above the residual maps are prepared too.

Standard Score:

For constructing composite index, the method of standard score or composite standard score has been used. This technique is very useful as it allows us to calculate the probability of a score occurring within normal distribution and also this technique enables us to compare two scores that are from different normal distributions. The standard score does this by converting or standardizing score in normal distributions to z-scores in what becomes a standard normal distribution.

The technique has been explained as follows:

$$Z_{ij} = \frac{X_i - \bar{X}}{\sigma}$$

where, Z_{ij} = Standard Score of the Observation

X_i = Original Value of the Observation

\bar{X} = Mean Value for all the Values of X

Σ = Standard Deviation of X.

Further the results of standard score obtained from the different indicators aggregated by composite standard score (CSS). In this way the regional disparities in the level of development of North Bengal region may be obtained on common scale. It is expressed as:

$$\text{Composite Standard Score (CSS)} = \frac{\sum Z_{ij}}{N}$$

where, 'Zij' indicates, 'z-score' of any indicators finally added to determine the overall pattern of economic development, educational development, educational infrastructure development, and composite z-score of selected demographic indicators etc. to assess the inequality in the levels of development among the regions. In order to measure the overall development, the composite standard score value of six districts, sixty nine C.D.Blocks, five selected towns, eighty three selected villages of North Bengal region.

Correlation Regression Analysis:

To identify the casual relationship between literacy and its determinants the correlation regression analysis has been used. Correlation refers to the relationship of two or more variables. It generally measures the degree or extent to which two variables fluctuates with reference to each other. Correlation analysis deals with the association of co-variation between two or more variables. Correlation is classified into positive and negative; simple and multiple; partial and total and linear and non-linear.

Bivariate Regression Analysis: Regression analysis is a statistical device with the help of which we can estimate or predict the unknown values of one variable from known values to another variable. The variable which is used to predict the variable of interest is called the independent variable or explanatory variable and the variable we trying to predict is called the dependent variable or explained variable. The analysis is called the simple linear regression analysis – simple because there is only one predictor or

independent variable and linear because of the assumed linear relationship between the dependent and independent variables.

Regression equations, also known as estimating equations, are algebraic expressions of the regression lines. The regression equation can be expressed as follows:

$$Y = a + bX$$

where, 'Y' is dependent variable

'X' is independent variable

'a' is 'Y-intercept' (its value is the point at which the regression line crosses the Y-axis i.e. the vertical axis)

'b' is 'slope' of line.(it represents the change in Y variable for a unit change in X variable)

'a' and 'b' in the equation are called numerical constants because for any given straight line, their value does not change.

If the values of the constant 'a' and 'b' are obtained, the line is completely determined. The 'Least Square' method is used to obtain the values of 'a' and 'b'. The method states that the line should be drawn through the plotted points in such a manner that the sum of the squares of the deviations of the actual values from the computed Y values is the least, that is to say, in order to obtain a line which fits the points best $\sum (Y - Y_c)^2$, should be minimum. Such a line is known as the line of 'best fit'. With a little algebra and differential calculus it can be shown that the following two equations, if solved simultaneously, will yield values of the parameters 'a' and 'b' such that the least squares requirement is fulfilled:

$$\begin{aligned} \sum Y - Na + b\sum X \\ \sum XY = a\sum X + b\sum X^2 \end{aligned}$$

These equations are usually called the *normal equations*. In the equations $\sum X$, $\sum XY$, $\sum X^2$ indicate totals which are computed from the observed pairs of values of two variables 'X' and 'Y' to which the least squares estimating line is to be fitted and 'N' is the number of observed pairs of values.

Of the several mathematical methods of measuring correlation the Karl Pearson's method, popularly known as Pearson's coefficient of correlation is denoted by the symbol r. It is very one of the very few symbols that are used universally for describing the

degree of correlation between two series. The formula for computing Pearsonian 'r' is:

$$r = \sum xy / N \sigma_x \sigma_y.$$

Here, $x = (X - \bar{X})$; $y = (Y - \bar{Y})$

σ_x = Standard deviation of series X

σ_y = Standard deviation of series Y

N = Number of pairs of observations

r = the (product moment) correlation coefficient

The value of the coefficient of correlation as obtained by the above formula shall always lie between ± 1 . When 'r' = + 1, it means there is a perfect positive correlation between the variables. When 'r' = - 1, it means there is a perfect negative correlation between the variables. When 'r' = 0, it means there is no relationship between the two variables. The coefficient of correlation describes not only the magnitude of correlation but also its direction.

Multivariate analysis: Multiple regression analysis represents a logical extension of two-variable regression analysis. Instead of a single independent variable, two or more independent variables are used to estimate the values of dependent variable. However, the fundamental concept in the analysis remains the same. The following are the three main objectives of multiple regression and correlation analysis:

- (i). to derive an equation which provides estimates of the dependent variable from values of the two or more independent variables.
- (ii). to obtain a measure of the error involved in using this regression equation as a basis for estimation.
- (iii). to obtain a measure of the proportion of variance in the dependent variable accounted for or 'explained by' the independent variables.

The first purpose is accomplished by deriving an appropriate regression equation by the method of least squares. The second purpose is achieved through the calculation of standard error or estimate. The third purpose is accomplished by computing the multiple coefficient of determination.

The multiple regression equation describes the average relationship between these variables and this relationship is used to predict or control the dependent variable.

A regression equation is an equation for estimating a dependent variable, say, X_1 from the independent variables X_2, X_3, \dots and is called a regression equation of X_1 on X_2, X_3, \dots . In functional notation, this is sometimes written briefly as $X_1 = F(X_2, X_3, \dots)$ read as “ X_1 is a function of X_2, X_3 and so on.”

In case of three variables, the regression equation of X_1 on X_2 and X_3 has the form

$$X_{1.23} = a_{1.23} + b_{1.23} X_2 + b_{1.23} X_3 \quad \dots(i)$$

$X_{1.23}$ is the computed or estimated value of the dependent variable, and X_2, X_3 is the independent variables.

The constant $a_{1.23}$ is the intercept made by regression plane. It gives the value of the dependent variable when all the independent variables assume a value equal to zero. ‘ $b_{12.3}$ and $b_{13.2}$ are called partial regression coefficients or the net regression coefficients. $b_{12.3}$ measures the amount by which a unit change in X_2 is expected to affect X_1 when X_3 is held constant and $b_{13.2}$ measures the amount of change in X_1 per unit change in X_3 when X_2 is held constant.

Due to the fact the X_1 varies partially because of variation in X_2 and partially because of variation in X_3 . We call $b_{12.2}$ and $b_{13.2}$ the partial regression coefficients of X_1 on X_2 keeping X_3 constant and of X_1 on X_3 keeping X_2 constant.

Just as there exist least square regression lines approximating a set of N data points (X', Y) in a two dimensional scatter diagram so also there exist least square regression planes fitting a set of N data points (X_1, X_2, X_3) in a three dimensional diagram.

The least square regression plane of X_1 on X_2 has the equation (i), where $b_{12.3}$ and $b_{13.2}$ are determined by solving simultaneously the normal equations

$$\begin{aligned} \sum X_1 &= N a_{1.23} + b_{12.3} \sum X_2 + b_{13.2} \sum X_3 \\ \sum X_1 X_2 &= a_{1.23} \sum X_2 + b_{12.3} \sum X_2^2 + b_{13.2} \sum X_2 X_3 \\ \sum X_1 X_3 &= a_{1.23} \sum X_3 + b_{12.3} \sum X_2 X_3 + b_{13.2} \sum X_3^2 \end{aligned}$$

These equations can be obtained by multiplying both sides of equation (i) by 1, X_2 and X_3 successively and summing on both sides.

For point estimation, the principle assumptions of linear multiple regression analysis are:

- 1) The dependent variable is random variable whereas the independent variable need not be random variable.
- 2) The relationship between the several independent variables and the one independent variable is linear, and
- 3) The variances of use conditional distributions of the dependent variable, given various combinations of values of the independent variables, are all equal. For internal estimation, an additional assumption is that the conditional distributions for the dependent variable follow the normal probability distribution.

The residuals are computed as $(y - Y_c)$ where, y = actual value, Y_c is the estimated or computed value. The sum of the squares of deviations of y -values from their mean (\bar{y}) is defined as total variation $\sum (y - \bar{y})^2$. It has two components – one, that can be explained by the regression line and the other, that can not be explained. The Unexplained Variation can be expressed as: $\sum D_s^2 = \sum (y - Y_c)^2$ whereas the Explained Variables can be symbolized as: $\sum D_c^2 = \sum (Y_c - \bar{y})^2$

The *coefficient of multiple determination* is analogous to the coefficient of determination in the two-variable case. As explained earlier, the fit of a straight line to the two-variable scatter was measured by the simple coefficient of determination r^2 which was defined as the ratio of the explained sum of squares to the total sum of squares. In the same fashion, we can define coefficient of multiple determination which is denoted by R^2 . Symbolically:

$$R^2 = SSR/SST = 1 - SSE/SST$$

Similar to the case of r^2 and r in two variable analyses, R^2 is easier to interpret since R^2 is percentage figure, whereas R is not.

As a ratio of explained variation to the total variation in X_1 , R^2 can be interpreted as the proportion of the total variation in the dependent variable that is associated with or explained by the regression of X_1 on X_2 and X_3 . We may also think of R^2 as a measure of closeness of fit of the regression plane to the actual points. The closer the value of R^2 to 1, the smaller is the scatter of the points about the regression plane and the better is the fit.

The square root of the coefficient of multiple determination is called the coefficient of multiple correlation, denoted as R.

Student's t test: Theoretical work on t-distribution was done by W.S.Gosset in the early 1900. Gosset was employed by the Guinness and Son, a Dublin brewery, Ireland, which did not permit employees to publish research findings under their own names. So Gosset adopted the pen name "student" and published his findings under this name. Thereafter, the t distribution is commonly called *Student's t*-distribution or simply *Student's*-distribution.

Testing of the Significance of an Observed Correlation Coefficient: Given random sample from a bivariate normal population if we are to test the hypothesis that the correlation coefficient of the population is zero, i.e., the variables in the population are uncorrelated; we have to apply the following test:

$$t = r/\sqrt{1-r^2} \times \sqrt{n-2}.$$

Here, t is based on (n-2) degree of freedom. If the calculated value of t exceeds $t_{0.05}$ for (n-2), d.f., we say the value of r is significant at 5%. If $t < t_{0.05}$ the data are consistent with the hypothesis of an uncorrelated population.

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