EFFECTIVENESS OF INTERVENTION STRATEGIES IN THE LEARNING OF POPULATION EDUCATION CONCEPTS BY STANDARD IX PUPILS IN COIMBATORE

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A Thesis Submitted to the Avinashilingam Institute for Home Science and Higher Education for Women (Deemed University) Coimbatore in partial fulfilment of the requirements for the degree of Doctor of Philosophy

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DECLARATION

I hereby declare that the matter embodied in this thesis entitled, **"Effectiveness of Intervention Strategies in the Learning of Population Education Concepts by Standard IX pupils in Coimbatore"**, submitted to the Avinashilingam Institute for Home Science and Higher Education for Women (Deemed University), Coimbatore is the result of investigation carried out by me in the Faculty of Education, under the supervision of **Dr. G. Thilakam**, Reader, Faculty of Education, Avinashilingam Institute for Home Science and Higher Education for Women (Deemed University), Coimbatore, and it has not been submitted for the award of any Degree/Diploma/Associateship/Fellowship or similar title of any other university or institute.

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CERTIFICATE

This is to certify that the thesis entitled, **"Effectiveness of Intervention Strategies in the Learning of Population Education Concepts by Standard IX pupils in Coimbatore"**, submitted to the Avinashilingam Institute for Home Science and Higher Education for Women (Deemed University), Coimbatore, for the award of the Degree of Doctor of Philosophy in Education is a record of original work done by **R. Chandraleka**, during the period of her study in the Faculty of Education, Avinashilingam Institute for Home Science and Higher Eduation for Women (Deemed University), Coimbatore, under my supervision and guidance and the thesis has not formed the basis of the award of any Degree/Diploma/Associateship/Fellowship or similar title to any candidate of any University.

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Signature of the guide with date

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CHAPTER I

INTRODUCTION

A nation's wealth lies not only in its land and water, in its forests and mines, in its flocks and heards, but also in its healthy and happy men, women and children. It lies in the energy, initiative, physical and moral fitness of its people - the population. The population of a country can at once be an asset and a liability depending on its resources. If the size of the population is such as to permit optimum exploitation of the available resources in the country, it becomes an asset. On the other hand if it exceeds the resources, it becomes a liability.

To-day population explosion is one of the greatest problems of India and some other parts of the world. The present world with its 5.3 billion inhabitants is already showing serious ecological stress. The world population is growing faster than ever before, at a rate of three people per second, a quarter million people every day and 94 million people a year (Sadik, 1990). The world population reached this 5.3 billion in 1990 and in ten more years, a billion more will be added bringing the total to about 6.3 billion. The projections are that world population will be 8.5 billions by the year 2025 and will double by the year 2050 (Ministry of Information and Broadcasting, 1989).

The concurrent pressures of population growth, have increased the demands for resources. Environmental degradation is a serious threat to the earth's capacity to sustain human population. According to the Report of the State of World Population, (1988), "Increasing human demands are damaging the natural resource base - land, water and air upon which all life depends". Thus population explosion has become the most crucial human problem. In the words of the Brundtland Commission, (1991), "Global population has doubled, demand for food has trebled, energy needs may have quadrupled and general economic necessities may have increased five times or more".

Asia contains over half of the world's people, with their number increasing rapidly. If these rates were to continue, in another 35 years, Asian population would be greater than the present world population, (World Population Growths and Response, 1976).

India is the second most populated country in the world next to China. The population of India as on March 1991 stood at 843.9 million, which had increased about three and a half times during the last seven decades. As Tata (1987), says, "It took us only 34 years of Independence to double our population from about 350 million to 700 million. Today, it is still growing at the rate of about 150 million a year, and will probably reach a billion by the turn of the

century". According to Joshi (1990), "For every minute almost 33.5 people are added to the Indian population whereas even China is adding only 30 people. Thus, it is estimated that by the year 2020 India will rival China as the world's largest nation with about 130 crore people" With just 2.42 per cent of the world's land area, India has to sustain 16 per cent of the world population. The projection, tells that Indian population will be 915.5 million by the year 1996 and 991.5 million by the year 2001 (Registrar General and Census Commissioner of India, 1984).

This trend of population growth of India has implications not only in global perspective, but also for the Indian nation. The country is striving to fulfill the basic needs of its people in order to improve the quality of life. "But the population growth nullifies all efforts for the improvement of the quality of life of the people (Mani, 1991). According to Nevzorov (1985), "Human poverty and misery are inevitable because of population growth which leads to food, energy and natural shortages and concurrent environmental deterioration". Another alarming feature of the Indian population is that about 42 per cent of it, is children below the age of fifteen.

India is the first country in the world to have a national policy and a programme of population control. The National Family Planning Programme was initiated in the year 1952. After a few years, these were integrated with health

services especially with maternal and child health services and also with corollary efforts such as mass-communication, extension education and family welfare programme.

But soon, it was again felt that besides spreading the message of family planning programmes to the general masses, a concerted effort through education was necessary to bring about a lasting change in the attitude towards small family norm in the minds of the younger generation.

Education Commission, (1964-66), reports that, education is the means to produce the desired behavioural change which may be of different forms, like economy, right values or correct attitudes. It makes the individuals to realise the present possibilities and makes them better fitted to cope with the difficulties ahead. Education increases awareness and hopefully helps us to achieve wisdom in the conduct of our lives, both as individuals and as groups. The main purpose of formal education in a democratic society is to prepare our youth to cope more effectively with the increasingly complex problems of modern society.

The problem of population growth like all other problems, begins in the minds of human beings and it is in these minds that the seeds of its solution must be sown. It is in this context that an innovative educational programme known as Population Education plays a vital role. In 1969,

the First National Seminar on Population Education held at Bombay, formulated the objectives and content of population education.

Population education is a process leading to the understanding of the changing world population phenomenon and its varied implications, a process of investigating the causes and consequences of population growth and the alternative courses of action in controlling it.

The objectives of population education should be to enable the students to understand that - the family size is controllable, population limitation can facilitate the improvement of the quality of life in the nation and a small family size can contribute materially to the quality of living of the individual and family. It should also enable the students, to appreciate the fact that for preserving the health and welfare of the members of the family, to ensure the economic stability of the family, to assure good prospects for the younger generation and to realize the Indian families of today and tomorrow should be small and compact. Hence, population education should be introduced into the curricula of schools and colleges by integrating it with the subjects such as languages, mathematics, social studies, general science and health education.

Population education is an inter-disciplinary interactive and participatory type of learning. It involves

collection of demographic data and material, interpretation of these in terms of their economic and social implications and monitoring the deduction of trends in respect of population growth and its social dimensions. This type of education needs good planning and the use of intervention strategies to enliven and stimulate learning, through various senses, especially hearing and seeing. By involving the senses, intervention strategies and electronic media will have to be introduced.

Statement of the problem

Effectiveness of Intervention Strategies in the Learning of Population Education Concepts by Standard IX pupils in Coimbatore.

Definition of important terms

Learning

Learning is acquiring knowledge leading to the change in attitude.

> "Learning can be defined as the process of effecting changes in behaviour that brings about improvement in our relations with environment", according to Mohanty (1991).

Population Education

Population education is giving knowledge and bringing about attitudinal change towards population control.

Parakh (1985), says, "Population education is an intervention strategy to supplement family planning endeavours to prepare the ground where persons entering reproductive age group voluntarily accept a small family norm and in due course adopt family planning measures".

"Population education is one, which would promote for learners at any level an in-depth understanding of the relationships of population process with social reality, increased concern and responsibility for social well-being and acquisition of greater skills in dealing with population related matters and problems", (UNESCO, 1983).

Concepts

Concepts are ideas in terms of cognition. Rout (1988), says, "Concepts are considered as fundamental units in human thought process".

Strategy

Strategy is a planned sequence of audio-visual materials. Webster's dictionary (1989) defines strategy as, "a careful plan or method especially for achieving an end".

Need for the study

Education is a process of behaviour modification and is essentially a process of casting influence on the beliefs, attitudes and values of an individual and this makes it eminently suitable as an innovation to deal with this immediate problem of population growth.

The capacity to learn is equally important to what is learnt and how well it is learnt. The use of innovative strategies and instructional materials like audio-visual aids and electronic media can make learning attractive, interesting, meaningful and assimilable. These strategies can further enrich learning and make it more effective, add flesh and colour to population education at all stages and in all forms and can eliminate boredom, distractions and barriers, the usual banes of the formal and informal systems of educations. Further, these learning strategies enable the young learners to develop favourable attitudes in order to make strong decisions uninterruptedly, towards checking the population growth. Hence, it was felt necessary to study the impact of the learning strategies namely - video-lesson and tape slide-lesson in learning population education concepts leading to strong conviction for population control.

Objectives of the study

1. To study the effectiveness of video and tapeslide strategies (to be developed by the investigator) in learning population education concepts by the pupils of standard IX.
2. To compare the effectiveness of teaching devices - pupil discussion, interactive instructions and assignment to be incorporated into the intervention strategies.
3. To develop achievement tests and an attitude scale to assess the effectiveness of the strategies and the devices.

4. To assess, the influence of socio-economic status on the knowledge and attitude of the pupils, as seen from the test scores in achievement and attitude scale, before exposing them to the experimental programme.

5. To compare the relative effectiveness of the intervention strategies and devices, after removing the effect of socio-economic status and previous knowledge of the sample, in terms of locality, gender and their interactions.

6. To find out the correlation between pre - and post-achievement scores and pre - and post - attitude scores in the various strategy devices and with socio-economic status.

Hypotheses

1.1. There is no significant difference in the achievement of pupils learning through video and tape slide strategies and through the traditional method.

1.2. There is no significant difference in the attitude of the pupils in the control and experimental groups.

2.1. There is no significant difference among the pre-test achievement scores of the pupils belonging to various socio-economic status groups, selected for video strategy.

2.2. The pre-test achievement scores of the pupils selected for video strategy do not differ significantly between

a. boys and girls
b. urban and rural pupils and
c. combinations of gender and locality after removing the effects of socio-economic status.

2.3. The post-test achievement scores of the pupils learnt by video-strategy do not differ significantly between

a. boys and girls
b. urban and rural pupils
c. intervention strategy devices
d. combinations of gender and locality
e. combinations of gender and intervention strategy devices.
f. combinations of locality, and intervention strategy devices and

g. combinations of locality, gender and intervention strategy devices

after removing the effects of pre-test knowledge and socio-economic status, if found significant in the pre-test.

2.4.1. There is no significant difference between means of post-test achievement scores of pupils in any two devices in video-strategy:

2.4.2. There is no significant difference between the means of post-test achievement scores of pupils in the control group and in the various devices of the experimental group in video-strategy.

2.5. The post test achievement scores of the pupils do not differ significantly when analysed sub-areawise (statistics, causes, consequences and control).

3.1. There is no significant difference among the pre-test achievement scores of the pupils belonging to various socio-economic status groups, selected for tape slide strategy.

3.2. The pre-test achievement scores of the pupils selected for tape slide strategy do not differ significantly between:

a. boys and girls
b. urban and rural pupils and
c. combinations of gender and locality

after removing the effects of socio-economic status.

3.3. The post-test achievement scores of the pupils learnt by tape-slide strategy do not differ significantly between:

a. boys and girls
b. urban and rural pupils
c. intervention strategy devices
d. combinations of gender and locality
e. combinations of gender and strategy devices
f. combinations of locality and strategy devices and
g. combinations of locality, gender and strategy devices

after removing the effects of pre-test knowledge and socio-economic status, if found significant in the pre-test.

3.4.1. There is no significant difference between the means of post-test achievement scores of pupils in any two devices in tape-slide strategy.

3.4.2. There is no significant difference between the means of post-test achievement scores of pupils in the control group and in the various devices of the experimental groups in tape-slide strategy.

4.1. There is no significant difference among the pre-test attitude scores of the pupils belonging to various socio-economic status groups.

4.2. The pre-test attitude scores of the pupils do not differ significantly between:

a. boys and girls
b. urban and rural pupils and
c. combinations of gender and locality

after removing the effects of socio-economic status.

4.3. The post-test attitude scores of the pupils do not differ significantly between:

a. boys and girls
b. urban and rural pupils
c. intervention strategy devices
d. combinations of gender and locality
e. combinations of gender and strategy devices
f. combinations of locality and strategy devices and
g. combinations of gender , locality and strategy devices.

after removing the effects of pre-test attitude and socio-economic status, if found significant in the pre-test.

4.4.1. There is no significant difference between the means of post-test attitude scores of pupils in any two devices.

4.4.2. There is no significant difference between the means of post-test attitude scores of pupils in the control group and various devices, taken separately in the experimental group.

4.5. The post test attitude scores of pupils do not differ significantly when analysed sub-areawise (small family norm, social development, economic development, health and nutrition, statistics, environment and education).

5.1. There is no significant correlation between the pre- and post-test scores of achievement in video, tape slide and attitude of urban boys, rural boys, urban girls and rural girls of the significant difference group.

5.2. There is no significant correlation between the achievement gain scores in video, tape slide and attitude scores of urban boys, rural boys, urban girls and rural girls of the significant difference group.

5.3. There is no significant correlation between the achievement gain scores in video, tape slide and attitude scores against the socio-economic status of urban boys, rural boys, urban girls and rural girls of the significant difference group.

Scope of the study

The present investigation has been designed to assess the effectiveness of intervention strategies in the learning of population education concepts. Though the study is meant for the entire Tamil Nadu school pupils, the investigator intends to study only standard IX, State Board Tamil Medium pupils of some of the schools in and around Coimbatore. Apart from these, among various innovative intervention strategies, only video-lesson and tape slide-lesson are taken into consideration for indepth study of the population education concepts in social science and general science respectively. Further, among the devices available only three devices namely - pupil discussion, interactive video/tape slide and assignment are introduced in both video and tape slide lessons. Thus the investigator intends to introduce different types of technological strategies and devices for learning population education concepts at this level.

Research Organisation

The study is concerned with the effectiveness of intervention strategies namely - the video-lesson and tape slide lesson in the learning of population education concepts by standard IX pupils in Coimbatore. The various aspects of the study are presented in six chapters. Chapter I deals with an introduction, statement of the problem, need for the study, objectives of the study, hypotheses and scope. Chapter II details the various angles of the population phenomenon. Chapter III enumerates the review of related literature in the field of population problems. The various techniques and methods involved in the conduct of the study are presented in Chapter IV, Chapter V deals with the analysis of the results and discussions. The summary and conclusions, suggestions and recommendations for further study are given in chapter VI. The bibliography and appendices follow next.

CHAPTER - II

POPULATION EDUCATION - A THEORETICAL OVERVIEW

1. Population - A Conceptual Framework

Population, the most pressure mounting phenomenon of the day with the daunting prospects, is not the monopoly of statistical treatment alone. It has got a wider perspective with temporal and spatial ramifications. Statistics pertaining to population dynamics, project the future on the basis of the present. But there is no present that is entirely unencumbered by the past, though the passage of time may observe the old memories.

At different times, different people (academicians) have perceived the word 'population' differently. Different disciplinarians such as population specialists, demographers, family planning experts and recently population education specialists have viewed population differently. Some of the explanations are as follows:

The population studies covers the body of knowledge, concepts and theories which describe and attempt to explain the dynamics of human population and their relationship with the social, cultural, economic, political and biological environments. This particular concept deals with the theories and concepts in the area of population.

Demography deals with the dynamic process of fertility, mortality and migration from the view point of statistical analysis. This particular approach deals with the statistical presentation of population and their growth.

The concept of family planning is related to programme aspect which aims at restricting the population size.

In short, population is defined as "An aggregate of persons or human beings living in a precisely demarcated geographical territory", (Pillai, 1988).

2. Population Theories

Population phenomenon has been an important area of interest for philosophers, thinkers and scientists in all ages and like many issues of human concern, it has been subjected to varied and contradictory treatment. A gestaltic view of the ideas and theories propounded in this field might help in identifying certain basic issues that are essential for proper understanding of population phenomena in specific socio-economic, cultural, political and biological perspectives.

Ancient and Medieval Ideas on Population

"The size, structure and quality of population were issues of concern even for ancient and medieval philosophers", says, Ali (1983). Ancient Greek philosophers, Plato and Aristotle dwelt upon the possibility of the

population. Plato has fixed a particular number for the population size of his Ideal State. His concern for the quality of population was reflected in his theory of eugenics which provided a model for the production of qualitative progeny. To Aristotle, the size of population should be large enough for sustaining self-efficiency in the State, but should not be too large to become a liability for the constitutional government. The Chinese philosopher, Confucius also advocated the idea of optimum numbers, so that on ideal equation would be maintained between land and population.

The Roman-thinkers regarded population as an asset in the context of empire building. They rejected the idea of celibacy, advocated marriage and procreation and supported legislations that inspired marriage and more births. The medieval christian philosophy was also pro-natalist, as they were against any kind of unnatural intervention in the process of procreation though they glorified virginity and celibacy.

Mercantilist Theories

During the 17th and 18th centuries Europe witnessed an upsurge of thinkers belonging to the school of political economy, who put forth ideas that could help population growth. To them, population growth was an index of economic prosperity, (Croontz, 1957). They advocated measures to stimulate population growth because according to

them, 'fewness of number is real poverty'. Sussmilch, who authored the first complete treatise on population, while referring to the doubling time of population, favoured measures to accelerate population growth, because such growth might not cause any problem for a considerably long period, if the agricultural production continued to increase.

Malthusian Theory

The Malthusian Theory Thomas Robert Malthus who propounded in his Essay on the Principle of Population, published in 1778, was perhaps the first one to draw attention to the problem of over population (UNESCO, 1983; Weeks, 1981). Atleast Malthus was the first to hold that the day of over population situation has already arrived. Malthus agreed that the power of population growth was always greater than that of the earth to produce subsistence for man. Therefore, if population growth is not checked it will lead to hunger, unemployment, poverty and other miseries. It was in this context that he mentioned the preventive and positive checks on population growth and stated that if preventive checks in terms of moral measures, such as, postponement of marriage, observing abstinence and having less children were not employed, positive checks like death through diseases, famine and war would operate.

Neo-Malthusian Theory

In view of the limitations of the Malthusian theory, brought out by the critics, the followers of Malthus

revised the theory. Their views came to be known as Neo-Malthusian theory, (Hardin, 1968). Like Malthus they also viewed a constant dichotomy between growing population and existing resources. If there is unabated growth, there may be less availability of resources for human beings to subsist on. By rejecting the thesis of Malthus that only moral restraint is enough they advocated the use of all kinds of contraceptive devices.

Marxian Theory

Marx and Engels propounded the Marxian theory of population in relation to Malthusian theory (Spenger, 1976). According to them poverty was not the outcome of over population, but an offshoot of the evils of capitalist economy. This theory suggested a collective mode of production where a planned and collective effort could be made to absorb properly the increasing labour force owing to population growth. However, both Marx and Engels had little to say about the future course of population growth. They surmised that with the reduction of inequality in distribution of wealth and the consequent improvement in the living conditions of the masses, there would be decline in death rate and birth rate.

Neo-Marxian Theory

In the course of the experiments within the socialist system, the Marxist theory has undergone a revision. The assumption that a well-planned collective mode of production would absorb the ever-increasing labour force

and meet the demands of growing population did not come true. As a result a Neo-Marxian approach emerged in People's Republic of China which suggested a new family planning policy (Weeks, 1981). The planned production, needs to be associated with planned reproduction in order to achieve quantity and desirable quality of people. According to an assessment of the United Nations Fund for Population Activity, "The Chinese recognise the cruciality of economic growth coupled with equity. China admits that uncontrolled population growth would cause problems in all societies, regardless of the social system (UNFPA, 1983).

Demographic Transition Theory

Based on the premise that the socio-economic and cultural forces regulate population in all societies, the demographers describe the demographic variations that take place spatially and temporally. The theory that describes conditions that bring birth rates and death rates into balance is known as the theory of demographic transition, (Kirk, 1971). It is based on the experiences of Western Europe. According to this theory, the demographic transition is delineated into a sequence of four stages, viz., first, the high stationary stage; second, early-expanding stage; third, late expanding stage; and fourth, low-stationary stage (Robinson, 1981). In the first stage, the population tends to remain at low level, because both the birth rate and death rate remain high. During the second stage, the mortality rate starts declining owing to improved health

conditions and environment, but natality rates continue to increase. Thus starts demographic transition from the stationary to the expansion stage. In the third stage, the death rate stabilises at a low level and the birth rate also declines, resulting in the reduction of growth rate of population. And finally in the fourth stage, both death rate and birth rate are low and they fluctuate very little. When this stage is reached, population is more or less stationary.

Biological Theories

Apart from various other theories that have relevance to the socio-economic and cultural facets of population, a number of biological or natural theories have also been propounded. Without entering into the specificities of such theories, some basic principles emanating from them deserve reference, (Ali, 1983). Biologists hold that human population grow according to the same laws as do plants, animals and other natural populations, though the protagonists of the theory of metabiological evolution believe that the intellectual capacity of human beings now regulates the growth process by the phenomenon of error and correction. This phenomenon operates as regulatory feedback. Also a number of other factors, such as over population, strain on natural and human resources, pollution, ecological imbalance etc., will constitute such feedback, resulting in the reduction of human population (Phondke, 1983).

3. World Population - Trends and Current Scenario

There is scanty evidence in support of the history of population growth of the world in the ancient period. We have no information about the world population before 1600 A.D. Any information about the world population is based on speculation. In this situation, it is difficult to arrive at any reliable estimate of the world population. At the beginning of the Christian era, the world population was estimated around 256 million. By 1300 A.D., the population increased to 400 million. Thus, it was the slow increase in 1300 years. According to Carr-Sawnder the world population was 545 million in 1650 A.D. But Wilcox has estimated it as about 470 million. According to Walford, there were 310 famines in the world from 1600-1850 A.D. From 1650 onwards the population grew up rapidly, the rate of population growth increased from 0.1 per cent per year to 0.6 per cent per year.

The world population began to grow rapidly from the beginning of the twentieth century. The annual rate of growth has already increased considerably. During the period 1900-1950, the rate of average rate of world population growth was 0.8 per cent per year. After 1950, there was a great population explosion which was due to the control of diseases and death rates having been brought down, but the birth rates were still very high. In 1970, the world population was estimated to be about 1677 million.

To give a historical perspective of the growth of world population, Table I presents the estimates of the size and growth rate of world population from 1750-1985.

TABLE I

WORLD POPULATION GROWTH DURING 1750-1985

Year	World population (in million)	Annual rate of increase (per cent)	Population doubling time (years)
1750	791	0.4	175
1800	978	0.5	140
1850	1262	0.5	140
1900	1650	0.8	87
1950	2513	1.8	39
1955	2745	2.0	35
1960	3027	2.0	35
1965	3344	1.9	37
1970	3678	1.8	39
1975	4033	1.8	39
1980	4415	1.7	41
1985	4845	1.8	39

Since 1900, population has been increasing from about 1.5 billion to the present level of about 5.3 billion. 'It is expected, from various estimates, that the world population will reach 6.25 billion by 2000 A.D' (World Population trends and prospects 1950-2000, 1979). According to United Nations Projections (1981), it is assumed that the world population will increase to 6.1 billion by 2000 and 8.2 billion by 2025. Debavalya (1982) expects the annual increment to the world population to be 88.4 million between 1995 and the year 2000.

4. Population of Developed and Less Developed Regions of the World

According to the population estimates provided by the Population Reference Bureau for mid-1985, out of 4.845 million inhabitants of the world, 3671 million lived in less developed regions. This implies that a major share of the world population (more than 75 per cent) inhabited the less developed regions (Table II).

TABLE II

ESTIMATED POPULATIONS OF MORE-DEVELOPED AND LESS-DEVELOPED REGIONS, 1750-1989

Year	World population (in million)	More developed regions	Less developed regions
		Population (in million)	Population (in million)
1750	791	201	590
1800	978	246	732
1850	1262	342	920
1900	1650	561	1089
1950	2513	832	1681
1970	3678	1050	2628
1980	4415	1131	3284
1985	4845	1174	3671
1989	5234	1206	4028

The data clearly reveal a phenomenal increase in the size of the population of the less developed regions of the world in that the population of more developed regions has increased six fold from 1750 to 1989, while that of less developed has increased seven times more.

The less developed region comprise countries of Asia, Africa and Latin America, except Japan and the USSR.

It is noteworthy that out of the three-quarters of the world population living in less developed regions, about 75 per cent is concentrated in Asia alone (Table III).

TABLE III

ESTIMATED POPULATION OF LESS AND MORE-DEVELOPED REGIONS, 1975, 1980, 1985 and 1989

Region	Population (in million)			
	1975	1980	1985	1989
Less Developed Regions	2990	3284	3671	4029
Africa	408	469	551	646
Northern Africa	94	109	128	142
Western Africa	121	141	166	200
Eastern Africa	115	134	159	194
Middle Africa	47	53	62	66
Southern Africa	29	33	37	44
Latin America	323	368	406	438
Central America	79	93	105	115
Caribbean	28	30	31	33
Tropical South America	177	204	225	242
Temperate South America	38	41	46	48
Asia	2207	2441	2708	2938
East asia (excluding Japan)	952	1019	1173	1198
South Asia	1255	1422	1535	1740
More Developed Regions	1093	1131	1174	1206
North America	236	246	264	275
Japan	112	116	121	123
Europe	474	484	492	499
Australia New Zealand	17	18	19	20
USSR	254	267	278	289

In Asia, China and India are the two most populous countries, and together, they account for about 37 per cent of the world population. Among the South Asian countries, India, Pakistan and Bangladesh have been the main contributors to the present size of the population of this region.

5. Population of India - Trends and Current Scenario

The changes in the size and growth of the population of India are considered here in terms of two broad periods, namely, (a) the pre-modern period; and (b) the modern period. "The year 1881 marks the dividing line between the pre-modern and the modern periods, as it was the year when the first census on a country-wide basis was taken in India", says Dandekar (1975).

Population Growth in the Pre-modern Period

According to Davis (1951), "It appears that during ancient times no systematic efforts were made to ascertain the total population of India. From historical evidences one gathers however, that some three to seven thousand years ago, India possessed a technology sufficiently advanced to support a dense and slowly growing population". Ancient India passed through two highly developed civilizations, namely (i) the urban-metropolitan; and (ii) the great pastoral agricultural civilizations of the Aryans (1500 B.C-600 B.C). It is believed that during the periods of these two highly developed and flourishing civilizations, living conditions improved, bringing down mortality and morbidity.

According to Herodotus (490 B.C), India was the most populous of the countries in the world. Alexander's army which invaded India in 327-326 B.C, found a large population there. One small kingdom was said to have 37 towns of over 5000 inhabitants each. India's first real empire under Chandragupta Maurya (321-297 B.C) left records

indicating the existence of a standing army of approximately 7,00,000 men. Only a very substantial population could have supported such a large army.

Historical evidences suggest that even prior to the Christian era, India had a substantial population. This view was confirmed by Pran Nath (1929), who after a painstaking survey of the literature concluded that the population of India around 300 B.C was between 100 and 140 million.

While making an estimate of population of India for the year 1600, Moreland (1920) cited contemporary accounts to show that in the 15th and 16th centuries, Europeans were impressed by the density of settlements in India, both on the plains and in the Deccan. Taking into account the strength of the army in the south and the land under cultivation in Akbar's empire, for which contemporary figures are available and making adjustments for areas about which little was known, Moreland concluded that the total population of India at that time was around 100 million.

Davis (1951), on the basis of his arguments, concluded that the population of the Indian subcontinent in the year 1600 was 125 million whereas the estimate given by Das (1972) for the same period was 135 million.

There are two more estimates of population of the Indian subcontinent for 1600-one by Datta (1960), at 110 million and the other by Durand (1967), at 140 million.

Thus, various available estimates of the population for 1600 indicate that the population of the Indian subcontinent at the beginning of the 17th century was between 100 million and 140 million. It appears that the growth of population of the subcontinent was more or less stationary and staggered between 100 and 140 million.

For A.D., 1750, Davis (1951) estimated the population of the subcontinent to be 125 million. The estimate of the population for the year 1800 given by Mahalanobis and Bhattacharya (1976), was 207 million.

Table IV summarizes various estimates of the population of the Indian subcontinent discussed above.

TABLE IV

ESTIMATES OF INDIA'S POPULATION, 300 B.C TO A.D. 1871.

Year	Population (in million)	Estimate provided by
300 B.C.	100-140	Pran Nath (1929)
A.D. 1600	100	Moreland (1920)
	125	Davis (1951)
	135	Das Gupta (1972)
	110	Datta (1960)
	140	Durand (1967)
A.D. 1750	125	Davis (1951)
A.D. 1800	207	Mahalanobis and Bhattacharya (1976)
A.D. 1871	255	Census of India (1871)

Population Growth in the Modern Period

As stated earlier, the modern period has been synchronized with the period of modern comprehensive censuses starting in 1881. Since then the count has been

made regularly every ten years. Prior to 1881, however, a population census was conducted during 1871-72, but it was non-synchronous and several territories, had been omitted the population of which totalled around 33 million in 1881. Table V gives an account of the size and growth of India's population since 1891.

TABLE V

POPULATION OF INDIA AND ITS GROWTH, 1891-1981

Year	Population (in million)	Decennial change (per cent)	Growth rate	
			Arithmetic	Geometric
1891	235.9	-	-	-
1901	238.4	1.06	0.11	0.11
1911	252.0	5.75	0.58	0.56
1921	251.3	-0.31	-0.03	-0.03
1931	279.0	11.00	1.10	1.04
1941	318.7	14.22	1.42	1.33
1951	361.1	13.31	1.33	1.25
1961	439.2	21.64	2.16	1.95
1971	548.2	24.80	2.48	2.20
1981	685.2*	25.00	2.50	2.25

* Included projected pop. of Assam.

The history of population growth in India since 1891 can be divided into three parts, the points of division being 1921 and 1951. The year 1921 is called the year of the 'Great Divide' because it distinguished the earlier period of chequered population growth from a period of moderately increasing growth. The year 1951 marks the beginning of three decades of accelerated population growth.

Since 1921, the major causes of high mortality have been gradually brought under control, and between 1921 and 1951 India witnessed a gradual rise in the trend of

population growth rates. The decline in the level of mortality became steep after independence in 1947, with the result that population nearly doubled from an estimated 347.5 million in 1947 to 685.2 million in 1981. The steep decline in mortality rate was mainly due to success in controlling epidemics like plague and small pox and on account of the advancement in medical technology in the West during the last three decades.

6. Youth Population in India

According to Parakh (1982), "A preponderance of young people is as much a characteristic feature of the Indian population. 42 per cent are below 14 years of age implying a high dependency ratio and consequently low per capita income and standard of living". Edlefsen (1983), says, "In India, the proportion of young population is very large. It also means that the bulk of the population is economically dependent and unproductive. Young population calls for greater expenditure on food, clothing, shelter, health, education, leaving very little capacity to save for providing them with jobs when they grow. With bigger and bigger proportions of our young population entering into reproductive age-group the population of India is bound to increase faster in years to come".

"It is imperative to create an awareness of population education among the younger generation at present and prepare them appropriately and adequately for population

planning through small planned families for their future", says, Bhatt (1990).

7. Distribution of People in Indian Zones and States

The Indian census divides the country into 5 zones - north, south, east, west and central. Madhya Pradesh, in the Central zone, is geographically the biggest state in the country, accounting for 13.5 per cent of the total land area. Uttar Pradesh is largest in population. In fact, the two states together, forming the central zone, at present account for 22.4 per cent of the area and 23.8 per cent of the total population. The share of the country's population enumerated in the central zone consistently declined from 27.5 per cent in 1901 to 23.7 per cent in 1971. In contrast, the share of the country's population enumerated in the eastern zone has continuously increased over the past 80 years, except in 1951 when it declined slightly owing to the exodus of Muslims to newly-created Pakistan. The share of the country's population in the southern zone increased until 1951, when it was 26.2 per cent, and has been gradually declining ever since, becoming 24.1 per cent in 1981.

The nine union territories (as per 1981 census) taken together accounted for only 9.8 million people, 1.4 per cent of the country's total population. In population size, the largest of the nine is the almost entirely urban territory of Delhi, containing 6.2 million people in 1981.

Uttar Pradesh has remained the most populous state in the country, followed by Bihar, over the entire period of 80 years. At the other extreme, Lakshadweep with a population of 40.2 thousand in 1981, has ranked last throughout the period.

Between these two extremes, some of the states - Karnataka (eighth in population size), Rajasthan (tenth except in 1981, when it stepped up to ninth in rank), Kerala (twelfth), Jammu and Kashmir (sixteenth except in 1981, when it slid to seventeenth in size), and Himachal Pradesh (seventeenth except in 1971 and 1981, when it slid to eighteenth position) - have maintained their ranking over the whole period.

8. Causes of Population Explosion

Though the population growth is taking place in the world as a whole, it has more significance or repercussions in the developing countries. Considering the causes of population growth one is confronted with a substantial number of causative factors. As India is passing through a transitory period, there is bound to be a wide spectrum of factors. Some of the causes of population explosion are, pronatality factors; desire for large family for economic security, social prestige and power; religious influences, social norms, polygamy, inadequate housing, poor socio-economic conditions, economic security in the joint family, emotional security and protection in the joint family; social pressure for girls to marry', psychological

urge for the married women to have children, sex preference and equilibrium of sex of children, need for more hands for handicrafts and agricultural activities, production of more children to prove greater masculine virility/fertility, little freedom for wives to decide the number of children; legal and religious recognition of the status of the male child for the purposes of inheritance and family name, inducements for having more children, e.g., child allowance, tax exemption, maternity facilities, extra rations etc., low legal age for marriage, regional/state/racial/ethnic competition for political power high proportion of the population in the reproductive age group, more man-power for defence needs, belief in the ability of agricultural technology and science being able to support large population remarriage of widows/divorced women and anti-mortality factors.

9. Adverse Effects of Population Explosion in India

The mounting population pressure has severely eroded the achievements of our planned development. The economy is severely battered despite food grain production having treated in the last 30 years. The adverse effects of the population explosion in India are discussed in the following paragraphs.

Food

An analysis of the poverty profile in India and its projection for future years indicate, that even by the year A.D.2000, there will be a sizable poverty-stricken

population in the country with very limited purchasing power. Though India stands seventh among all nations in industry it has not been possible to provide the basic needs of food and shelter to a sizable proportion of the population.

Shelter

Keeping in mind the recommended norms for space, light, ventilation, type of flooring etc., academic surveys and also the census data have brought out that about 60 to 70 per cent of the people live in substandard houses both, in rural and urban areas. The cities and towns are expanding out of proportion whereas material for construction is scarcely available in the rural areas. In village only a few have financial resources and are able to live comfortably, whereas the large majority have to huddle in huts and semi-permanent structures.

Water

With the rapid migration that has been taking place from rural to urban areas, there is no city or town in India today which is not facing a shortage of water. Unfortunately, the situation is getting worse in the rural areas also.

Fuel

Unfortunately it is the lopsided urbanization and migration which are responsible for a fuel crisis that is now in evidence. The demand from the cities and towns for

timber for construction, for household and industrial fuel and for power generation has motivated the rich and greedy contractors to devastate trees and denude forests on an unprecedently large scale.

Education

One could straight-away say that the infrastructure has not been adequate and it cannot possibly cope up with the growing population. However, the number of children who attend school has been so small that it cannot be argued that the infrastructure was not enough. Moreover over the past four decades, we have witnessed the advent of a huge number of private schools catering to the needs of those who could afford to pay. The governments have not taken enough specific steps to ensure that every child gets some education, formal or informal. The number of illiterates in the country has increased from 300 million in 1951 to 437 million in 1981. The present system of school and college education has only resulted in large unemployment and frustration and has also made the situation worse by taking the youth away from their traditional trades and then leaving them in the lurch; thereby compelling them to leave the villages.

Environment

India is twice as densely populated as China, putting heavy pressure on the environment, resources infrastructure and basic services. The needs of the rapidly growing population are likely to overtake the ability of the

nation to provide essential services like health care, education, employment opportunities, housing etc. There is a chronic shortage of safe drinking water both in rural and urban areas.

Urbanization, a phenomenon closely related with bourgeoning population, has swallowed up approximately 1.5 million hectares of agricultural land in the past 30 years. In addition, 1.3 million hectares of forest was lost each year during 1975-82. Over one-fifth of the urban population live in slums. In Bombay, Delhi and Calcutta about 30-40 per cent of the population resides in slums. Many of the problems experienced in accommodating a growing family in a one-room house on a small plot are analogous to those posed by expanding population. Demands upon natural resources expand rapidly while their per capita availability decreases progressively damaging the natural resource base.

The consequences of environmental degradation and resource scarcity hit the poor most severely. To stay alive these people destroy the very resources they will need tomorrow. The resultant damage to the environment, only deepens that poverty. The 'scissors effect' of poverty and increasing population slices away their ability to sustain human life. The victims of poverty destroy forests for fuel-wood, food, water and fodder and the growing population forces them to farm marginal land at non-sustainable levels. The excessive resource exploitation combined with a poor understanding of the inter-relationship between man and

environment has thus led to an ecological crisis. Soil erosion and land degradation, deforestation, the fuelwood shortage, problems of water management, excessive population pressure on land and other environment-degrading trends inhibit the pace of economic development.

The mounting problems of pollution consequent upon unimaginative interference of human beings with nature have been adversely affecting the quality of life. Pollutants may be regarded as resources at the wrong place, but as such they represent a continuous drain on resources, apart from their disruptive or degrading impact on air, soil and water.

Deforestation

Apart from the above mentioned adverse effects due to flood excessive ground-water exploitation, destruction of wild trees, abuse of chemicals and pesticides, unimaginative mining, acid rain, green house effect and ozone depletion are the other evil factors which disturb the environment. Fig.1 summaries the relationship between population growth and environment pollution.

10. Measures of Population Control - Historical Perspective

During the First Five Year Plan (1951-'56) the planners recognized that a rapid population growth is a threat to the development of the country. In order to control birth rate, the planners desired to adopt the family planning programme in 1952. It was decided that every town having a population of 50,000 or above should have at least

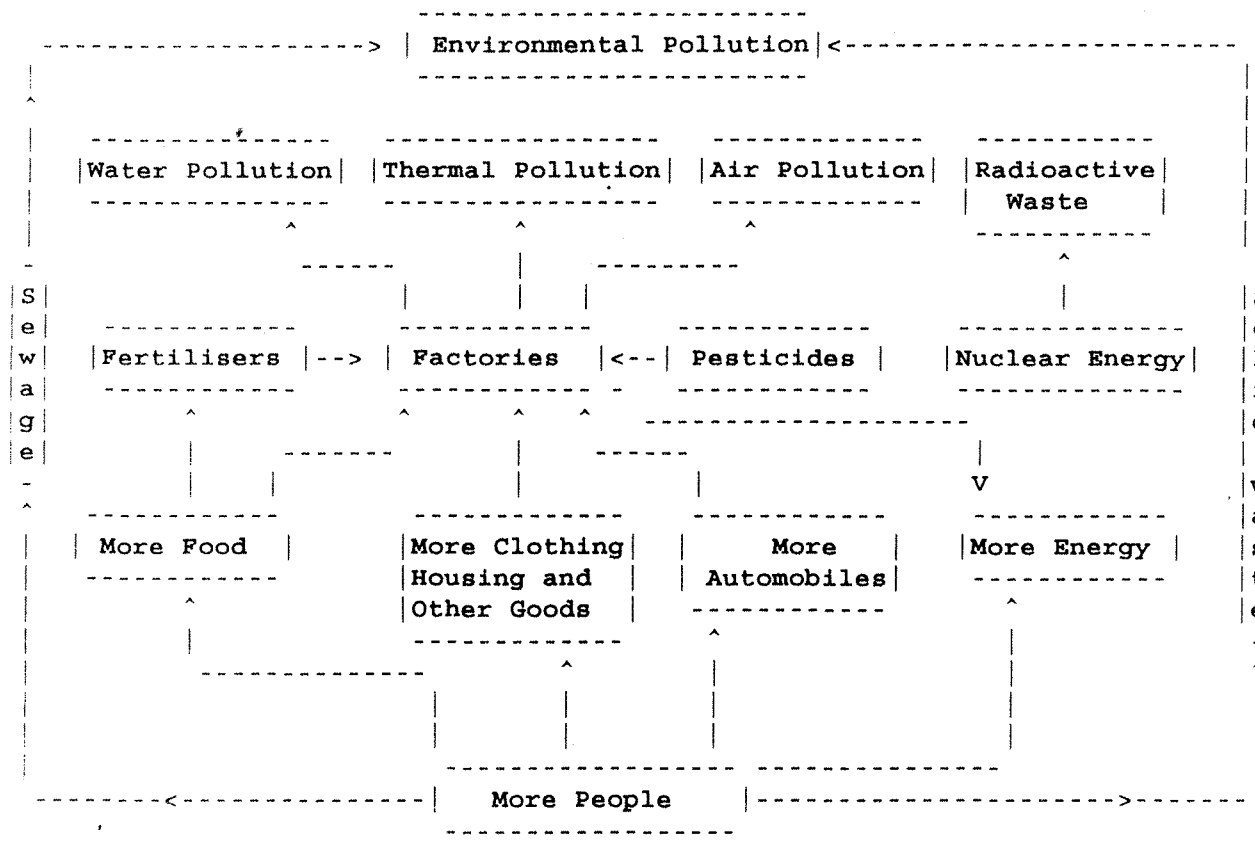

Figure 1.

Pollution Trend, Resources and Environment

(Dr.R.C. Sharma, 'Population trends, resources and environment. Handbook on Population Education, p.249.)

one family planning clinic. An independent Family Planning Board was set up. Thus the approach was clinical in the beginning. But, this approach was modified with the introduction of extension approach under which the message, services and supply of contraceptives were taken to the people. A full fledged department of Family Planning was created in 1966 in the Ministry of Health and Family Planning. Later priority was given to the approach to integrate family welfare services with those of health, maternal and child care and nutrition.

The important methods of family planning include rhythm method, foam tablets, sterilization and use of IUD. In more recent times, the contraceptive pills are in use. India adopted anti-natalist population policy for her socio-economic development in terms of family planning programmes. The National population policy announced in April 1976 was revised. The main features of the revised policy are - provision of all family welfare recanalization services, importance for maternal and child health programmes, improvement of women's education, raising the minimum age of marriage for boys and girls, treating the population figures of 1971 census as the base till the year 2001, linking 8 per cent of Central assistance to State plans, greater attention to population education, motivation through the extension approach, greater utilization of voluntary organization, full rebate in the income tax assessment for amounts given as donations for the family welfare performance, social

attention to research in reproductive Biology and contraception, involvement of other Ministries and departments of the Government of India in the family welfare programme and intensive and careful monitoring of family welfare programme in the States and a review in depth of situation by the Union Cabinet.

The Government launched a broad based programme for mass education and motivation. Population education has been introduced in school curricula. The population education cell in NCERT is playing a great role in implementing the programme of population education in the school curricula and has prepared instructional materials for the purpose. Out of school adults are also being educated through functional literacy classes.

11. Role of Mass Media in Population Control

One of the major findings of impact study conducted by the International Institute for Population Sciences was that students who were exposed to print, audio and audio-visual media showed a higher level of awareness and more positive attitude. The potential for media for improving the effectiveness of the learning process has been recognized now. The media create a distinct classroom environment. Indeed instructional media are making a major impact on the quality of education. Media are useful tools that can greatly help in improving the teaching - learning process. Media assume an increasingly important role in every aspect of instructional planning and design. Hence,

there is a need to promote the use of mass media on a large scale. Similarly, with the launching of the Indian Communication Satellite and in view of the availability of electronic equipments in many of our schools and training centres, emphasis has to be laid on the use of electronic media. Need has also been felt to introduce the strategy of media blitz in order to transmit simple but effective population education messages to different target groups repetitively through different media.

12. Role of Voluntary Agencies in Population Control

The role of voluntary agencies in controlling the population growth is widened by continuing to develop and refine the objectives, scope and content of population education at various levels stimulating and orienting the various concerned agencies, so as to lend their powerful support to the effective implementation of population education; conducting pilot programmes in schools, colleges, in teacher-training activities and among out of school groups.

A large number of big voluntary agencies have carried out population related programmes consistently for many years of using their own strategies and even funds. Among these are the Indian Red Cross Society, All India Women's Congress, Indian Medical Association, Family Planning Foundation of India, Gandhigram Institute for Rural Health and Family Welfare Trust. The latest development in these lines is the Indian Association of Parliamentarians

for Problems of Population and Development, which aims to mobilise strong political support for population and family planning, cutting across party divisions.

In addition, a number of large private sector companies, industrial concerns, public service organisations like Rotarians, Lions, Giants, Jaycees etc., have, in recent years paid increasing attentions to population related programmes.

As a result innumerable conferences, seminars, workshops, orientation training courses are taking place all over the country. Thus with the help of the voluntary agencies, every possibility is there now, to gain knowledge, deepen insights, exchange experiences and evolve methodologies of work and seek co-operation and co-ordination in activities.

Regarding action-oriented programmes, the voluntary organization can take the lead with the cooperation and coordination of educational institutions. Regarding awareness building the educational institutions can play a vital role and the equally important programme of follow up can be carried out by the voluntary organisations. As the educational institutions are sharing the responsibility of educating the youth in colleges and schools, the voluntary agencies concentrate on out of school youth both in the urban and rural areas.

Last but not the least, the educational institutions and the local voluntary organisations should prepare a plan of action for each and every occasion and should share responsibilities accordingly. This not only avoids duplication of work, but also helps to do qualitative work.

13. Role of Education in Population Control

Education helps in controlling the population growth in the following ways - understanding the population phenomenon; appreciating population structure and the need for its manipulation; bringing about induced changes in population structure; realizing the determinants and consequences of population changes which take place automatically or a result of deliberate attempts; focussing sharp attention on relation between man and environment his role as a mere consumer of food, his place in the inter-dependent ecosystem and enlightened part he would have to play in maintaining ecological balance; studying inter-relationships between growing numbers and dwindling per capita resources particularly those that are not replenishable or unlimited; inculcating an urge in every human being to aspire and work for better quality of life, preparing man to think in terms of economics based on recycling of resources, dissuading him from increasing his wants endlessly and getting into a vicious circle of consumerism and helping citizens of tomorrow in formulating population policies and programmes.

Education thus can go a long way in clarifying the concept of better quality of life and also contributing to bring about the same. While helping to understand the problem at wider level in the global context and a national perspective, it can really help the individuals to behave responsibly, intelligently and meaningfully at the micro-level, i.e., at the individual and family level.

14. Population Education - Concepts, Objectives and Content

a) Concepts

According to Mani (1991), population education is a process by which the students investigate and expose the interactions between population and its environment, characteristics of population; the nature and meaning of the processes, causes and controls of population change and the implications and consequences of the population increase in the biological, ecological and social systems at the local, national and international levels.

Viderman (1974), defines population education as, "an educational process which assists persons (a) to learn the probable causes and consequences of population phenomena for themselves and their communities including the world, (b) to define for themselves and their communities the nature of the problems associated with population processes and characteristics and (c) to assess the possible effective means by which the society as a whole and he as an individual can respond to and influence these processes in order to enhance the quality of life now and in the future".

According to Merh (1984), "Population education is the study of people as they live in families, in villages, in cities and in nations, here and now in other places and other times in future. It is the study of the basic needs and how they are met, jobs and how they are provided, income and how it is distributed, natural resources and how they are used, services and how they are financed; as well as of human sexuality, human reproduction and family responsibility. It is collecting and interpreting data, as well as examining attitudes, values, customs and morals. It is thinking about quality of life and sorting out ways to achieve that. It is establishing relationships, dealing with causes and effects and exploring options. It is the means whereby students can be helped to make responsible decisions as members of a family, a community, a nation and the world".

b) Objectives of Population Education

According to Parakh (1985), the general objectives of population education are to help the students to understand the population phenomenon in all its dynamics and dimensions; to assist the students to understand and appreciate the current population explosion, its determinants and consequences, to lead the students to understand the phenomenon of demographic transition where modern societies have been able to establish a rational balance between death rates and birth rates through planned and determined efforts, to help the students to appreciate the need for small family norm in the interest of an

individual, family, country and the world at large; to assist the students to explore different alternatives open to them in handling the problem of population explosion and the socio-economic, political, psychological and physiological implications of each one of them, to help the students realise that a small family norm is not only desirable but also now attainable now because of the advances in science and technology and to impress upon the younger generation that man through the use of science and technology has been able to bring down the death rate and through the same rational approach and the use of the same science and technology he is capable of bringing down the birth rate as well.

c) Broad Content Areas of Population Education

According to Merh (1984), "The overall content base of population education ranges extensively over the social and biological sciences and could be broadly put under the following categories : Population and Education; The Population Situation; Population and Development; Population and Resources; Population and Environment; Population and Population Policies and Population Processes and Life cycle events". According to Jayasuriya (1972), the five broad areas within which the content appears to fall may be demarcated as the collection and analysis of population data, population growth and human development; the problem of urbanization; psycho-social aspects of human sexuality, the reproductive process and Population planning.

"It may be more pragmatic to concentrate on more essential ones like Population, Health, Sanitation and Nutrition; Population and Environment; Population and Small Family; Population, Women's education and Work opportunities", says Malhan (1992).

"Significance of population problems; Population phenomenon, problems of over population; solution of population problems and factors impending the solution of population problems", were the suggested five broad content areas by the Report of Project in Curriculum Improvements for Population Education (1971).

15. Curricular Approaches of Population Education at School Level

There are two main approaches to incorporate population education in school programme viz., integrated approach and special subject approach. In the special subject approach many problems arise like the dilution and loose needed articulation of the population education concepts when fused with various other subjects. Hence, the integrated approach has been accepted to teach the population education concepts considering the advantages of the same. According to the integrated approach, the content of population education is integrated with the existing subject areas in the school curriculum.

Mehta (1971), says, "In the context of our educational set up and the school programmes, the quantum of population education content at various school levels has to be given as an integral part of school curricula (Social Studies, Geography, Economics, History, Civics, Mathematics, Sociology, Biological Sciences and Languages) and not as a separate subject".

16. Intervention Strategies of Population Education at School Level

Population education should enable the pupils to understand the population and relate his day-to-day life experiences to knowledge provided to them in the classroom. The content of population education reflects on the immediate socio-economic environment of the pupils, e.g., health, hygiene, nutrition and environmental sanitation and family relationship are immediate concern of the pupils to think of themselves and their families. Once the pupils could be made responsive and responsible, they would be in a position to integrate the population ideas to the broader realms of population issues of the society, community and the nation.

Teaching aids, audio-visual and other intervention strategies are many. It is the right selection of relevant intervention strategies and their timely utilization in proper place, would make the lesson more lively and interesting. It would also inoculate in the pupils curiosity

and interest. The population education ideas can be taught more effectively through these intervention strategies. Involvement of pupils in such intervention strategies would enable them to understand the concepts and to apply the same in their lives.

It is desirable that we undertake evaluation of various components of this programme, which may include curriculum, textual materials, training strategies and various teaching-learning devices or aids prepared for this purpose.

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CHAPTER - III

REVIEW OF RELATED LITERATURE

"An essential aspect of any research project is the review of literature", says, Mouly (1970). Study of related literature and researches play an important role in the development of any area of study. It is more so in respect of new educational areas like population education, as it contributes not only in creating a knowledge base and enriching it with fresh ideas and contents, but also in providing scientific support to population related themes and messages. Aggarwal (1975), opines that if we fail to build the foundation of knowledge provided by the review of literature our work is likely to be shallow and naive and will often duplicate work that has already been done better by someone else. In view of the above, it has been a pressing need to take stock of the researches conducted in the area of population education. Therefore the investigator intends to study the related literature already conducted in this field.

The present review in this chapter covers the studies categorised under the following headings :

1. KAP studies on knowledge, attitude and practice/ behaviour,
2. Curriculum development and instructional materials,
3. Teaching methodologies and
4. Intervention strategies

1. KAP Studies on Knowledge, Attitude and Practice/ Behaviour

A successful programme of population education depends to a great extent upon the knowledge and attitude towards population problems of the primarily concerned group such as teachers, pupils, parents and decision-makers at different levels of school administration. Such studies aimed at answering questions such as what is the present status of knowledge of students and teachers on population problems, how do parents and teachers perceive population education and what is their reaction to the introduction of population education in schools.

The most popular method employed for collecting data is the questionnaire, followed by the interview method and opinionnaire. There are studies aimed at finding out the attitude towards population education. The technique employed was 4 to 5 point rating scale on the pattern of Likert scales. The sample taken for the study vary from 50 to 2039, the average being about 250.

In almost all the studies, it has been found that the students, teachers and parents were aware of population problems. Both parents and teachers favoured the introduction of population education. From the studies of, Poffenberger (1981), Maheswari (1981), Jot (1984), Chandraleka (1979), Dayal (1973), Nagda (1974), Ramachandran (1974), Varghese and Zarine (1971), it is found that the

secondary school pupils as well as the college students have a favourable attitude towards adopting small family norm as they considered that small family is advantageous and is conducive to higher standard of living. The same idea was accepted by the parents which is revealed by the studies of Mehta (1981) and Hanumanulu (1976), "The majority of the unmarried students belonging to upper caste groups of Hindu religion who were post-graduates, residing in urban areas and having parents of urban origin, belonging to the professional and technical categories were in favour of small family", reports, Saksena (1985).

The studies of Srivastava (1981), Nagda (1981), Hanumanulu (1976) and Ramachandran (1974) give the suggestion of the teachers which emphasize the education of the younger generation and developing responsible parenthood among them in order to check the over-population.

Teachers, (Ramachandran, 1974), and girls, (Nagda, 1975) opined a sufficient gap between two successive children is necessary for the health of the mother and happiness of children.

Pushpa (1984), says that majority of the teachers and educational administrators in Chandigarh were in favour of introducing population education in schools, especially the female teachers showed 100% favourable attitude Swain (1988) and Barapanda (1988) report that both male and female teachers had favourable attitude towards the introduction of

population education in secondary schools. Sundararajan (1989) says that female teachers had more favourable attitude. According to Akhtar (1988) and Sodhi (1988), a significant difference was seen between the respondents on the basis of per capita income, exposure to mass media, contact with population education personnel, conceptualisation of population education, sources of population education information, orientation on population education programmes, opinion regarding introduction of population education in secondary school level with regard to their scores on the knowledge test and attitude scale towards population education.

Pareek (1989), found that the female teachers of rural areas were found to have more positive attitude towards population education than their urban counterparts. "There was a significant difference in the attitude of rural and urban students, boys and girls towards different areas of population education. A significant correlation between achievement and attitude of students was observed", according to Sharma (1987).

The college students, (Jathar, 1971), and the Principals of schools (Trilokekar, 1971) also had a favourable attitude towards the introduction of population education in the syllabi.

Rout (1988), Kaur (1985) and Kaur (1985), tells that the interaction between faculty of education such as

arts, sciences, commerce and levels of scores on population awareness test significantly attribute high position to science students over their counterparts in arts and commerce.

Kaur (1985) found that among the post-graduate students boys were aware of the various population related problems than girls. He found a significant difference among students relating to their ordinal position. According to Kaur (1984), a significant difference in population awareness was found among post-graduate students belonging to different family size and different type of family. Teachers belonging to different type of schools, sex and religion, differ in their attitude towards different aspects of population problems.

Devi (1981), Kapoor (1977), Kausalya (1977), Jaya (1977), Poongodi (1977), Ammal (1976), Rao (1976), Hanumanulu (1976) and Prabhakar (1975) conducted studies to find out the willingless of the school-going children towards population education.

2. Studies Related to Curriculum Development and Instructional Materials

Studies leading to the development of suitable curriculum in population is an important area of research. The sensitive socio-cultural values involved in introducing population education needs to be investigated and integrated into the curriculum on population education. Research in

this area will answer questions such as, what social and cultural values are to be imparted through population education. What population concepts are to be introduced into the curricula? How to develop curriculum models which can best achieve the objectives of population education? Most of the studies reviewed here have been aimed at developing curriculum for schools.

A 13 day intensive training programme with a focus on development of curriculum and instructional materials was organized at Osmania University, Hyderabad in November, 1980. The training strategy adopted in this programme was to develop a curriculum and support it with teachers' manuals in population education for primary schools. This activity helped to develop insights into the problems and procedures in the development of curriculum and instructional materials.

In January, 1981, in Bombay, another 12 day workshop-cum-intensive training programme was organised. Besides training, each of the ten participating state teams was requested to bring a draft on one of the themes of population education assigned to it. Draft manuscripts on the topics of population education were also developed by Population Education Unit Staff members of NCERT. Both sets of these drafts were discussed and then subsequently synthesised by different groups of participants in the workshop.

A ten-day workshop was organised in March, 1981, at Coimbatore (Tamil Nadu) for orienting and sensitizing text book lesson writers in population education (Parakh). The authors were exposed to the concept and philosophy of population education. They were then asked to review existing textual materials. The participants then developed draft text book lessons in different subjects.

In Bhopal Intensive Workshop (October 14 to 23, 1981) and Varnasi workshop (December 14 to 23, 1981) were helpful to develop the curriculum for population education.

"Teachers recommended that population education concepts should be integrated with social studies, biological sciences, civics and economics", says, Dayal (1973). In the study of Maheswari (1981), the teachers felt that the population education concepts could be integrated through social studies, sciences, languages and mathematics. "It can be taught preferably along with science subjects according to the teachers", (Ammal, 1981). Srivastava (1984) conducted a study and concluded that population education components could be taught through biology content. Indrani (1991) analysed the effectiveness of the integration of population education concepts in the school syllabi.

Mehta (1971) investigated the main theme relevant to population education programme in different syllabi and summarised it as under : adjustment of man and nature, improvement of the quality of living, increasing the

effectiveness of social institutions such as family, community etc. Usha (1981) and Prabhavathy (1982) suggested the following steps for the development of integrated curriculum : diagnosis of needs, formulation of objectives, selection of content, organisation of content, selection of learning experiences, organisation of learning experiences and what and how to evaluate.

Parakh (1979), analysed the text-books and found that the population education contents are found in the following subjects in the order of its weightage-social studies, geography, civics, economics, biology, life sciences and general sciences. Kaur (1985), says that still more could be added for complete clarity of population related concepts in the subjects of social studies and geography of secondary school text books.

According to Pohlman (1970), the teachers had an agreement both in interview and questionnaire, that the topics on 'over population', and 'need for small families' should be introduced in the school curriculum. In another study, (Balasubramaniam, 1970), the teachers suggested that the contents to be integrated are, 'relationship between economic growth and population', 'ways and means of finding solutions to population problem' and 'demographic trends of population growth'. Maheswari (1981), says that the teachers had the opinion that, topics such as the characteristics, causes and trends of population growth, its impact on the economic and social development of the country and also on

the health and nutrition of people and the knowledge about family life should be included in a course on population education. The teachers recommended the inclusion of demographic concepts, economic and social consequences of population growth and the process of human reproduction in the curriculum, (Mehta, 1981). Pohlman (1970) in his other study reports, "Teachers, parents and students recommended the following topics to be included in school curriculum : population dynamics and the dangers and problems of rapid rate of population growth affecting the nation, the advantages of small family to individual couples and to the country at large, importance, of late marriage and spacing of children and the topics related to population education excluding human reproduction and use of contraceptives.

Based on the above recommendations and suggestions, Mehta (1971) innovated the syllabus in which the contents were woven around the following five areas : Population growth, economic development and population, social development and population, health, nutrition and population and biological factors-family life and population. Similarly, a syllabus for standard IX pupils was developed by Feneuff (1971) with the content areas : birth rate, mortality rate and population, health and population, food production and population, family size and population and standard of living and population.

Apart from all these, Population Education Unit in the NCERT has brought out a variety of educational literature in population education as detailed below : Readings in Population Education, (1969); National Seminar on Population Education : A Report : First Edition, 1969, Second Edition, 1970; Plug-points for Population Education in School Curricula, 1971; Population Education : A Draft Syllabus, 1971; Bibliography on Population Education, 1971; Indian Population Situation, 1971; Population Education : Current Problems in Education Series, 1971; Population Education : Selected Readings, 1972; National Conference on Population Education : Problems of Implementation, 1972; Dreams of Tomorrow (Hindi), 1973; A story of a Postman, 1973; Nutrition and Population education : A Resource Book for Teachers, 1973; Teaching Units on Population Education, 1973; Population Education for Teachers, 1974; National Bibliography on Population Education, 1975; Indian Population and Development, 1977; Population Education in Classrooms, 1978; Co-ordination Between Education and Population Policies : A Case Study of India, 1978; Population Education - A Conceptual Framework, 1979; National Baseline Survey of Population Education in India, 1980; A Decade of Population Education Research in India, 1981; My Workbook on Population Studies, 1981; Population Education Research in India (1981-90), 1993 and Report on Needs Assessment 1990, 1993.

3. Studies Related to Teaching Methodologies

While teachers and educators are well aware of the different methods of teaching, it is necessary to find out which of the methods are especially effective in conveying the message of population education. The studies reviewed in this section are aimed at answering the questions such as which method of teaching is more effective? How to integrate contents in the existing syllabi without losing the continuity of subject matter or over burdening it?

Robinson (1975), Parakh (1977) and Desai (1979), through their studies found out a significant difference between the achievement of the pupils as tested by the pre-test and post-test. Thus, teaching did increase the total awareness of the pupils regarding population education. According to Feneuff (1971). "The formal and informal methods of instruction were equally effective in producing a significant information gain in the area of population dynamics. Gangrade (1975), says that the under-graduate students' opinion about the teaching methodology is that, it will prove effective if audio-visual aids are given importance, also population education concepts should be evolved through discussion groups. Parameswarappa (1981), highlights the superiority of integrated approach over the holistic method in teaching population education at secondary schools.

Sharma (1990), in his study revealed that the integration of knowledge, understanding and application

abilities among the students are better facilitated with the infusion approach. Chawla (1978), found that the integrated programme based upon national education and population policies go a long way in solving the population problem of a country. Pandey (1982) in his study indicated that the inquiry method was better than lecture method. The results in the study of Kathuria (1988), showed that the peer group discussion and mass media approach were equally successful in developing more knowledge among the students; in comparing the approaches with regard to sex, the mass media approach was found to be more helpful to urban boys than urban girls or rural boys and the self-learning approach was more beneficial to rural boys and urban girls than rural girls.

Thakore (1979), suggested that 10 topics included in the model can be taught in 20 periods of 40 minutes, thus covering each topic in two periods, he has also revealed that another 10 periods are required for imparting the message through co-curricular activities thereby the programme can be covered in 30 periods of 40 minutes duration spread over in an academic year.

4. Studies Related to Intervention Strategies

Some studies on the impact of mass media and communication, though not directly related to population education, have been included in this section mainly because some important lessons can be drawn from them in the use of mass media in population education.

Study by Pati (1985), has a very critical finding on the impact of advertisement, mass media and radio on the rural masses. The study has found no impact at all. In another study (Lavania, 1985), wall posters were found to be more popular in comparison with the other channels such as radio, group meetings, exhibitions and newspapers, which played rather, a very limited role. In a small study, conducted by Arora (1990), most respondents were found to hold the view that advertisement and television spots on the family planning had nothing more than their nuisance value. However, these critical findings may be taken with the pinch of salt.

The International Institute of Population Sciences study have highlighted the influence exercised by the exposure of students to mass media such as print, audio and audio-visual on the level of their awareness and attitudes. It was found that students exposed to all media recorded significantly high level of awareness than those exposed to a combination of two or one. Television was found to be more influential in developing positive attitude on lower class students than on higher class students.

Taglides (1985), in his study found that parents and teachers demonstrated favourable attitude towards the video message of sex-education programmes. Broyles (1986), says that the video feedback increased the congruency between students' and teachers' perception on some aspects of public speaking performance. Andrews (1986), observed

that video feed back was significantly more effective than verbal feedback. "Video programme was found to be more effective for teachers' training", according to Kwan (1986). Video presentation took significantly less time than the lecture based presentation (Clark, 1987).

Desai (1985) found that the slide with discussion approach was more effective than the traditional way of teaching science.

The Population Education Unit in collaboration with the Department of Teaching Aids in NCERT undertook the preparation of a coloured slides - cum-taped commentary programme. This material is woven around the following five areas - Population education; Meaning and scope (32 frames), Population Dynamics (40 frames), Consequences of Population growth (50 frames), Family life education (40 frames) and Population policies and programmes.

As population education is essentially a value-oriented area and aims at influencing one's philosophy of life, attitude towards socio-economic development and changing the life styles of the people, it is very necessary to find out what specific methods are more desirable or effective than others. Therefore, research and methodology of imparting population education at specific levels can be one of the important areas in this regard. The findings of such studies could be extended to the entire and much wider area of value education or moral instruction.

CHAPTER IV

METHODOLOGY

Population explosion is a world-wide phenomenon which is exercising the minds of all those who are concerned with the welfare of the humanity. In India, with its vast population and staggering growth rate, the population problems call for, an all-out effort on several fronts. Hence educational institutions at all stages should play a vital role in this effort by providing suitable population education to the younger generation. For this purpose, it is necessary to prepare a curriculum with a well conceived sequence of activities and experiences which could impart to the pupils the desired knowledge of population dynamics and develop in them the desired attitudes. It is through the curricular experiences that education seeks to achieve the ultimate goal of helping the pupils to develop self-direction and learn to contribute their share in national development and in the betterment of human life.

As the integrated population education approach is followed in our schools today, NCERT has done a lot of work through workshops and summer institutes and has integrated population education concepts into the school syllabi and text books of all subjects at the school stage. In the Report on Needs Assessment for Tamil Nadu by NCERT, (1990), it is suggested that, based upon the text-books, the gaps

will have to be identified and supplementary materials will have to be prepared at all levels.

Further, a review of the studies conducted in this field as reported in surveys of research edited by Buch (1960, 67, 87 & 91) reveals the fact that no systematic attempt has been made to develop and validate intervention strategies for the integration of population education in different subjects at school level till date.

Therefore, the following steps were taken to identify the population education concepts in order to choose the intervention strategies and to study the effectiveness of the selected intervention strategies at standard IX level.

The study has been basically designed as an experimental study with control and experimental group design. The details of the procedures followed in the conduct of the study are presented under relevant headings. The details of tools and variables used in this study are presented in Table VI.

TABLE VI
DETAILS OF THE TOOLS AND VARIABLES

Sl. No.	Name of the tool	Name of the variable	Nature of the variable
1.	Socio-economic status scale	Socio-economic status score	Independent
		i. Income	Independent
		ii. Education	Independent
		iii. Occupational level	Independent
		iv. Material possession	Independent
		v. Social interaction	Independent

Sl. No.	Name of the tool	Name of the variable	Nature of the variable
2.	Achievement test on population education concepts for video lesson	Achievement scores on population education concepts	
		i. statistics	Dependent
		ii. causes	Dependent
		iii. consequences	Dependent
		iv. control	Dependent
		Devices	
		i. Pupil discussion	Independent
		ii. Interactive	Independent
		iii. Assignment	Independent
3.	Achievement test on population education concepts for tapeslide lesson	Achievement scores	Dependent
		Devices	
		i. Pupil discussion	Independent
		ii. Interactive	Independent
		iii. Assignment	Independent
4.	Scale of attitude towards checking the population growth	Attitude scores	Dependent
		i. Small family norm	Dependent
		ii. Social development	Dependent
		iii. Economic development	Dependent
		iv. Health and nutrition	Dependent
		v. Demography	Dependent
		vi. Environment	Dependent
		vii. Education	Dependent

Conducting a status study through content analysis

As the first step, a status study was undertaken in order to know what is being taught with regard to population education concepts under various subjects in schools. This study covered all the school stages. An analysis of the existing State Board School Syllabi of Tamil Nadu in social science, general science, mathematics and languages was done. This provided the required information regarding the concepts of population phenomenon which are being taught in schools. The content analysis for standard

IX in social science and general science syllabi is given in Appendix I.

Identification of population education concepts

After analysing the various reference books and journals on population education, the concepts of population education were categorised on the basis of objectives under three major groups (triads) with an introduction of statistics about population growth. CAUSES, CONSEQUENCES and CONTROL are termed as TRIADS of population education (Gopal Rao, 1974). The concepts identified are given in Table VII.

Table VII

TRIADS

Statistics of Population	Causes	Consequences	Control
Total World Population Population of India Population density in World and India	- Birth rate not checked - Death rate not declining - Child mortality rate declining - Life expectancy improving - Lower legal age at marriage - Taboos, misbeliefs, superstitions and religious influence - Desire for large family for economic security - Not adopting family planning	- Lower standard of living - Low per capita income - More under below poverty line - Agricultural land converted to living areas and housing - Cutting down forests, rainfall failure - Inadequate health services - Lack of good nutrition - Low standards in education - Unemployment	INDIVIDUAL: -Education and awareness - Improving standard of living - Education for accepting small family norm - Motivational awareness campaigns -Checking marriageable age NATIONAL: - National policies

Statistics of Population	Causes	Consequences	Control
	- Not giving freedom to women to decide size of family - Ethnic competition for political power	problem - Food demands and low quality food - Land used by industries and high ways - School enrolment ratio-less - Migration and slums growing - pollution	- population education in curriculum - Withdrawal of some facilities - Rewards to family planners and motivators INTERNATIONAL: - Financial aids - Training persons - Dissemination of population knowledge to various countries

Results of the analysis of the State Board school syllabi, triads, compendium of lessons on population education NCERT (1990) and recommendations of the SCERT, Population Education Cell, Tamil Nadu (1982), formed the basis for developing the scripts for the lessons to be selected in this study.

Selection of the Sample:

Standard IX of secondary school level was selected as the sample for the present study for the following reasons:

1. About 42% of the Indian population consists of children below the age of 15 years, and their number is swelling enormously because of the rapid population growth and

their role will be crucial in changing the population situation of the country in the immediate future. At present as many as ten million out of this age group are entering into parenthood every year. If they are made aware of the critical dimensions of population phenomena, they can be expected to take informal and rational decision regarding population issues.

2. Since population issues are value laden, individual decisions are invariably influenced by the value orientation of the person concerned. The attitude and value orientation of individuals are shaped by their socialisation process. Attitudes in particular are formed during the adolescent age of a person. The introduction of population education at secondary school stage can therefore prove very effective as it would provide suitable setting of value clarification and development of scientific temper at this stage.

3. The whole business of family planning and reduction of the birth rate are not once - for - all affair, nor it is concerned only with the currently fertile population that is capable of adding the country's numbers. Hence population education at secondary school becomes relevant as a motivational instrument that will inject these new entrant's with the desire to adopt small family as a way of life.

4. It is also obvious that population education must come not only to the college going students, but also to schools, as majority of children grow into adulthood without having more than secondary education.

5. The population education elements in the existing secondary education system would encourage children who would grow into adult while passing through the school stage to play the role of opinion leaders in their respective communities.

6. It would eventually make the learners realise that although it is essential to believe in the dignity of the individual and freedom of choices, it is equally and even more important to dovetail the belief with the social good and national demands.

So it would be ideal to take standard IX for the present study as they are available with a free mind unlike standard X without any fear of government examination. It is also a remarkable and right age for the formation of favourable attitude towards checking population growth according to the psychologists.

Selection of the subjects and lessons.

In order to select the subjects and lessons for this study, the State Board Syllabi and Textbooks of all the five subjects of standard IX were thoroughly analysed. The analysis was done to examine-the contents wherein adequate emphasis is given to the population education themes; the

lessons in which less emphasis has been given to population education concepts and the courses of study where there is scope for integration of additional population education concepts as formulated in the objectives and triads.

Based on the above analysis, the following lessons of the two subjects namely social science and general science of standard IX were selected for the study.

a. "Human Interaction with Environment", in social science (Unit IV, lesson No. 18) and
b. "Chemistry and Environment", in general science (Unit 16).

These subjects were selected because they were found to contain a number of population education concepts giving ample chance for integrating additional population education concepts as given in the triads. The additional concepts to be integrated were listed first and then incorporated at appropriate places in the lessons mentioned above.

Selection of the Intervention Strategies and Devices

In recent years, we see media assuming an increasingly important role in every aspect of instructional planning and design. We frequently see audio-visual and audio-video media strategies assuming centre-state prominence. Among various types of media, the investigator selected video and tape slide as the two intervention strategies to be used for the present study. Along with the

intervention strategy in order to have the role of the teacher in contact activity, three experimental devices namely - pupil discussions (E1), interactive video/tapeslide (E2), and assignment (E3) were introduced in the video / tapeslide lessons in the experimental programme. The traditional method of teaching served as a control group.

Video lesson

Video has a great potential as a medium of communication for educating the pupils and can prove to be a boon to education if used properly. The educational programmes recorded on video with the help of competent subject matter specialists can provide information of a standard quality. The video can help to maximize activities. "No other audio-visual system allows to record both sound and moving image and play them back so immediately", says, Mukhopadhayay (1988).

Video lesson incorporates demonstration which is an essential part of learning. The problems in live demonstration can be largely overcome by using a video. A good teacher can encapsulate a few real classes and have them properly edited for viewing in the class. Editing helps in highlighting the material information to be presented. This gives the pupils an opportunity to view a large number of real classroom situations and examine many techniques. Thus the big advantage of video learning is that, it gives pupils access to a range of classroom they cannot otherwise enter (Allan, 1985).

Secondly, while discussing the lesson, it is possible for a teacher to retrieve the required bit and allow for a second viewing. Certain ambiguities can also be resolved by such viewing or having a set of frames on the pause and freezing the frames for detailed study. The advantage of the video is mainly seen in the use thus cited. A live television programme cannot be interrupted nor retrieved and the time of telecast may not be suitable for use in the class. Further, once produced, a video-lesson can be used many times and the material can be stored for considerably long period of time and if needed modified too. Thus a live demonstration is an ephemeral occasion, by recording it we are giving the task a long lease of life. .

A video thus being a powerful medium - ''hot medium' as it is called, leaves a lasting impression on the minds of the pupils, particularly so, when what is viewed once, is reviewed and discussed properly. Therefore, the investigator decided to prepare a video-lesson on population education concepts as one of the intervention strategies.

Preparation of the video-lesson

A video script in Tamil (Regional language) was prepared for the lesson, Human Interaction with Environment, in social science of standard IX. This was given to a panel of teacher educators, experienced teachers and experts in the field of education for comments and suggestions. Based on their views, the investigator made necessary modifications and included a set of questions in order to

avoid passive viewing of the pupils. Again the video script was corrected by the experts to ensure unambiguity, continuity, suitability and objectivity for the level of standard IX pupils. Thus a re-organised video script was prepared.

Then the investigator collected various types of pictures, posters, real objects and live scenery that are essential for the preparation of the video lesson. Using these and the video script, a video lesson was prepared with audio mixing and edited with the help of an expert.

Initially, the video-lesson was viewed by the investigator uninterrupted and unsliced. Then using the facilities available in the video techniques, the lesson was sliced into smaller chunks and each chunk was viewed separately with pre-viewing and post-viewing tasks with the hope that it would help in better assimilation of the population education concepts for standard IX pupils in tune with their mental, physical and psychological levels. As a trial, the prepared video lesson was shown to a sample of 30 pupils with due representation of the internal variables to get their feedback regarding understandability and suitability. The details of the content covered in the video lesson is given in Appendix 2.

Tape slide

According to Sharma (1991), Tape slide is one of the projected aids containing verbal and visual materials

which are used in devices designed to throw images on to an external or built-in screen, usually by optical means. In tape slide, the instructional programme or presentation is in the form of slide sequences accompanied by an audio tape, the two being synchronized by means of audible or inaudible synchronizing signals recorded on the tape.

A slide, is a picture photographed, drawn or otherwise reproduced on the transparent material and mounted on card-board or plastic mounts for use in a slide projector. It is an example of still projection which is accomplished by passing light through film or other transparent material containing images such as pictures or drawings and transmitting them onto a screen. The 2 x 2 inches or 35 mm slides have become the most widely used type of slides in educational institutions. The development of a variety of cameras which will accept 35 mm films has provided an inexpensive and practical method for taking either black and white or colour pictures. These films after taking the pictures are sent to the film processing laboratories for making slides.

Unlike the non-projected aids like charts and diagrams which are viewed under normally available light, slides are shown through a projector on a bright screen in darker surrounding. This has the effect of focussing attention which results in improved retention of the information. The slides can be locally produced to meet the

specific educational needs of the learners. Once the slides are produced, they can be arranged in any desired order and they can easily be revised and updated. Apart using the slides, a teacher can present striking information in quick succession to stimulate the interest of the pupils on the topic under study and to encourage discussion, provided the pacing of the slides remain under the control of the teacher.

Slides along with audio synchronization thus being a powerful strategy helps the pupils to retain the concepts in their minds. Hence, the investigator decided to prepare a tape slide lesson for the population education concepts.

Preparation of tape slide-lesson

A script for the tape slide-lesson was prepared for the lesson, Chemistry and Environment, in general science of standard IX. The script was given to a panel of experienced teachers, teacher educators and experts in the field of education for their comments and suggestions. Based on their views the investigator slightly modified the script to elicit and focus on the main population education concepts. Again the script for the tape slide-lesson was corrected by the experts to ensure unambiguity, continuity, suitability and objectivity for the level of standard IX pupils. Thus, a reorganised script for the tape slide-lesson was prepared.

Then the investigator collected many pictures, drawings and writings which are necessary for preparing the tape slide-lesson. Some figures, drawings and flowcharts were drawn wherever necessary. After collecting all the needed materials, they were photographed and then made into slides with the help of an expert. At the same time the lesson was audio taped in a meaningful pace on a tape-recorder, by the investigator. Thus, the slide along with the tape was prepared for the learning of the population education concepts.

The tape slide-lesson thus prepared was viewed by the investigator uninterruptedly. Slight modifications were done in order to improve the lesson and sufficient time was given for viewing the slides. This would help in better understanding and assimilation of population education concepts for the standard IX pupils. As a trial, this was again shown to a sample of 30 pupils with due representation to the internal variables, to get their feedback regarding understandability and suitability. The details of the content covered in the tape slide lesson is given in Appendix 3.

Development of Tools

The following tools were developed by the investigator for the present study:

a. Achievement Test on Population Education Concepts 1 (video lesson)

b. Test on population Education concept 2
(tape slide lesson)

c. Scale of Attitude towards checking the population growth.

Achievement Test on Population Education Concepts (1)

Based on the script of video-lesson, different types of questions were framed to include all the concepts of population namely statistics, causes, consequences and control. Questions were framed taking into account the mental level of the pupils by consulting the school teachers, teacher educators and experts in the field of education. The types of questions included: multiple choice, alternate response and short answer. A table of specification was prepared to outline the number of items objective wise which is given in Appendix 4.

Pilot study

Pilot study was carried out for 425 pupils of nine schools in Coimbatore. The list of schools is given in Appendix 5. The pupils were given proper instructions as to how to answer the questions and were given enough time to complete the questions and the time taken by the pupils was noted. The papers were valued and the item analysis was done. The difficulty index was between 25% and 90% Keeping this in mind, the items having discriminative power less than 0.28 and the items having a negative discriminative

power were rejected. Thus only those questions which showed a significant difference between high and low scores were retained for the final form of the achievement test I on population education concepts and are given in Appendix 6. Scoring key was prepared for the test and is given in Appendix 7.

Reliability of the Achievement Test

One of the first requirements of a test is its internal consistency. The split half method and test-retest method were employed to calculate the reliability of the achievement scores in total and in the sub-areas namely- statistics, causes, consequences and control.

1. Split-half method

In this method, the co-efficient of correlation was determined by correlating the odd-even items and applying the Spearman-Brown formula. This method was applied for the sub-areas, namely -statistics, causes, consequences and control put together and also individually. For this a small random sample of 100 pupils were isolated out of the sample of 425 by selecting every fourth paper. Reliability coefficient was calculated in all the four sub-areas of achievement in population education concepts put together and also individually in these 100 papers. The reliability coefficient values obtained are given in Table VIII.

TABLE VIII

RELIABILITY OF THE ACHIEVEMENT TEST ON POPULATION EDUCATION CONCEPTS - SPLIT HALF METHOD

S.No.	Name of the sub-area	Reliability coefficient
1.	Statistics	0.625
2.	Causes	0.519
3.	Consequences	0.721
4.	Control	0.407
	Whole test	0.583

2. Test - Re-test method

This method was used to estimate the reliability, of all the sub-areas of achievement in total as well as individually. The reliability group of 30 pupils was taken and they were given the tests before and after the exposure of the intervention strategies. The scores of both the tests were correlated and the coefficients of correlation were found out. The reliability coefficients of all the sub-areas of population education concepts in total as well as individually are given in Table IX.

TABLE IX

RELIABILITY OF THE ACHIEVEMENT TEST ON POPULATION EDUCATION CONCEPTS - TEST-RETEST METHOD

S.No.	Name of the sub-area	Reliability coefficient
1.	Statistics	0.616
2.	Causes	0.607
3.	Consequences	0.678
4.	Control	0.532
	Whole test	0.627

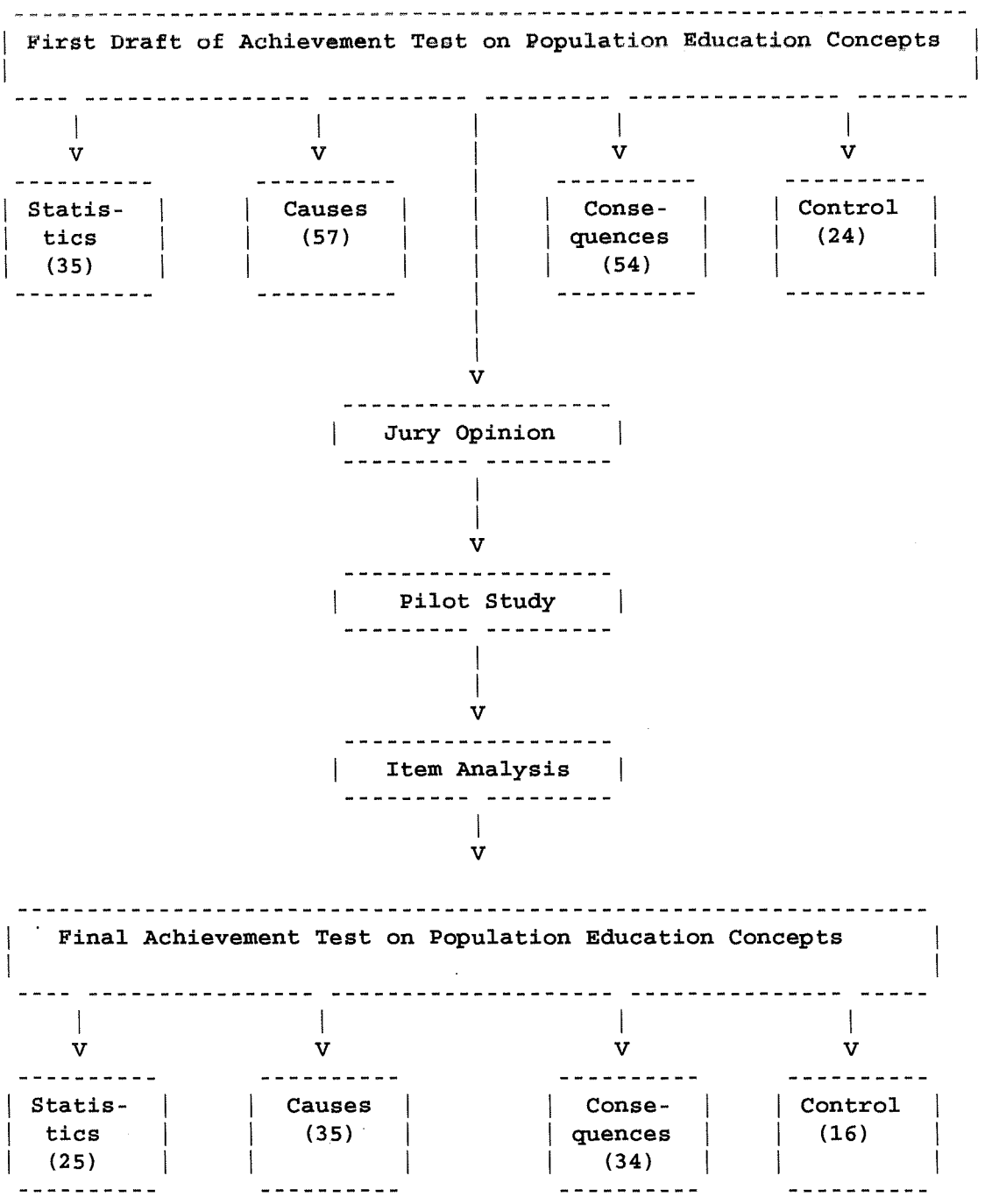
Validity of the Achievement Test on Population Education Concepts

"Validity of the test depends upon the fidelity with which it measures what it purports to measure", according to Garrett (1973). Here, the content validity of the achievement test on population education concepts and the video-lesson were established by the table of specification and jury opinion of the same. Moreover the test-items were selected after subjecting them for item validation at the preliminary state.

The sequence of events involved in the construction of achievement test is given in Figure 2.

Achievement test on population education concepts (2)

Similar to the achievement test (1), questions were framed to include all the concepts in the tapeslide lesson having in mind the mental level of the pupils with the guidance of the experts in the field of education. The types of questions included: multiple choice and short answers. Pilot study was carried out as that for achievement test (1). Item analysis was done. Difficulty index was between 38 per cent and 85 per cent. Hence the items having discriminative power less than 0.31 and the items having the negative discriminative power were rejected. Thus only those questions which showed a significant difference between high and low scores were retained for the final form of the achievement test (2) on population education concepts and are given in Appendix 8. Scoring key was prepared for this



Figures 2.

Flow Chart Showing the Construction of Achievement Test on Population Education Concepts

test and is given in Appendix 9. The test was found to be reliable, since it has the reliable co-efficient value of 0.632 got by split half method and 0.569 got by test-retest method. The content validity of the test was established by the Jury opinion of this achievement test. Moreover the test items were selected after subjecting them for item validation at the initial stage. The sequence of events involved in the construction of the achievement test (2) is the same as that of the previous test.

Scale of attitude towards checking the population growth

Likert type of scale of attitude was used as a tool to measure the attitude of the pupils towards checking the population growth through the intervention strategies.

The first step in developing the scale was to collect a number of statements in such a way that the acceptance or rejection of each one will imply a different degree of favourable or unfavourable attitude towards checking the population growth. For this, a large number of statements on each aspect of the population problem, was collected from various sources, such as, relevant literature, experts in the field and the opinion of experienced teachers and educationists. The statements thus collected, at this stage numbered 120.

These items were thoroughly screened and edited on the basis of the criteria given by Edwards (1957). After editing, 90 statements were retained. these statements

represented different shades of favourable and unfavourable attitude towards checking the population growth. The statements covered 7 sub-areas namely - small family norm, social development, economic development, health and nutrition, demography, environment and education.

Pilot study

The scale of attitude prepared was administered to the sample of 425 pupils of standard IX belonging to nine schools in Coimbatore. The pupils were asked to give their reactions to the statements as per the instructions specified in the scale of attitude. The responses of the sample were assigned numerical values ranging form 1 to 5 depending upon the degree of favourable and unfavourable attitude towards checking the population growth. After scoring, item analysis was done.

Only those items which showed a significant difference between high and low groups were retained for the final form of the scale. Out of the 90 items, only 50 were found to be significant. These items were subjected to the scrutiny of the experts in the field. They were asked to check whether all the sub-areas of the attitude towards checking the population growth were covered by those items. As per their suggestions, the items were modified slightly. These items were retained in the final form of the scale, out of which 28 were positive and 22 were negative items. The final from of the scale of attitude towards checking the population growth is given in Appendix 10.

Reliability of the Scale of Attitude

The split-half method was employed to calculate the reliability of the scale of attitude towards checking the population growth.

Split-half method

In this method, the coefficient of correlation was determined by correlating the odd-even items and applying the Spearman-Brown Prophecy formula. Here the method was applied for all the 7 sub-areas namely - small family norm, social development, economic development, health and nutrition, demography, environment and education put together, as well as individually. For this a small random sample of 100 pupils out of the total sample of 425 pupils were selected. Every fourth paper was isolated from this and reliability coefficient was calculated in the 7 sub-areas put together and also individually. The values of reliability coefficient are given in Table X.

TABLE X

RELIABILITY OF THE SCALE OF ATTITUDE TOWARDS CHECKING THE POPULATION GROWTH - SPLIT HALF METHOD

S.No.	Name of the sub-area	Reliability coefficient
1.	Small family norm	0.592
2.	Social development	0.634
3.	Economic development	0.725
4.	Health and nutrition	0.662
5.	Demography	0.656
6.	Environment	0.706
7.	Education	0.645
	Whole attitude scale	0.637

Validity of the scale of attitude towards checking the population growth

The jury opinion of the scale of attitude towards checking the population growth establishes the content validity. Moreover the statements in the scale of attitude were selected after subjecting them for item validation at the preliminary stage.

The sequence of events involved in the construction of the scale of attitude towards checking the population growth is given in Figure 3.

Socio-economic status scale

The investigator used the socio-economic status scale prepared by Vendal (1981) to obtain the socio-economic status of the pupils in order to study the relationship between the achievement and attitude of the pupils with reference to their socio-economic status. The socio-economic status assesses the sub-areas, namely - income, education, occupational level, material possession and social interaction of the members of the families of the pupils under investigation. The socio-economic status scale used for the study is given in Appendix 11 and the weightage given for each sub-area is given in Appendix 12.

Selection of the sample

A random sampling technique was used to select the schools from both urban and rural localities. Out of the four schools selected in and around Coimbatore - 100 pupils

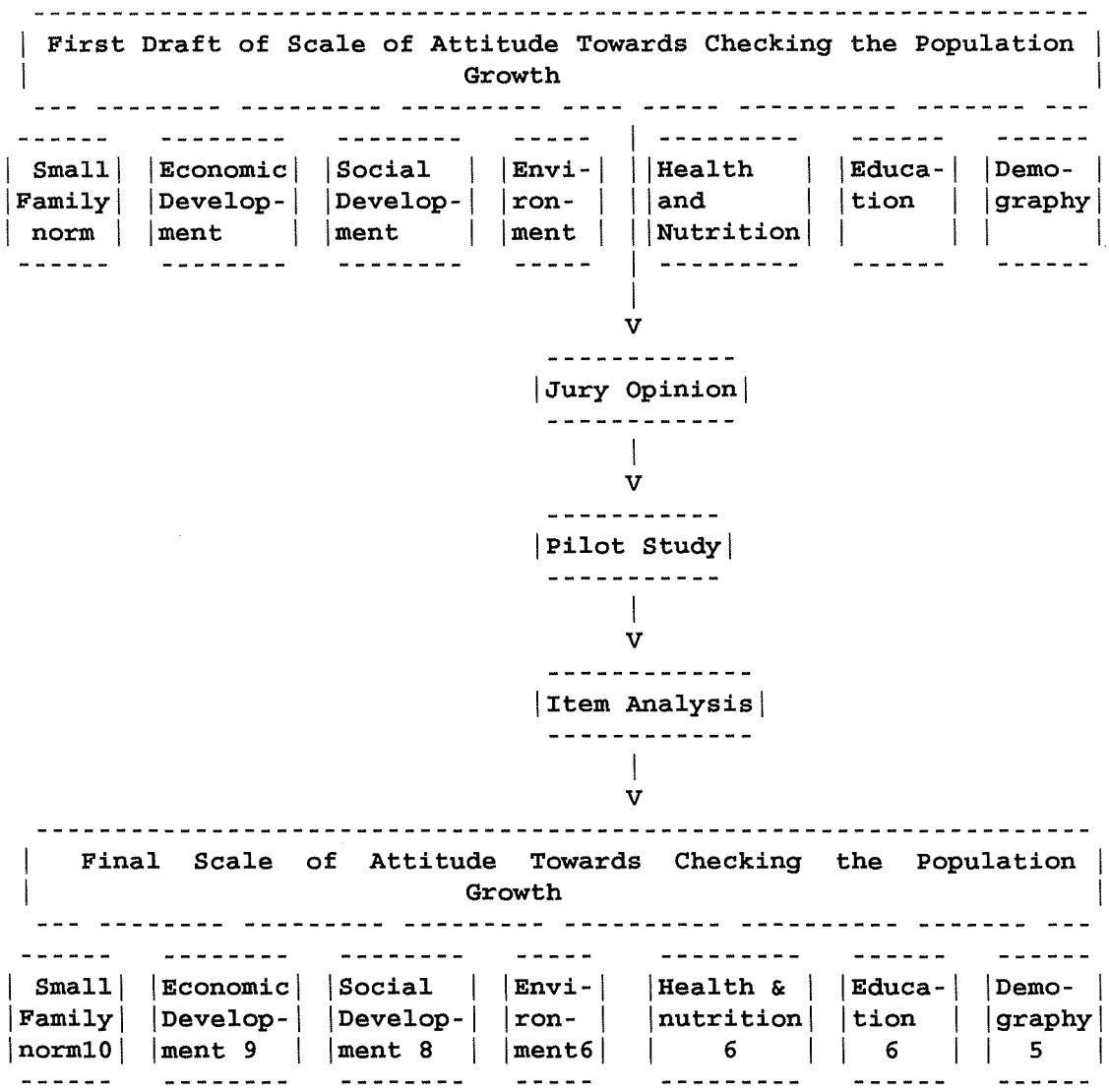


Figure 3.

Flow Chart Showing the Construction of Scale of Attitude Towards Checking the Population Growth

in standard IX of each school formed the total sample of 400. Among them 200 were boys and 200 were girls; 200 were from urban locality and 200 were from rural locality.

Of the 100 pupils selected in each school, 25 pupils were alloted at random to each of the groups namely (i) control group (25) (ii) experimental group (E_1) combined with pupil discussion video/tapeslide (25) (iii) experimental group (E_2) combined with interactive video/tapeslide (25) and (iv) experimental group (E_3) combined with assignment video/tapeslide (25). The details regarding the sample selected for final study is given in Table XI.

TABLE XI

DETAILS OF THE SAMPLE SELECTED FOR THE FINAL STUDY

Sl. No.	Name of the school	No.of pupils	Boys	Girls	Types of school	locality
1.	Sri Avinashilingam Higher Secondary School for Girls	100	-	100	Private	Urban
2.	St. Michaels Higher Secondary School for Boys	100	100	-	Private	Urban
3.	Govt. Higher Sec. School for Boys-Ondipudur	100	100	-	Govt.	Rural
4.	Govt. High School for Girls-Thondamuthur	100	-	100	Govt.	Rural
	Total	400	200	200		

Conduct of the study

The investigator visited each school personally and got prior permission from the heads of the institutions to conduct the study. Enquiry was made regarding the availability of facilities like television, dark room slide projector, video cassette recorder and tape recorders. When facilities were not available, the investigator made necessary arrangements to procure them.

The teachers were oriented to the procedure of the study and the method/procedure of teaching/learning in using the two intervention strategies - video and tapeslide. The two strategies with three experimental devices and one control group took 10 to 15 days in each of the schools selected for the study by the investigator with the help of the teachers. The conduct of the procedure for teaching was planned and conducted in all the four schools selected.

Administration of the Pre-test

The two pre-tests of achievement on population education concepts and the scale of attitude towards checking the population growth were administered to the standard IX pupils in each of the four schools selected. This was done by the investigator with the help of the teachers already oriented. Proper instructions were given to the pupils as to how to answer the achievement test and the scale of attitude. No prior information was given to the pupils, so that the real entry behaviour could be studied.

Sufficient time was given to the pupils for completing the tests. Care was taken to avoid copying among pupils. The answer sheets were then collected and scored by the investigator. Socio-economic status scale was then administered to the same pupils in order to collect information about their background.

Learning through Intervention Strategy Devices: Video lesson

Pupils of the experimental group - E1 (25) were motivated to receive the video lesson on "Human Interaction with Environment" and were given instructions for pupil discussion device. They were divided into 5 groups and were alloted specific portion in the lesson. Sufficient time was given for them to learn and get ready for discussion. After two days time the investigator showed the video lesson in parts and permitted the pupils to discuss the concepts included in the video lesson. They were also permitted to replay and view the video lesson again if required while discussing. The investigator supervised their discussions and helped for orderly discussions without intervening in the same.

Pupils of the experimental group -E2 (25) were motivated to receive the video lesson. Stopping at each concept, questions were asked by the investigator and pupils answered, thus making a good interaction between them. Clarification of doubts was also made whenever necessary. Replaying was also allowed when needed. Free discussions and

proper orientation by the investigator allowed the pupils to learn the concepts in a democratic atmosphere in this group.

Pupils of experimental group E3 (25) were motivated to receive the video lesson. No discussions by the pupils and the investigator was allowed in this group. They were permitted to replay and review the video lesson any number of times as desired by the group. After the viewing of the video lesson was over, properly planned assignments were given to the pupils and were given time to start the work. Pupils were asked to submit the assignment after two days. The investigator corrected them and returned the corrected assignment to this group, so that pupils could come to understand their performance.

Pupils of the control group C (25) were taught by the regular teacher using traditional method.

Tape slide lesson

The pupils of the same 4 groups consisting of 25 pupils in each of the four groups namely-

E1 - tapeslide lesson with pupil discussion device

E2 - tapeslide lesson with interactive device

E3 - tape slide lesson with assignment device

C - traditional method of teaching the lesson, formed the three experimental groups and control group for the tape slide lesson. The lesson on 'Chemistry and Environment' was shown as per the above groupings. After motivating them on the topic, the slides were screened and the audio cassette

tuned simultaneously. The same procedure was followed for each of the four groups as explained in the conduct of the video lesson described above.

Administration of the Post-test

The two achievement tests on population education concepts and the scale of attitude towards checking the population growth were administered to the entire group in each of the schools after the experimental and control group programmes were over. The same procedure was followed as that done in the administration of the pre-tests. The sequence of events involved in the conduct of the study is given in figure 4.

The two sets of pre- and post-tests of achievement tests I and II, attitude scale and socio-economic status scale were carefully scored by the investigator using the scoring keys. The data were consolidated and subjected to further statistical analysis as discussed in the following chapter.

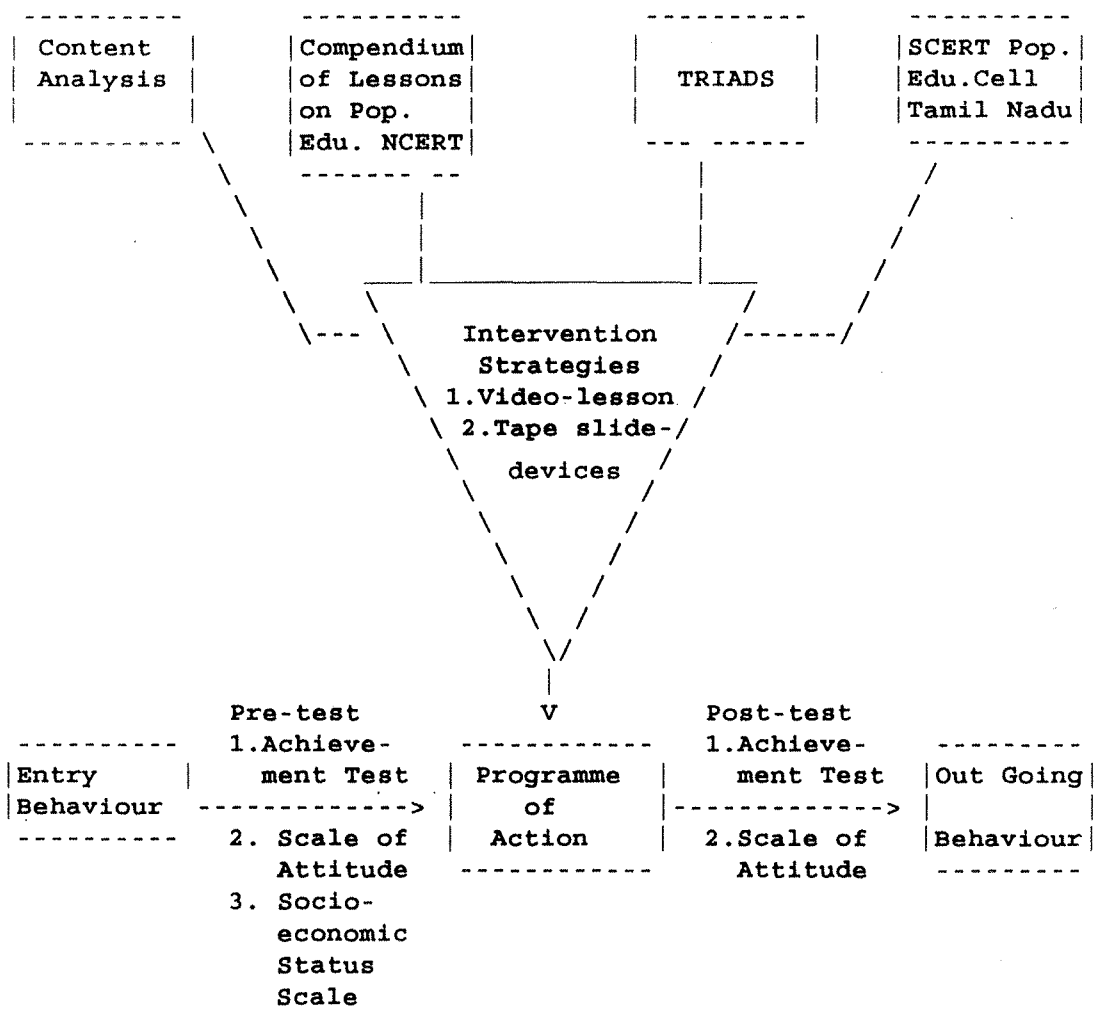


Figure 4.

Flow Chart Showing the Sequence of Events in the Study

CHAPTER V

RESULTS AND DISCUSSIONS

The data accruing from the study are tabulated, and analysed and discussed under the following headings.

A.Analysis of the scores of the control and experimental groups

1.1 Achievement scores in video and tape slide strategies:

In order to study the effectiveness of the video strategy and tapeslide strategy in the learning of population education concepts by the pupils of standard IX, 't' values are calculated for the mean achievement gain scores of the control and experimental groups and the values obtained are presented in Table XII.

TABLE - XII

STATISTICAL VALUES OF ACHIEVEMENT GAIN SCORES IN VIDEO AND TAPESLIDE STRATEGY

Groups	Means of the gain scores		Standard deviation		n		t-values	
	Video	Tape-slide	Video	Tape-slide	Video	Tape-slide	Video	Tape-slide
Control	11.62	2.77	3.24	1.35	100	100	13.39**	10.71**
Experi-mental	22.10	6.01	7.59	2.92	300	300		

** - significant at 0.01 level

From the above table, it is seen that there is significant difference at 0.01 level in the achievement gain scores of the control and experimental groups in video and tapeslide strategies. Hence hypothesis 1.1 is rejected.

This shows that video and tapeslide strategies are effective compared to the traditional method of teaching-learning of population education concepts at standard IX level.

1.2. Attitude scores

In order to study the effectiveness of the two strategies towards developing a favourable attitude for checking the population growth, t- value is calculated for the mean attitude gain scores of the control and experimental groups and the value obtained is given in Table XIII.

TABLE - XIII

STATISTICAL VALUES OF ATTITUDE GAIN SCORES

Groups	Mean	S.D.	n	t-value
Control	9.37	6.60	100	14.87**
Experimental	44.16	16.22	300	

** - significant at 0.01 level

From the above table, it is seen that there is significant difference at 0.01 level in the attitude gain scores of the control and the experimental groups of the sample and hence hypothesis 1.2 is rejected.

This shows that the two strategies are effective in developing a favourable attitude in the pupils of the experimental group towards checking the population growth compared to the traditional method of teaching population education concepts at standard IX level.

B. Analysis of the achievement scores in video strategy:

Before analysing the post-test achievement scores and the exposure of video strategy, an anlysis was done to find out the influence of the prior knowledge if any.

2.1.Influence of socio-economic status on the pre-test achievement of the pupils in video strategy:

Analysis of variance is performed for the pre-test achievement scores in video strategy of the low, middle and high socio-economic status groups of the sample and the values obtained are presented in Table XIV.

TABLE - XIV

ANALYSIS OF VARIANCE BETWEEN PRE-TEST ACHIEVEMENT SCORES IN VIDEO STRATEGY AND SOCIO-ECONOMIC STATUS GROUPS

Source of variation	Sum of squares	Degrees of freedom	Mean squares	F-ratio
Between groups	119.04	2	59.52	
Within groups	28573.40	397	71.97	0.83NS
Total	28692.44	399		

NS- not significant

From the above table, it is seen that there is no significant difference in the pre-test achievement scores of the sample and their socio-economic status. Hence hypothesis 2.1 is accepted.

This shows that the pre-test knowledge of the pupils is not dependent on the socio-economic status of the sample and it may/may not affect the future performance of the pupils.

2.2. Influence and interaction of gender and locality on the pre-test achievement of the pupils selected for video strategy:

The observed means and standard deviation of the pre-test achievement scores of gender and locality variations in video-strategy is presented in Table XV.

TABLE - XV

PRE-TEST ACHIEVEMENT SCORES OF THE SAMPLE IN VIDEO STRATEGY BY GENDER AND LOCALITY

Observed scores		Urban	Rural	Combined
Girls	$\bar{x}$	35.42	47.89	41.65
	σ	9.57	5.52	9.99
	n	100	100	200
Boys	$\bar{x}$	47.90	46.54	47.22
	σ	5.1	5.56	5.37
	n	100	100	200
combined	$\bar{x}$	41.66	47.21	44.44
	σ	9.88	5.57	8.48
	n	200	200	400

From the above table, it is clear that there are differences in the means of the sample when considered by locality or gender. In order to test whether these differences are significant or not, analysis of covariance is done for the observed means of the pre-test achievement scores in video strategy after adjusting with socio-economic status scores and the F-values are obtained.

The means of the adjusted pre-test scores of the sample in video strategy and the F-values are given in the following table XVI and XVII respectively.

TABLE - XVI

MEANS OF THE ADJUSTED PRE-TEST SCORES OF ACHIEVEMENT IN VIDEO STRATEGY - LOCALITY AND GENDER-WISE

Adjusted means	Urban	Rural	Combined
Girls	35.04	47.61	41.32
Boys	47.86	47.24	47.55
Combined	41.45	47.42	

TABLE - XVII

ANALYSIS OF COVARIANCE FOR THE PRE-TEST ACHIEVEMENT SCORES OF THE SAMPLE IN VIDEO STRATEGY AFTER ADJUSTING WITH SOCIO-ECONOMIC STATUS SCORES

Source of variation	Sum of squares	Degrees of freedom	Mean squares	F-values
Within cells	17344.67	395	43.91	
Covariance(SES)	383.32	1	383.32	8.73**
Locality	3412.55	1	3412.55	77.72**
Gender	3479.69	1	3479.69	79.24**
Locality by gender	4247.65	1	4247.65	96.73**

** - significant at 0.01 level

From the table XVI, it is clear that the performance of the pupils is better in the case of boys (mean 47.55) compared to the girls (mean 41.32). The performance of the pupils belonging to rural locality (mean 47.42) is better compared to the pupils belonging to urban locality (mean 41.45). Further, boys belonging to both urban and rural locality have performed equally well whereas girls belonging to rural locality have performed better compared to girls belonging to urban locality. The means obtained from the adjusted scores do not differ much when compared with the means of the values obtained before adjustment.

From table XVII, it is seen that the F-values of the means of the adjusted pre-test achievement scores of the sample are statistically significant at 0.01 level when considered by locality and gender and also their interaction. Hence, the hypothesis 2.2 is rejected.

2.3.Influence and interaction of gender, locality and devices in video strategy as seen by post-test achievement scores of the pupils:

Since prior knowledge about population education concepts of the pupils in the different groups by locality and gender are found to be significant in the above analysis, this would affect the achievement of the pupils in the post-test scores in video strategy. Even if pre-test

scores are not significantly different among the different groups of the sample, a better control can be exercised on the post-test scores by finding out whether there are any differences existing.

So, in order to find out the effect of the strategy in the post-test scores, it is necessary to eliminate the effects of the prior knowledge as seen in the pre-test scores and also to find out whether significant differences exist among the different groups of the sample. Analysis of co-variance is performed on the post-test scores, taking into account - locality, gender, devices in video strategy and their interactions with pre-test scores as a covariate.

Finally the means of the adjusted post-test scores for each group in locality, gender and devices are considered for comparisons. Scheffe's F-test is applied to find out which group has performed better taking two groups at a time.

The means of the post-test scores of achievement in video-strategy for the different groups by locality, gender and devices of control and experimental groups namely- E1-pupil discussion, E2- interactive video and E3-assignment are presented in Table XVIII.

TABLE - XVIII

OBSERVED MEANS OF THE POST-TEST ACHIEVEMENT SCORES IN VIDEO STRATEGY - LOCALITY, GENDER AND DEVICES

Devices		Urban			Rural			Total n = 100
		Girls n=25	Boys n=25	Combined n=25	Girls n=25	Boys n=25	Combined n=25	
Control	$\bar{x}$	53.44	57.36	55.40	61.80	58.80	60.34	57.87
	σ	7.78	3.41	6.27	5.95	4.73	5.52	6.38
E1	$\bar{x}$	57.92	71.50	64.56	61.72	70.60	66.16	65.36
	σ	8.26	5.24	9.58	3.64	5.16	6.30	8.11
E2	$\bar{x}$	61.12	78.28	69.70	74.56	68.60	71.58	70.64
	σ	9.11	7.25	11.90	9.86	6.39	6.38	9.54
E3	$\bar{x}$	59.28	62.96	61.12	64.72	60.24	62.48	61.80
	σ	9.93	4.40	7.82	4.92	5.36	5.57	6.79
Combined n=100		57.94	67.45		65.70	64.56		
		9.13	9.53		7.16	7.41		

From the above table, it is clear that there are differences in the means of various groups namely gender, locality and devices in video-strategy when compared with the means of the control group. To find out, whether these differences are significant or not, analysis of covariance is done for the post-test achievement scores after adjusting with the co-variance namely-socio-economic status and pre-test achievement scores.

The means of the adjusted post-test achievement scores in video strategy and the F-values are given in the following tables XIX and XX respectively.

TABLE - XIX

MEANS OF THE ADJUSTED POST-TEST ACHIEVEMENT SCORES IN VIDEO STRATEGY - LOCALITY, GENDER AND DEVICE-WISE

Devices	Urban			Rural			Total
	Girls	Boys	Combined	Girls	Boys	Combined	
C	56.08	56.21	56.15	57.52	55.93	56.72	56.44
E1	69.72	67.37	68.54	62.32	68.23	65.28	66.91
E2	73.65	73.49	73.57	71.29	69.50	70.39	71.98
E3	60.08	61.74	60.91	60.30	59.20	59.75	60.33

TABLE - XX

ANALYSIS OF COVARIANCE FOR THE MEANS OF POST-TEST ACHIEVEMENT SCORES AFTER ADJUSTING THE COVARIATES SES AND PRE-TEST ACHIEVEMENT SCORES IN VIDEO STRATEGY

Source of variation	Sum of squares	Degrees of freedom	Mean squares	F-values
Within cells	7602.42	382	19.9	
Covariates	7680.46	2	3840.23	192.96**
Gender	0.51	1	0.51	0.03NS
Locality	227.24	1	227.24	11.42**
Devices	13095.37	3	4365.12	219.34**
Locality by gender	5.19	1	5.19	0.26NS
Gender by devices	113.24	3	37.75	1.90NS
Locality by devices	247.79	3	83.60	4.16**
Locality by gender by devices	497.62	3	165.87	8.33**

** - significant at 0.01 level
NS - not significant

Table XIX shows the differences in means of the adjusted post-test achievement scores by different groups in video strategy.

From Table XX, it is clear that the effect of the covariates is significant at 0.01 level. The F-ratios are also significant at 0.01 level between pupils belonging to urban and rural locality, different devices in video-strategy and interaction of locality, gender and devices. There is no significant difference when considered by gender and also for the interactions of locality and gender and also gender by devices.

Hence the hypothesis 2.3 is rejected for the sub-divisions of 2.3, b, c, f and g only.

Hence, it would be inferred that,

1. On an average, boys and girls in the experimental groups have performed equally well compared to the control group.
2. When locality alone is considered, pupils belonging to urban locality have performed better than the pupils belonging to rural locality in the experimental group.
3. When devices are considered, all the three experimental device groups in video-strategy have performed better compared to the control group.
4. All the four groups namely - urban boys, urban girls, rural boys and rural girls have performed equally well in the experimental group.

5. Irrespective of locality all the pupils belonging to E1, E2 and E3 experimental groups in video strategy have performed better than the control group.
6. In all the three experimental devices, both boys and girls have performed equally well compared to the control group.
7. Irrespective of locality and gender, the pupils of all the three experimental devices in video strategy have performed well compared to the control group. This shows the effectiveness of the three devices used in the video strategy.

2.4.Comparison of the means of the devices in video strategy:

Scheffe's F-test is done between the means of the adjusted post-test achievement scores for the devices used in video strategy and is presented in Table XXI.

TABLE - XXI

SCHEFFE'S F- VALUES OF THE MEANS OF THE ADJUSTED POST-TEST ACHIEVEMENT SCORES IN VIDEO STRATEGY

Devices	F - values
Control x E1	275.43**
Control x E2	606.76**
Control x E3	38.02**
E1 x E2	64.58**
E1 x E3	108.78**
E2 x E3	34.01**

** - significant at 0.01 level

From the above table, it is confirmed that there is significant difference between any two devices of the experimental group and control group in video strategy and hence hypothesis 2.4 is rejected.

Further the means obtained from the post-test achievement scores of the various devices in experimental group of the video strategy and control group shows that,

1. All the three experimental groups have performed better than the control group.
2. Interactive video (device E2) is better than pupil discussion - video (device E1) and assignment - video (device E3).
3. The descending order of the effectiveness of intervention strategy devices in learning population education concepts is

i. interactive - video (ii) pupil discussion - video (iii) assignment - video and (iv) control group with traditional method of teaching-learning for the groups - urban boys, rural boys, urban girls and rural girls of the sample and is shown in Figure 5.

2.5 Influence and interaction of gender, locality and devices in video-strategy as seen by the post-test achievement scores subarea-wise.

The means of the post-test scores of achievement in video-strategy subarea-wise, for the different groups of

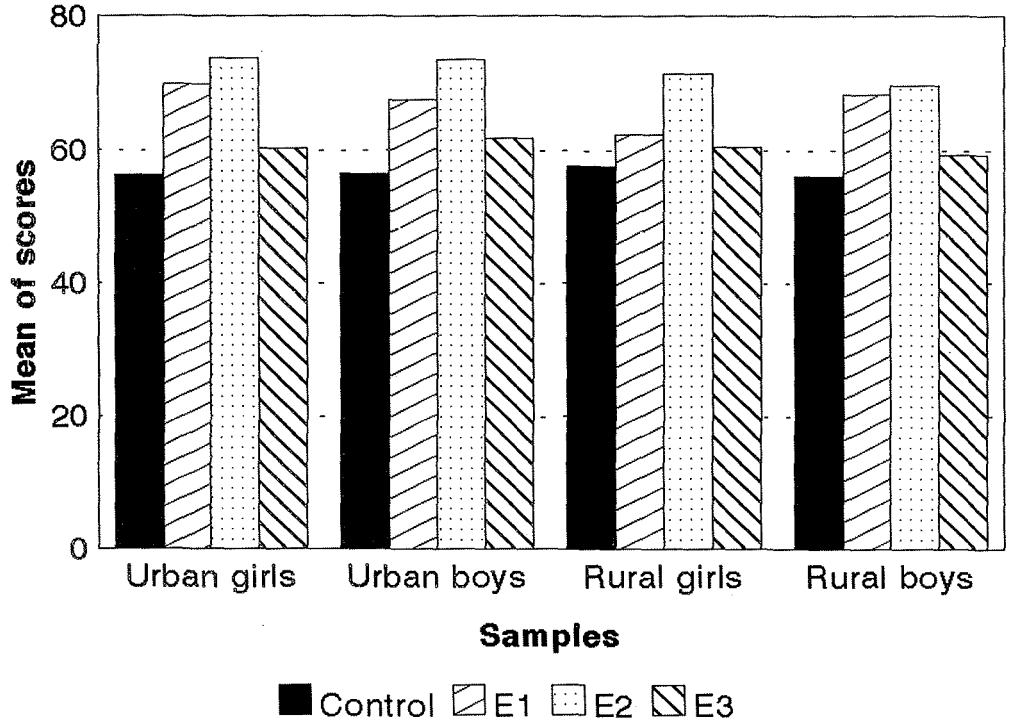


Fig. 5. Means of the adjusted post test achievement scores in video strategy

locality, gender and devices of the control and the experimental groups namely E_1- pupil discussion, E_2- interactive video and E_3 assignment are given in Appendix 13 and Figure 6.

To find out whether these differences are significant or not, analysis of covariance is done for the post-test achievement scores subarea-wise after adjusting with the covariates namely socio-economic status and pre-test achievement scores and the F-values obtained are given in Table XXII.

TABLE-XXII

F-VALUES OF THE ADJUSTED POST-TEST ACHIEVEMENT SCORES IN VIDEO STRATEGY SUBAREA-WISE BY LOCALITY, GENDER AND DEVICES

	Sub-areas			
Statistics	causes	consequences	control	
Locality	0.02NS	4.82**	14.69**	55.63**
Gender	0.60NS	14.28**	0.33NS	1.06NS
Devices	49.44**	75.60**	100.43**	76.47**
Locality by gender	2.00NS	10.72**	5.45**	0.29NS
Locality by devices	3.81**	0.83NS	4.82**	4.25**
Gender by devices	0.58NS	3.55**	3.66**	4.46**
Locality by gender by devices	2.72*	3.45**	4.98**	6.33**

** significant at 0.01 level.
* significant at 0.05 level
NS- not significant.

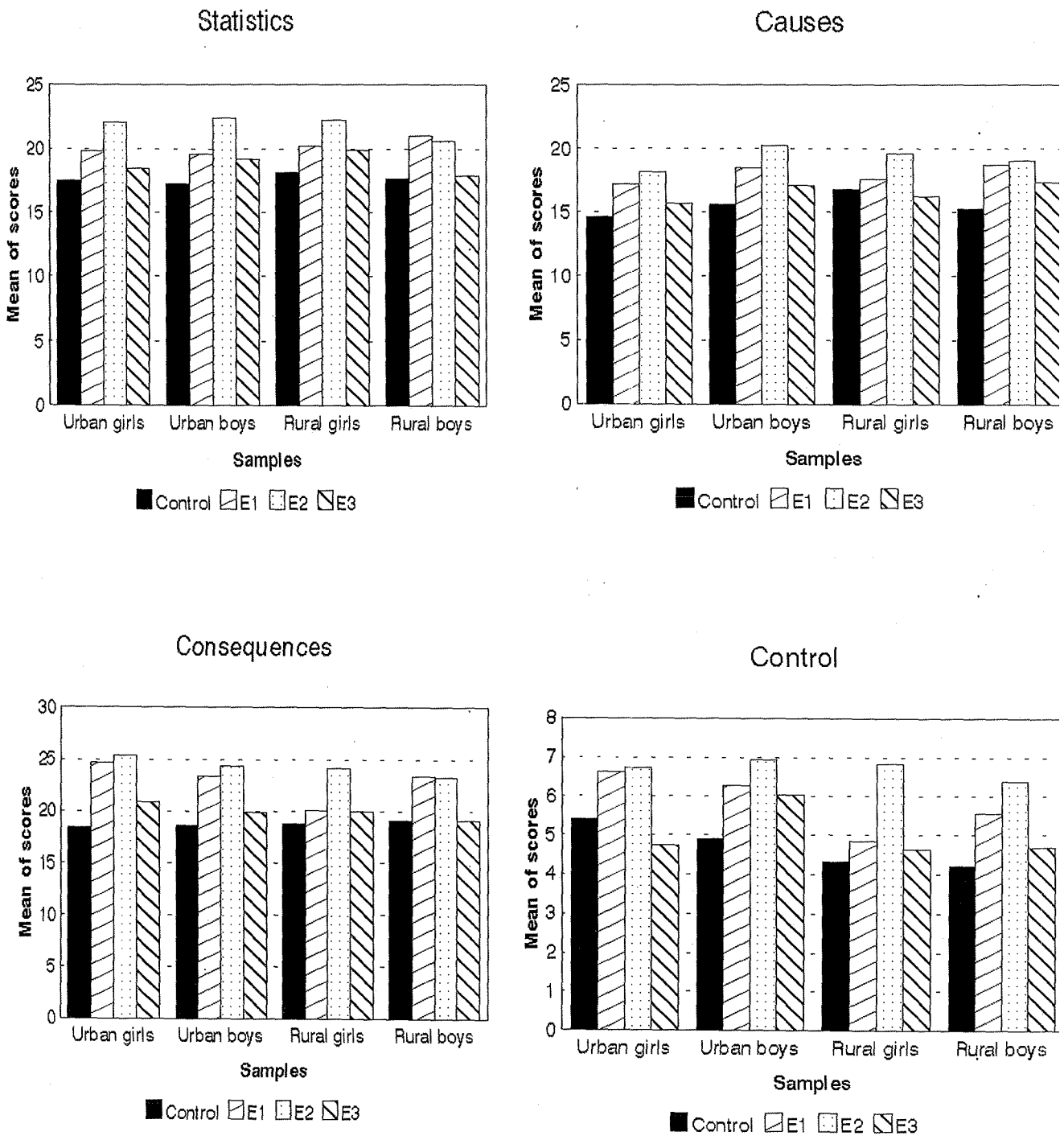


Fig. 6. Means of the adjusted post-test achievement scores in video strategy sub-area wise

From the above table, it is seen that in the subarea **'Statistics'** the F-ratio is significant at 0.05 level for the variable of locality by gender by devices, at 0.01 level for the variations of devices and locality by devices. It is not significant for the variations of locality, gender, locality by gender and gender by devices.

In the subarea of **'causes'** the F-ratios are significant at 0.01 level for all the variations except in locality by devices.

In the subarea of **'consequences'** the F-ratios are significant at 0.01 level for all the variations except in gender.

In the subarea of **'control'** the F-ratios are significant at 0.01 level for all the variations except in gender and locality by gender.

Hence the hypothesis 2.5 is almost rejected.

C. Analysis of the achievement scores in tapeslide strategy:

Before analysing the post-test achievement scores after the exposure of tapeslide strategy, an analysis was done to find out the influence of the prior knowledge if there is any.

3.1 Influence of socio-economic status on the pre-test achievement scores of the pupils in tapeslide strategy:

Analysis of variance is performed for the pre-test achievement scores in tapeslide strategy of the low, middle and high socio-economic status groups and the values obtained are presented in Table XXIII.

TABLE - XXIII

ANALYSIS OF VARIANCE BETWEEN PRE-TEST ACHIEVEMENT SCORES IN TAPESLIDE STRATEGY AND SOCIO-ECONOMIC STATUS GROUPS

Source of variation	Sum of squares	Degrees of freedom	Mean squares	F-values
Between groups	552.77	2	276.38	
Within groups	31873.47	397	80.29	3.44*
Total	32426.24	399		

* - significant at 0.05 level

From the above table, it is seen that there is significant difference at 0.05 level among the pre-test achievement scores in the tapeslide strategy for the socio-economic status groups of the sample. Hence hypothesis 3.1. is rejected.

Further the comparison of the means of the pre-test achievement scores shows that there is significant difference at 0.05 level between the low (mean 56.56) and high (mean 52.85) socio-economic status groups. So this may affect the future performance of the pupils.

3.2 Influence and interaction of gender and locality on the pre-test achievement scores of the pupils learning by tapeslide strategy:

The observed means and standard deviations of the pre-test achievement scores by gender and locality variation in tapeslide strategy are presented in Table XXIV.

TABLE XXIV

PRE-TEST ACHIEVEMENT SCORES IN TAPESLIDE STRATEGY OF THE SAMPLE - GENDER AND LOCALITY WISE

Groups		Urban	Rural	Combined
Girls	$\bar{x}$	52.98	56.45	53.21
	σ	7.70	8.70	8.20
Boys	$\bar{x}$	54.02	59.07	56.54
	σ	8.96	9.38	9.49
Total	$\bar{x}$	53.50	56.26	
	σ	8.35	9.45	

From the above table, it is seen that there are differences in the means of the sample, when considered by gender and locality in the achievement. In order to test whether these differences are significant or not, analysis of covariance is done for the observed means of the pre-test achievement scores in tapeslide strategy after adjusting with socio-economic status scores.

The means of the adjusted pre-test scores of the sample in tapeslide strategy and the F-values are given in the following Tables XXV and XXVI.

TABLE XXV

MEANS OF THE ADJUSTED PRE-TEST ACHIEVEMENT SCORES IN TAPESLIDE STRATEGY - LOCALITY AND GENDER WISE

Adjusted means	Urban	Rural	Combined
Girls	53.23	53.63	53.43
Boys	54.04	58.61	56.33
Combined	53.63	56.12	

TABLE XXVI

ANALYSIS OF CO-VARIANCE FOR THE PRE-TEST ACHIEVEMENT SCORES IN TAPESLIDE STRATEGY OF THE SAMPLE AFTER ADJUSTING WITH SOCIO-ECONOMIC STATUS SCORES

Source of variation	Sum of squares	Degrees of freedom	Mean squares	F-values
Within cells	29868.34	395	75.62	
Co-variate(SES)	162.84	1	162.84	2.15**
Locality	591.41	1	591.41	7.82**
Gender	754.36	1	754.36	9.98**
Locality by gender	423.89	1	423.89	5.61**

** - significant at 0.01 level

From the table XXV, it is clear that the performance of the pupils is better in the case of boys

(mean 56.33) compared to the girls (mean 53.43). The performance of the pupils belonging to rural locality (mean 56.12) is better compared to pupils belonging to urban locality (mean 53.63) and also boys (mean 56.33) compared to girls (mean 53.23). The performance of rural boys (mean 58.61) is higher compared to rural girls, urban boys and urban girls. The means of the adjusted pre-test scores differ from the means of the observed scores compared to those obtained in video strategy. This may be due to significant differences seen among pre-test achievement of the three socio-economic status groups.

From table XXVI, it is seen that the F-values of the means of the adjusted socio-economic status scores of the sample are statistically significant at 0.01 level when considered by locality and gender and also by interactions of gender and locality. Hence hypothesis 3.2 is rejected.

3.3.Influence and interaction of gender, locality and devices in tapeslide strategy as seen by post-test achievement scores of the pupils:

The means of the post-test achievement scores of the pupils in tapeslide strategy for the different groups by locality, gender and devices namely control and experimental - E1 pupil discussion, E2 interactive tape slide and E3 assignment are presented in Table XXVII.

TABLE - XXVII

OBSERVED MEANS OF THE SAMPLE IN POST-TEST ACHIEVEMENT SCORES BY LOCALITY, GENDER AND DEVICES IN THE TAPESLIDE STRATEGY

Devices		Urban			Rural			Total n = 100
		Girls n=25	Boys n=25	Combined n=50	Girls n=25	Boys n=25	Combined n=50	
Control	$\bar{x}$	54.32	57.32	55.82	60.76	63.36	62.06	58.94
	σ	8.34	7.68	8.08	7.84	8.48	8.19	8.68
E1	$\bar{x}$	57.84	61.24	59.54	60.52	62.04	61.28	60.41
	σ	8.52	10.37	9.55	9.10	12.95	11.10	10.34
E2	$\bar{x}$	65.04	57.20	61.12	57.48	67.44	62.46	61.79
	σ	7.96	9.68	9.62	8.47	8.85	9.94	9.76
E3	$\bar{x}$	56.00	56.36	56.18	59.60	64.80	62.20	59.19
	σ	6.01	7.06	6.49	8.62	7.96	8.62	8.17
Combined n=100	$\bar{x}$	58.30	58.03	58.16	59.59	64.41	62.00	
	σ	8.69	8.76	8.76	8.49	9.82	9.47	

The above table shows clearly the differences in the means of various groups by locality, gender and devices in the tapeslide strategy. To find out whether these differences are significant or not, analysis of covariance is done after adjusting the scores with the co-variates-socio economic status scores and pre-test achievement scores.

The means of the adjusted post-test achievement scores in tapeslide strategy by locality, gender and devices and also the F-values are presented in the following tables XXVIII and XXIX.

TABLE XXVIII

MEANS OF THE ADJUSTED POST-TEST ACHIEVEMENT SCORES IN TAPESLIDE STRATEGY BY LOCALITY, GENDER AND DEVICES

DEVICES	URBAN			RURAL			TOTAL
	GIRLS	BOYS	COMBINED	GIRLS	BOYS	COMBINED	
CONTROL	57.89	57.52	57.71	57.89	57.18	57.59	57.65
E1	60.44	58.48	59.46	60.61	60.87	60.74	60.10
E2	63.92	59.04	61.48	62.97	63.91	63.44	62.46
E3	58.57	60.53	59.55	62.52	58.86	60.69	60.12

TABLE XXIX

ANALYSIS OF COVARIANCE FOR THE MEANS OF POST-TEST ACHIEVEMENT SCORES AFTER ADJUSTING WITH THE COVARIATES SES AND PRE-TEST ACHIEVEMENT SCORES IN TAPESLIDE STRATEGY

Sources of variation	Sum of squares	Degrees of freedom	Mean squares	F-ratios
Within cells	1615.05	382	4.23	
Covariate	27758.39	2	13879.19	3282.78**
Gender	98.44	1	98.44	23.28**
Locality	106.43	1	106.43	25.17**
Devices	1146.22	3	382.07	90.37**
Locality by gender	5.97	1	5.97	1.41NS
Locality by devices	54.41	3	18.14	4.29**
Gender by devices	28.45	3	9.48	2.24NS
Locality by gender by devices	434.88	3	144.96	34.29**

** - significant at 0.01 level
NS - not significant

The adjusted means given in Table XXVIII indicates variation in the different groups. From Table - XXIX, it is clear that the effect of the co-variates is significant at 0.01 level. The F-ratios are significant at 0.01 level for all the variations excepting the interaction of locality by gender and gender by devices in tapeslide strategy. Hence hypothesis 3.3 is rejected for all the sub-divisions excepting d and e.

Hence it could be inferred that,

1. On an average, boys and girls in the experimental groups have performed equally well compared to the control group.
2. When locality alone is considered, pupils belonging to urban locality have performed better than the pupils belonging to rural locality in the experimental group.
3. When devices are considered, all the three experimental device groups in tapeslide strategy have performed better compared to the control group.
4. All the four groups namely - urban boys, urban girls, rural boys and rural girls have performed equally well in the experimental group.
5. Irrespective of locality, all the pupils belonging to E1, E2 and E3 experimental groups in tapeslide strategy have performed better than the control group.
6. In all the three experimental devices, both boys and girls have performed equally well compared to the control group.

7. Irrespective of locality and gender, the pupils of all the three experimental devices in tapeslide strategy have performed well compared to the control group. This shows the effectiveness of the three devices used in the tapeslide strategy.

3.4 Comparison of the means of the devices in tape slide strategy:

Scheffe's F-test is done between the means of the adjusted post-test achievement scores for the devices used in tapeslide strategy and is given in Table XXX.

TABLE - XXX

SCHEFFE'S F-VALUES OF MEANS OF THE ADJUSTED POST-TEST ACHIEVEMENT SCORES FOR THE DEVICES IN TAPESLIDE STRATEGY

Devices	F - values
Control x E1	71.06**
Control x E2	273.47**
Control x E3	72.19**
E1 x E2	65.73**
E1 x E3	0.004 NS
E2 x E3	64.64**

** - significant at 0.01 level

NS - not significant

From the above table, it is clear that any two combination of devices in tapeslide strategy excepting between pupil discussion and assignment, the differences

between the means are statistically significant at 0.01 level and hence hypothesis 3.4 is rejected almost.

Further, the adjusted means shows -

1. All the three devices in tapeslide strategy are effective in the learning of population education concepts when compared with the control group.

2. When compared among the devices, interactive tapeslide (device 2) is effective compared to pupil discussion (device 1) and assignment (device 3). But pupil discussion, and assignment devices are equally effective when compared.

3. The descending order of effectiveness of the devices in learning population education concepts using tapeslide strategy is (i) interactive -tapeslide (ii) pupil discussion and assignment and (iii) control, in both boys or girls and pupils belonging to urban or rural locality and is shown in Figure 7.

D.Analysis of the attitude scores of the pupils:

Before analysing the post-test attitude scores after the exposure to the strategies, an analysis was done to find out the influence of the prior attitude of the pupils towards checking the population growth, if there is any.

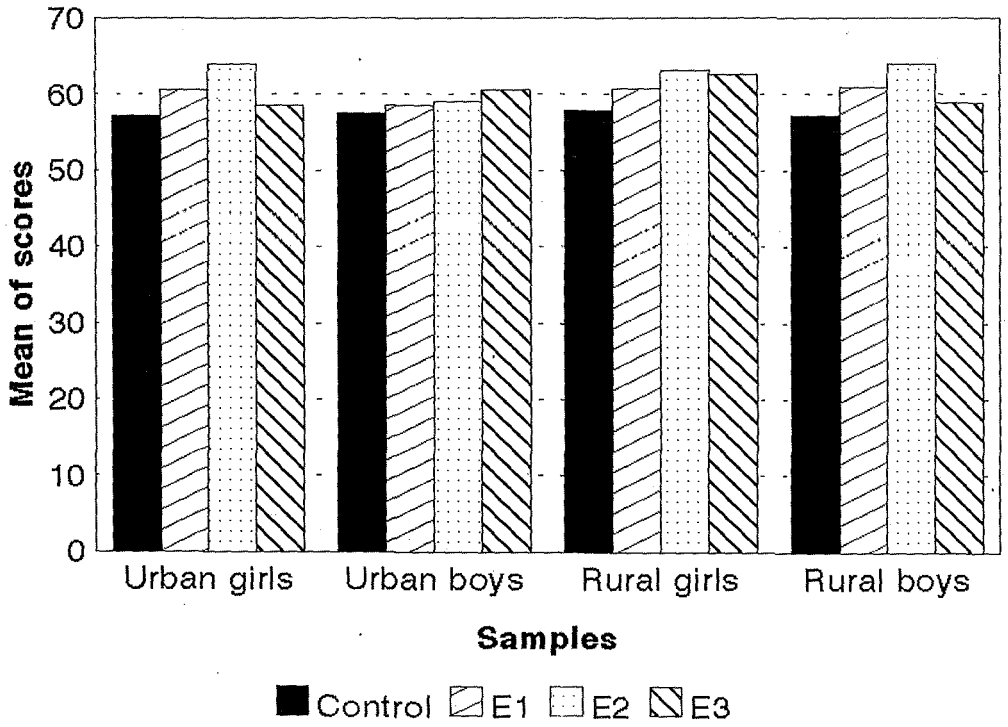


Fig. 7. Means of the adjusted post test achievement scores in tape slide strategy

4.1. Influence of socio-economic status on the pre-test attitude of the pupils:

Analysis of variance is first performed for the pre-test attitude scores of the low, middle and high socio-economic status groups of the sample and the values obtained are shown in Table XXXI.

TABLE - XXXI

ANALYSIS OF VARIANCE BETWEEN PRE-TEST ATTITUDE SCORES AND SOCIO-ECONOMIC STATUS SCORES

Source of variation	Sum of squares	Degrees of freedom	Mean squares	F-values
Between groups	2046.50	2	1023.25	
Within groups	166229.34	397	418.71	2.44NS
Total	168275.84	399		

NS - not significant

From table XXXI, it is clear that there is no significant difference among the pre-test attitude scores of the three socio-economic status groups of the sample. Hence hypothesis 4.1 is accepted.

4.2.Influence and interaction of gender and locality on the pre-test attitude scores of the pupils:

Analysis of variance is next performed for the pre-test attitude scores of the sample to find out whether significant differences lie between locality and/or gender and/or combinations of locality and gender. Socio-economic

status is also included as a covariate to remove the effect if there is any. The observed means and standard deviation of the pre-test attitude scores of the sample-locality and gender-wise is presented in Table XXXII.

TABLE - XXXII

OBSERVED MEANS OF PRE-TEST ATTITUDE SCORES OF THE SAMPLE-LOCALITY AND GENDER WISE

		Urban	Rural	Combined
Girls	$\bar{x}$	147.90	127.04	137.47
	σ	19.02	16.78	20.73
Boys	$\bar{x}$	113.82	129.16	121.49
	σ	11.97	17.78	16.96
Combined	$\bar{x}$	130.86	128.10	129.48
	σ	23.30	17.28	20.53

From the table XXXII, it is seen that there is difference in the means of the sample when considered locality and gender-wise. In order to study whether these differences are significant or not, analysis of covariance is done for the observed means of the pre-test attitude scores after adjusting with socio-economic status scores. The means of the adjusted pre-test attitude scores and F-values are given in the following tables XXXIII and XXXIV.

TABLE XXXIII

MEANS OF THE ADJUSTED PRE-TEST ATTITUDE SCORES -LOCALITY AND GENDER WISE

Adjusted means	Urban	Rural	Combined
Girls	147.84	127.00	137.42
Boys	113.81	129.26	121.54
Combined	130.83.	128.13	

TABLE - XXXIV

ANALYSIS OF COVARIANCE FOR THE PRE-TEST ATTITUDE SCORES OF THE SAMPLE AFTER ADJUSTING WITH SOCIO-ECONOMIC STATUS SCORES

Source of variation	Sum of squares	Degrees of freedom	Mean squares	F-values
Within cells	109209.22	395	276.48	
Covariate	7.82	1	7.82	0.03NS
Locality	697.16	1	697.16	2.52NS
Gender	22651.03	1	22651.03	81.93**
Locality by gender	32097.02	1	32097.02	116.09**

** - significant at 0.01 level
NS - not significant

From table XXXIII, it is seen that the mean of the adjusted pre-test scores is higher in girls (147.84) than in the case of boys (113.81) in urban locality, whereas in rural locality, it is lower in girls (127.00) compared to boys (129.26). Moreover, as the covariate, socio-economic status is not significant, the means of the adjusted pre-test scores in terms of locality and gender do not differ

much when compared with that of the observed means of the pre-test attitude scores.

From table XXXIV, it is seen that the effect of the covariate, socio-economic status is not significant. Again, there is no significant difference between the scores of pupils belonging to urban and rural locality. But it is significant at 0.01 level between boys and girls and the combination of locality and gender. Hence hypothesis 4.2 is rejected only for the sub-divisions of a and c.

Hence, it could be inferred that,

1. Compared to boys, girls had a more favourable attitude towards checking the population growth before exposing them to the intervention strategies.
2. When considered locality-wise, pupils belonging to both urban and rural locality were equally favourable towards checking the population growth before exposing them to the intervention strategies.
3. In terms of locality and gender, urban girls and rural boys were favourable towards checking the population growth when compared to rural girls and urban boys, before exposing them to the intervention strategies.

4.3.Influence and interaction of gender, locality and devices on the post-test attitude scores of the pupils:

Since the prior attitude between boys and girls is found to be significant, this would affect the attitude in the post-test. So, in order to find out the effect of the

two strategies in changing the attitude of the pupils as measured in the post-test scores, analysis of covariance is done for the post-test attitude scores taking into account locality, gender and devices in both the strategies and their interactions with pre-test attitude scores as covariate.

The observed means of the post-test attitude scores for the different categories by locality, gender, devices and combinations are shown in Table XXXV.

TABLE - XXXV

OBSERVED MEANS OF THE SAMPLE IN POST-TEST ATTITUDE SCORES BY LOCALITY, GENDER AND DEVICES

Devices		Urban			Rural			Total n = 100
		Girls n=25	Boys n=25	Combined n=50	Girls n=25	Boys n=25	Combined n=50	
Control	$\bar{x}$	193.40	147.28	170.34	163.56	154.48	159.02	164.68
	σ	14.04	10.40	26.31	8.08	12.79	11.54	21.00
E1	$\bar{x}$	204.88	159.52	185.20	151.80	152.04	151.92	167.06
	σ	11.30	9.01	25.04	7.96	6.62	7.20	23.82
E2	$\bar{x}$	199.28	163.41	181.34	163.24	174.08	168.96	175.15
	σ	15.83	5.45	21.58	7.19	9.14	9.98	17.85
E3	$\bar{x}$	194.52	134.04	164.28	150.24	172.68	101.46	162.87
	σ	16.65	6.00	32.96	8.92	7.65	14.00	25.25
Combined n=100	$\bar{x}$	174.54	151.06		157.21	163.47		
	σ	27.65	13.97		10.10	13.82		

The above table shows the differences in the means of attitude scores of various groups of locality, gender and devices. To test the significance of these differences, analysis of covariance is done after adjusting the means of the scores with the covariate pre-test attitude scores. The means of the adjusted post-test attitude scores by locality, gender and devices and the F-values are presented in the following tables XXXVI and XXXVII.

TABLE - XXXVI

MEANS OF THE ADJUSTED POST-TEST ATTITUDE SCORES-BY LOCALITY GENDER AND DEVICES

Devices	Urban			Rural			Total
	Girls	Boys	Combined	Girls	Boys	Combined	
Control	164.99	148.48	156.73	147.74	147.42	147.59	152.16
E1	191.75	172.05	181.50	161.32	168.32	164.69	173.29
E2	196.27	184.38	190.32	177.22	181.58	179.40	184.86
E3	180.79	148.88	164.83	150.27	157.84	154.05	159.44
Combined	183.45	163.44	173.45	159.14	163.72	161.43	-

TABLE - XXXVII

ANALYSIS OF COVARIANCE FOR POST-TEST ATTITUDE SCORES AFTER ADJUSTING WITH THE COVARIATE -PRE-TEST ATTITUDE SCORES

Source of variation	Sum of squares	Degrees of freedom	Mean squares	F-values
Within cells	13562.08	383	35.41	
Covariate	27627.44	1	27627.44	780.21**
Locality	14195.51	1	14195.51	400.89**
Gender	3766.02	1	3766.02	106.35**
Devices	32357.94	3	10785.98	304.60**
Locality by gender	8674.93	1	8674.93	244.98**
Locality by devices	856.00	3	285.33	8.06**
Gender by devices	932.97	3	310.99	8.78**
Locality by gender by devices	2202.03	3	735.01	20.73**

** - significant at 0.01 level

From table XXXVI it is seen that the means of the adjusted post-test attitude scores when compared with the observed post-test scores (Table XXXV) are quite altered as seen in the significance at 0.01 level of the covariate.

Thus it is seen from table XXXVII, the effect of covariate pre-test attitude scores is significant at 0.01 level. The F-ratios are significant at 0.01 level for all the variations of locality, gender and devices and for all the interactions among the three.

Hence, the hypothesis 4.3 is rejected for all the sub-divisions.

Thus, it is inferred that,

1. Compared to boys, girls have developed a more favourbale attitude towards checking the population growth after exposing them to the intervention strategies.

2. When considered locality wise, pupils belonging to urban locality have developed a more favourbale attitude towards checking the population growth than the pupils belonging to rural locality after learning through the intervention strategies.

3. In terms of locality and gender, urban girls and rural boys have developed a more favourable attitude towards checking the population growth than urban boys and

rural girls after learning through the intervention strategies.

4. Irrespective of locality, all the pupils belonging to E1, E2 and E3 experimental groups have developed a more favourable attitude than the control group towards checking the population growth.

5. Both boys and girls in all the experimental groups have developed almost an equal favourable attitude towards checking the population growth when compared with the control group.

6. Irrespective of locality and gender, the pupils of all the three experimental devices have developed better attitude towards checking the population growth when compared to the control group. This shows the effectiveness of the three devices used in the two intervention strategies.

4.4 Comparison of the means of the attitude scores device wise:

Scheffe's F-test is carried out to find out the effectiveness of the devices combined with the intervention strategies in terms of the attitude of the pupils. The Scheffe's F-test values obtained are presented in Table XXXVIII.

TABLE XXXVIII

SCHEFFE'S F-TEST VALUES OF THE MEANS OF THE ADJUSTED POST-TEST ATTITUDE SCORES OF THE DEVICES

Devices	F - values
Control x E1	630.72**
Control x E2	1510.34**
Control x E3	74.97**
E1 x E2	189.03**
E1 x E3	270.78**
E2 x E3	912.32**

** - significant at 0.01 level

From the above table, it is seen that the means of the scores are statistically significant at 0.01 level for all the combinations and hence hypothesis 4.4 is rejected.

Further it is seen that, when the devices are compared with each other and also against the control, interactive-video and tape slide strategies (device 2) is more effective compared to pupil discussion (device 1) and assignment (device 3). Thus the descending order of effectiveness of the intervention strategy devices the

formation of a favourable attitude towards in checking the population growth is (i) interactive in both video and tapeslide strategies, (ii) pupil discussion (iii) assignment and (iv) control-traditional teaching - learning method in both boys and girls and in pupils belonging to urban and rural locality. This is shown in Figure 8.

4.5.Analysis of the post-test attitude scores sub area wise

Influence and interaction of gender, locality and devices on the post-test attitude scores of the pupils subarea-wise:

The means of the post-test attitude scores subarea-wise for the different groups of locality, gender and devices of the control and experimental groups namely E_1-pupil discussion, E_2-interactive video /tapeslide and E_3-assignment are given in Appendix 14 and Figure 9.

To find out whether these differences are significant or not, analysis of covariance is done for the post-test attitude scores subarea-wise, after adjusting with the covariates namely - socio - economic status and the pre-test attitude scores and the F-values obtained are given in Table XXXIX.

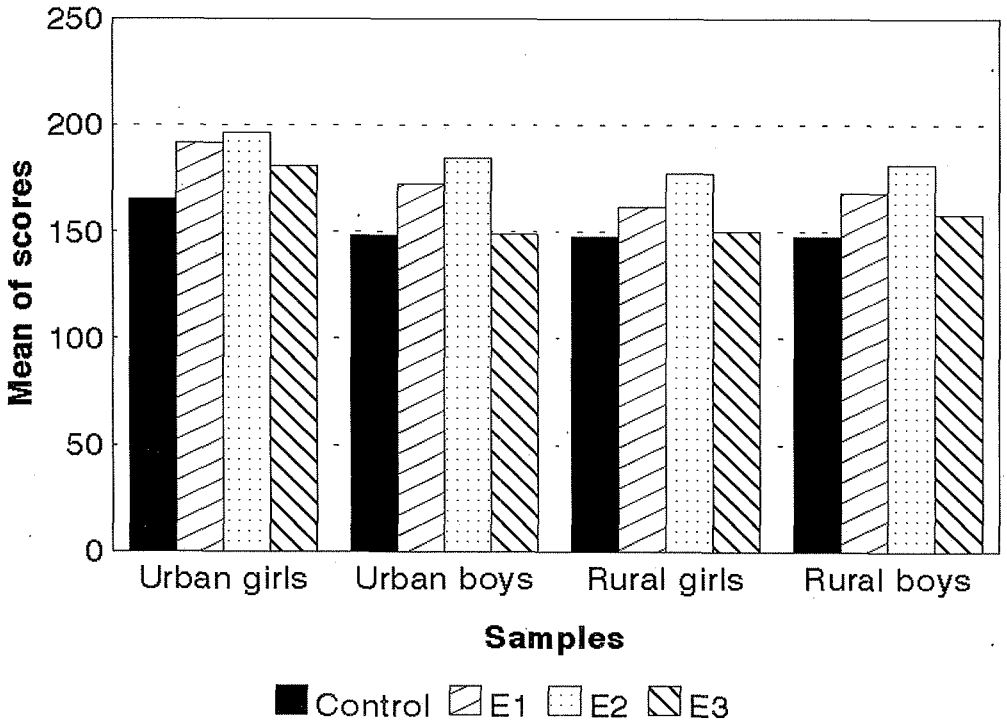


Fig. 8. Means of the adjusted post test attitude scores

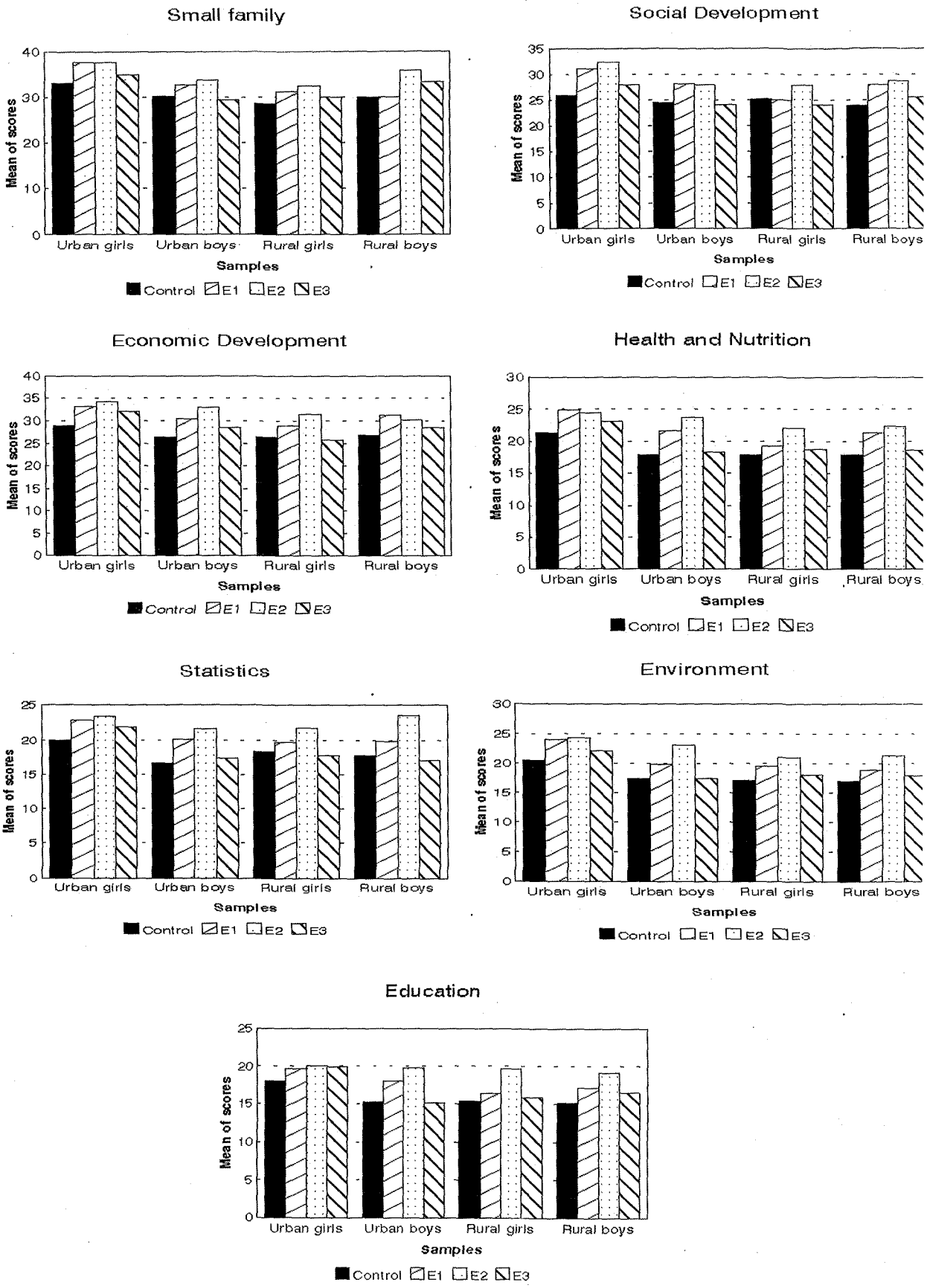


Fig.9. Means of the adjusted post-test attitude scores subarea wise

TABLE- XXXIX

F-VALUES OF THE ADJUSTED POST-TEST ATTITUDE SCORES SUBAREA-WISE BY LOCALITY, GENDER AND DEVICES

	Sub-areas						
	Small family	Social develop-ment	Economic develop-ment	Health Nutrition	statistics	Environ -ment	Educatic
Locality	74.73**	68.02**	76.68**	148.24**	20.22**	134.70**	70.26**
Gender	29.37**	30.43**	27.83**	27.88**	40.90**	53.80**	35.43**
Devices	53.52**	64.91**	115.94**	97.28**	107.75**	78.48**	81.20**
Locality by gender	125.54**	91.00**	97.22**	85.56**	90.93**	53.90**	57.63**
Locality by devices	10.70**	6.33**	3.08**	2.47**	6.84**	1.52NS	3.94**
Gender by devices	6.43**	3.12**	2.74**	9.39**	5.50**	6.57**	6.67**
Locality by gender by devices	6.71**	9.93**	19.51**	7.92**	4.59**	2.53**	12.79**

** - significant at 0.01 level

NS - not significant.

From the above table, it is seen that the F-ratios are significant at 0.01 level for all the variables of locality, gender and devices in all the sub-areas of attitude except in the sub-area of environment for the variable locality by devices. Hence the hypothesis 4.5 is rejected almost. This further shows that all the three experimental devices have helped in the formation of a favourable attitude towards checking the population growth when considered for all the sub-areas.

E. Correlation Analysis

Correlation analysis is done only for the scores of the significant difference group namely the pupils belonging to the experimental group where interactive-video and tapeslide strategy device was used leaving the other groups.

5.1. Correlation between the pre-test and post-test achievement scores of video tapeslide and attitude scores:

The correlation coefficient values are calculated for the significant difference group and are given in Table XL.

TABLE- XL

CORRELATION BETWEEN PRE- AND POST-TEST ACHIEVEMENT SCORES AND ATTITUDE SCORES

Sample in the significant difference group	Correlation among combinations		
	Tapeslide pre-and post	Video Pre- and post	Attitude pre-and post
Urban girls	0.9541**	0.5928**	0.7641**
Urban boys	0.9766**	0.5835**	0.5930**
Rural girls	0.9768**	0.6041**	0.7527**
Rural boys	0.9768**	0.8463**	0.8491**

** - significant at 0.01 level

From the above table, it is clear that the correlations are significant at 0.01 level in all four

groups of significant difference group between pre- and post-test scores in tapeslide strategy; and in video strategy and also in pre-and post-test attitude scores. Hence hypothesis 5.1 is rejected.

5.2. Correlation between the gain scores of video, tapeslide and attitude in urban boys, rural boys, urban girls and rural girls:

Correlation coefficient values are calculated for the significant difference group between the gain scores of video, tapeslide and attitude among urban boys, urban girls, rural boys and rural girls of the sample and are given in Table - XLI.

TABLE - XLI

CORRELATION IN THE SIGNIFICANT DIFFERENCE GROUPS WITH GAIN SCORES

Sample in the significant difference group	Correlation among combinations		
	Video and attitude	Tapeslide and attitude	Video and Tapeslide
Urban girls	0.2636	0.0471	0.2521
Urban boys	0.0350	0.2338	0.1209
Rural girls	0.1262	0.0193	0.0066
Rural boys	0.0852	0.0629	0.2476

From the above table, it is clear that there is no correlation between the gain scores, of video, tapeslide and

attitude in the significant difference group of the sample and hence the hypothesis 5.2 is accepted. Further it is inferred that the gains in the scores are similar in all the above three combinations.

5.3. Correlation between the gain scores of achievement in video, tapeslide and attitude scores and socio-economic status in urban boys, rural boys, urban girls and rural girls:

Correlation coefficient values are calculated for the significant difference group of the sample between the gain scores and socio-economic status scores and is given in Table XLII.

TABLE - XLII

CORRELATION IN THE SIGNIFICANT DIFFERENCE GROUPS BETWEEN SOCIO-ECONOMIC STATUS SCORES AND GAIN SCORES

Sample in the significant difference group	Correlation among combinations		
	SES and video	SES and attitude	SES and Tapeslide
Urban girls	0.0910	0.1743	0.0578
Urban boys	0.0664	0.0899	0.1473
Rural girls	0.0669	0.1725	0.3848*
Rural boys	0.3712	0.1230	0.0520

* - significant at 0.05 level

From the above table, it is clear that the socio-economic status does not correlate with the gain scores of video, attitude and tapeslide except in rural girls where socio-economic status is correlated at 0.05 level. Hence hypothesis 5.3 is almost accepted.

Hence it is inferred that

1. Correlation between pre and post-test scores is higher in tapeslide followed by attitude and then by video.
2. Gain scores of achievement in video and tape slide and attitude are uncorrelated groups.
3. Socio economic status does not correlate with gain scores of achievement in video, tape slide and attitude except in rural girls whereas socio-economic status is correlated with gain scores of achievement in tape slide at 0.05 level.

This summary and the conclusion of the results obtained are discussed in the next chapter.

CHAPTER VI

SUMMARY AND CONCLUSIONS

INTRODUCTION

This chapter aims at summarising the procedure adopted in studying the 'Effectiveness of Intervention Strategies in the Learning of Population Educating Concepts by Standard IX pupils in Coimbatore', presents the findings and the conclusions arrived at by consolidating and analysing the various data presented in the previous chapter.

SUMMARY OF THE PROCEDURE

A status study was undertaken in order to know what is being taught with regard to population education concepts in the various subjects at the secondary school level in Tamil Nadu State Board Syllabi. An analysis of the existing concepts of population education in standard IX, in all the subjects was done next. Social science and general science were selected, as these two subjects contain lessons in which integration of population education concepts has already been done.

The concepts of population education as categorised by Gopal Rao (1974) in TRIADS namely - causes, consequences and control with an introduction to statistics about population growth, along with the compendium of lessons on population education (NCERT, 1990) and the recommendations of the SCERT, Population Education Cell of

Tamil Nadu (1982), formed the basis for developing the scripts of the lessons selected in this study.

The following two lessons - i) "Human Interaction with Environment" in Social science and ii) "Chemistry and Environment" in General Science of standard IX were found to have ample scope for integrating the additional concepts which were necessary for the preparation of scripts for the intervention strategies selected. The investigator selected two intervention strategies namely - video-lesson and tape-slide lesson for conducting the study as they have assumed increasingly important role in every aspect of our instructional planning, as effective audio-visual aids. Three experimental devices - pupil discussion interactive and assignment were combined with the video and tape-slide strategies for better learning.

Video-script was prepared for the lesson in social science - 'Human Interaction with Environment' and modified based on the opinion and suggestions of experts, experienced teachers and teacher educators. The video-lesson, one of the intervention strategies was prepared by using pictures, posters, drawings, real objects, live scenery and audio-mixing and editing with the help of an expert. The prepared video lesson was presented to 30 pupils of standard IX for viewing to study its understandability and suitability.

A script for the tape-slide lesson on 'Chemistry and Environment' in the subject general science for standard

IX, was prepared and modified based on the comments obtained from a panel of experts, experienced teachers and teacher educators. Pictures, drawings, writings and flow charts were prepared, photographed and made into slides with the help of an expert. At the same time the audio recording was done using an audio tape-recorder and care was taken to see that the slides and audio-tape recorder replay, would synchronise with each other. Necessary modifications were done based on the feed back obtained from a trial viewing of 30 pupils of standard IX..

Two 'achievement tests' on population education concepts and a 'scale of attitude' to assess their attitude towards checking the population growth were the tools developed by the investigator in order to study the effectiveness of the two intervention strategies and devices used. Pilot study was conducted and validity and reliability were established for these tools. The socio-economic status scale of Vendal (1981) was used to obtain the background information about the sample.

A random sample of 400 pupils of standard IX from 4 schools in and around Coimbatore, with due consideration for the variables of gender and locality, were selected as the sample for the final study.

The achievement tests on population education concepts and the scale of attitude towards checking the population growth were administered to 100 pupils of

standard IX in each of the schools selected, in order to study the entry behaviour of the sample. Necessary instructions were given and supervision was done to avoid copying. Socio-economic status scale was then administered to the same sample to collect their background information.

Then the pupils were motivated, and the video-lesson on 'Human Interaction with Environment' in Social Science was presented by the investigator with the help of the teachers. The video-lesson was showed a number of times and review was permitted if necessary to the experimental group by E_1-pupil discussion device, E_2 interactive device and E_3- assignment device. Twenty five pupils of the control group were taught by the regular teacher using the traditional method.

Tape-slide lesson was then introduced and the lesson on 'Chemistry and Environment' in General Science was shown by screening the slides along with the audio-cassette replay simultaneously. The pupils of the experimental group were permitted to take turns and relearn a number of times getting the assistance from the investigator for operating the slide-projector and a tape-recorder, like the video lesson groups of E_1- pupil discussion device, E_2 interactive device and E_3 assignment device. 25 pupils of the control group were taught by the regular teacher using the traditional method.

The achievement tests on population education concepts and the scale of attitude towards checking the population growth were administered to the same pupils of each of the schools, after learning using the two intervention strategies and devices and the same procedure was followed in the post-test administration meant to study the outgoing behaviour of the pupils.

The collected answer papers were scored carefully by the investigator using the scoring keys. The data so obtained was consolidated and subjected to further statistical analysis. The hypotheses formulated were verified using the statistical analysis done and the results were interpreted.

Summary of the results

1. Both video and tapeslide strategies are effective in the learning of population education concepts compared to the traditional method of teaching for standard IX pupils and the difference is significant at 0.01 level.
2. Both video and tapeslide strategies are effective in developing in the pupils, a favourable attitude towards checking the population growth compared to the traditional method of teaching and the difference is significant at 0.01 level.
3. The pre-test knowledge of the pupils is not dependent on their socio-economic status for the concepts selected for the video-lesson.

4. The F-values of the means of the adjusted pre-test achievement scores in video-lesson are statistically significant at 0.01 level when considered by locality, gender and also their interactions. The performance of the pupils belonging to rural locality is better compared to the urban pupils. On the whole boys have scored more than girls and they have performed equally well irrespective of the locality whereas girls belonging to rural locality have performed better than those belonging to urban locality.

5. The F-values of the means of the adjusted post-test achievement scores in video-lesson are statistically significant at 0.01 level when considered-

(a) between pupils belonging to rural and urban localities,

(b) among pupils learning through the three different devices,

(c) among pupils belonging to different localities and three devices and

(d) among pupils belonging to different localities, gender and devices.

There is no significant difference between

(a) boys and girls

(b) locality and gender and

(c) by gender and devices.

Therefore the findings are-

i) Boys and girls in the experimental group have performed equally well compared to the control group,

ii) Urban pupils performed better,

iii) all the three experimental devices groups have performed better than the control group irrespective of gender and locality.

6.1. Pupils learning through all the three experimental devices in video strategy have performed better than the control group and the differences are significant at 0.01 level.

6.2. When the three devices are analysed against each other, the differences are again significant at 0.01 level.

6.3. Among the three devices, interactive video is better than pupil discussion and the latter is better than the assignment device.

7. When the post-test achievement scores were analysed subarea-wise, against gender, locality, devices and their interactions the findings are as follows:

7.1. In the subarea '**Statistics**' -its scores are not significant against locality, gender, locality by gender, and gender by devices whereas it is significant at 0.01 level for devices, locality by device and significant at 0.05 level for locality gender by device.

It shows that all the three experimental devices in video strategy are effective in making pupils learn the concepts in the subarea statistics better.

7.2. In the subarea '**causes**' the difference are significant at 0.01 level for all the variables except locality by

device, and this shows that the pupils have learnt more about causes in the experimental group than the control group

7.3. In the subarea '**consequences**,' the differences is significant at 0.01 level for all the variables except between boys and girls. This again shows the effectiveness of the experimental devices in video strategy.

7.4. In the subarea '**control**', the differences are significant at 0.01 level for all the variables except in gender and locality by gender.

8. The pre-test knowledge of the pupils is dependent on their socio-economic status for concepts selected for tapeslide lesson. The pupils belonging to low socio-economic status group performed better than those belonging to high socio-economic status group.

9. The F-values of the means of the adjusted pre-test achievement scores of the tapeslide strategy are significant at 0.01 level when considered by gender, locality and their interactions. Boys and rural pupils have performed better than their counterparts.

10. The F-Values of the means of the adjusted post-test achievement scores of the tapeslide strategy are significant at 0.01 level for all the variables except in locality by gender and gender by devices. Boys and rural pupils have performed better than their counterparts. Here again all the three experimental

device groups have performed better than the control group irrespective of gender and locality.

11.1. Pupils learning through all the three experimental devices in tapeslide strategy have performed better than the control group and the difference are significant at 0.01 level.

11.2. When the three devices are analysed against each other, the differences between pupil discussion and assignment devices is not significant.

This shows that interactive tapeslide device is better than the other two devices.

12. There is no significant difference among the pre-test attitude scores of the three socio-economic status groups,

13. The F-values of the means of the adjusted pre-test attitude scores are significant at 0.01 level when considered by gender and locality by gender but not significant in the case of locality. Girls have developed a more favourable attitude towards checking the population growth. Urban girls and rural boys have more favourable attitude than their counter-parts.

14. When the experimental group is compared with the control group regarding the attitude formation for checking the population growth, the differences of all the variables are significant at 0.01 level.

14.1. Girls have developed a more favourable attitude than boys

14.2. Urban pupils developed a more favourable attitude than rural pupils and

14.3. In terms of locality and gender, urban girls and rural boys have developed a more favourable attitude than urban boys and rural girls.

14.4. Despite the locality and gender, pupils of all the three experimental devices groups have developed a more favourable attitude than the control group.

15.1. Pupils learning through all the three experimental devices have developed a more favourable attitude towards checking the population growth and the differences are significant at 0.01 level.

15.2. Interactive device helped better in developing the favourable attitude towards checking population growth compared to pupil discussion and assignment, both in video and tapeslide lessons.

16. When the post-test attitude scores of the various subareas are analysed against gender, locality, devices and their interactions, it is found that the differences between all the variables are found to be significant at 0.01 level except in the subarea - environment and locality by device.

This shows that all the three experimental devices in both the strategies have helped in the formation of a

favourable attitude towards checking population growth when considered for all the subareas.

17.1. The correlation coefficient values between the pre-and post-test achievement scores of video, tapeslide and attitude are significant at 0.01 level in all the four groups of the significant difference group.

17.2. Correlation between pre-and post-test scores is higher in tapeslide strategy compared to the pre-and post-test attitude scores. It is least in the case of pre-and post-test achievement scores in video strategy.

18. There is no correlation between the gain scores of video, tapeslide and attitude when they are compared with each other.

19. There is no correlation between the socio-economic status and the gain scores of achievement in video, tapeslide and attitude scores except in rural girls, between socio-economic status and gain scores of achievement in tapeslide.

Suggestions

1. Video tapes and tape-slides could be prepared for other subjects in standard IX in order to integrate additional population education concepts.
2. Video tapes, tape slides and other audio-visual aids prepared by NCERT-CIET could be made available for the State by combining the budget of many schools.
3. By combining the services of experts in university departments of Educational Technology with subject

matter specialists, teachers and teacher educators, quality audio-visual materials for the teaching of population education concepts suitable for different levels of schools can be planned, prepared and distributed.

4. The services of the Central and State Level Departments of Publicity and Health Laboratories may be combined to plan and execute the mobile population education cells for the dissemination of population education concepts for the non-formal set up.

5. Population Education Cells can be organised at the school level, concentrating on projects, activities and cultural activities with regard to population phenomena and the disastrous effects of over population.

6. The teacher education institutes can take up projects to disseminate the knowledge of population education concepts among the schools in cities and rural areas using audio-visual materials as part of their internship.

7. The Population Education Cells of Arts and Science Colleges and Teacher Education Institutes, as part of their Community and Social Service, National Service Scheme, Adult-Education, and Mass Literacy Programmes can organise and include Population Education activities in their non-formal education scheme using audio-video materials.

8. Cultural activity Teams highlighting the advantages of small families, can be organised in schools and colleges and they can carry the messages to the rural masses during holidays and summer vacation.

Conclusion

One of the special features of population education as an educational endeavour is that it lays more emphasis on objectives relating to the affective domain, necessitating the selection of such topics that have a potentiality to initiate among the learners the processes of attitude formation and value orientation towards population issues. For this purpose there is a need to formulate and modify, every now and then, the knowledge base by preparing a number of curricular and instructional materials and a greater emphasis on the wider use of electronic media, as effective implementation depends on its effective presentation in the classrooms. The use of all these intervention strategies and devices should result in the development of voluntary, strong minded resolution on the part of the future citizens, to limit the size of their families, as small family is the key to open the door of prosperity and progress.

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APPENDIX - I

Analysis of the syllabi for standard IX (in social science and general science)

Sub-area of population	Subject of Integration	Major concepts
Statistics	Social Science, Part IV, Lesson 18, Topic - The Human Interaction with environment	1. Projections on population explosion 2. Population growth in developed and under developed continents and a. Percentage of population explosion and b. its related problems 3. Ratio between land and people per square kilometre in different continents 4. Population density in urban and rural areas, big cities, different countries and different continents 5. Understanding of countries with high population density, low population density and very low population density
Causes		6. Reasons for difference in population density-cultural and geographical 7. Population growth a. Causes of population growth-birth rate, death rate and migration. b. Socio-economic problems related to population growth
Consequences		1. The relation between the environment and innates 2. Food chain, food-web and balance in nature 3. Dangers due to disturbance in the natu balance with examples 4. Importance of herbivores and carnivores 5. Important food stages in fresh water and l 6. Depletion of natural resources in differ continents

		7. Population growth and food requirements
Consequences	Science-Chemistry, Unit-16, Topic - Chemistry and Environment	1. Air pollution-Causes for air pollution-Oxides of carbon, oxides of sulphur, oxide of nitrogen, minute particles in air, he metal compounds, radioactive impuriti ozone layer and air pollution, air pollut due to sewage.
		2. Water pollution-consequences of wa pollution and dissolved oxygen in water, n for oxygen, water pollution due to excess fluoride, water pollution due to detergen leakage of oils, leather tanning industries.
		3. Land pollution-pollution due to insecticid control of land pollution, radioactive sew and environmental pollution, radioact destruction and ill-health, removal radioactive sewage

APPENDIX - 2

Content covered in video lesson

1. Relationship between man and environment - various types of organism that live and die in the earth, rotation of earth around the sun, age of the earth, origin of man on the earth.

2. Struggle for the existence of man and survival of the fittest.

3. Migration of the man for various purposes like food, shelter, employment etc.

4. Growth rate was less in ancient days since the birth rate and death rate was equal.

5. Advancement in science, technology and economics compared to the olden days using various natural resources.

6. Population growth in 18th and 19th centuries - growth rate comparison.

7. Reasons for population growth - decrease in death rate, increase in birth rate, increase in life expectancy.

7.1 Meaning and definition of death rate, birth rate, growth rate and average life expectancy

7.2. Calculation of birth rate, death rate and growth rate

7.3. Reasons for the increase in life expectancy and birth rate and decrease in death rate due to the advancement in science, technology and medicine

8. Table depicting the population of world from the year 1650 till 1991 (in millions)

8.1. Doubling of the population in the year 1850 in just 80 years

8.2. Projections of population growth upto the year 2022

8.3. Table depicting the population of the world from the year 1970 to 1991 with projections.

9. Increase in population in one second, one day and in one year

10. Population growth in different countries of the world

10.1. Population in developed countries

10.2. Population in developing countries

10.3. Reasons for the decrease of growth rate in developed countries

10.4. Reasons for the decrease of growth rate in developing countries

10.5. Population growth in northern and southern hemisphsere

10.6. Bar diagram showing the population growth in each continent

11. Pie diagram showing the distribution of population in different countries of the world

11.1. Population of China and India

12. Projections of India's population

12.1. Reasons for increase in popultion of India

12.2. Table depicting the birth rate, death rate and growth rate from the year 1921 to 1991 in India.

13. Some important concepts regarding population like every sixth person in the world is an Indian

14. Population density - definition and meaning

14.1. Population density in different countries

14.2. Population density in important cities like Madras, Calcutta, Delhi, Bombay, New York, Tokyo, Paris etc.,

14.3. Countries with more population density

14.4. Countries with less population density

14.5. Countries with least population density

14.6. Reasons for the uneven distribution of population like type of land, climatic conditions, political reasons, cultural reasons, etc.

14.7. Examples of places that are unfit for the people to live in.

14.8. Examples of places that are suitable for the people to live in

14.9. Political reasons like non-whites are not allowed to live in Australia

14.10. Cultural reasons like people belonging to Masai, Karibu culture do not allow others

15. Reasons of migration - formation of slums leading to poverty.

15.1. Reasons for low standard of living in developing countries.

15.2. Flow chart depicting the relation between population growth and low standard of living.

16. Meaning and definition of ecosystem.

16.1. Flow chart depicting the dependence of animals and human beings on plants.

16.2. Main Source of energy-food

16.3. Food chain.

16.4. Imbalance of ecosystem - reasons.

17. Effects of unplanned and unchecked use of natural resources by man for the past 200 years.

17.1. Harmful effects of population explosion in cities - air, water and land pollution.

17.2. New inventions causing new problems.

17.3. Main problem of population growth - food scarcity.

18. Various sources of food in different countries and specifically in India.

18.1. Methods to meet the needs of the increasing population by improving the natural resources and in other ways.

18.2. Roles and responsibilities of the developed and developing countries in checking the population growth.

4.8. Compounds of heavy metals - tetra ethyl lead prevents the knocking of the petrol-air mixture resulting accumulation of lead compounds, hazards of inhaling of lead compounds like brain damage to children etc.

4.9. Radioactive substance in the air - natural radioactivity and nuclear power plants produce nuclear wastes and causes nuclear pollution.

4.10. Ozone shield and atmospheric pollution-ozone layer absorbing sun's UV radiation, atmospheric pollution weakens the ozone layer.

4.11. Air pollution due to garbage - disposal of wastes from households, and also industries cause adverse effects of air, conversion of garbage waste into wealth in the form of energy like gobar-gas plant. bio gas plant, electric power etc.

4.12. Table presenting the air pollutants, reasons for the formation of these pollutants and health hazards of these pollutants.

5. Water pollution:

5.1. Importance of water

5.2. Reasons for water pollution - domestic wastes industrial wastes, chemical pollutants, agricultural wastes, etc. are thrown into public water supplies.

5.3. Hazards of water pollution - biological and chemical hazards.

5.4. Effect of pollution on the dissolved oxygen in water-pollution decreases dissolved oxygen.

5.5. Biological oxygen demand - examples of substances with high BOD, diseases caused by harmful bacteria like cholera, typhoid etc.

5.6. Water pollution due to excess fluorides-ill effects of water pollution due to the presence of excess concentration of fluorides like fluorosis, dental fluorosis, stiffness of joints, skeletal fluorosis, etc. Defluoridation techniques and ion exchange materials.

5.7. Water pollution due to detergents - difference between soaps and detergents, ill effects caused by detergents, remedial measures to control pollution of water by detergents like effluent treatment methods.

5.8. Water pollution by oil spillages-occurrence of spilling of crude oil, health hazards like carcinogenic diseases etc., methods adopted to check this type of pollution.

5.9. Water pollution due to tannery wastes-meaning of tannery wastes, effects of water pollution by tannery wastes, location of tanneries in Tamil Nadu. The Environment Act of India dealing with the management of pollution control and emphasis on public health.

5.10. Water pollution due to distillery wastes-meaning of distillery wastes, number of distilleries in India, pollution of water by distillery wastes, ways of treating the waste water.

5.11. Table depicting the pollutants of water, causes for the pollution and effect of this pollution.

6. Soil pollution:

6.1. Causes of soil pollution-excess use of fertilizers, insecticides, pesticides etc., industrial wastes, domestic wastes, etc.

6.2. Soil pollution by pesticides-Bhopal tragedy caused by methyl isocyanate, examples of pesticides like DDT, BHC, dieldrin etc., frequency of pesticide spray in a year, some pesticides like carboryl, carbofuran affect the population of earthworm which is called as 'farmer's friend', measures used for the prevention of pollution due to insecticides, suitable methods adopted for the removal of pesticide residues and agricultural wastes.

7. Nuclear wastes and environmental pollution:-

Types of energies, formation of nuclear energy, nuclear wastes causing environmental pollution.

7.1. Health hazards of nuclear pollution like genetic disorders cancer of the skin, blood cancer, attack of eye lens, etc. Evidence of nuclear disasters like Hiroshima and Nagasaki and Chernobyl.

7.2. Removal of radioactive wastes-methods of disposal of radioactive wastes.

8. Role and responsibilities of the pupils in avoiding pollution of air, water and land.

APPENDIX - IV 4

Table of specification

Sub-area	Knowledge	Understanding	Application	Skill
Statistics	A 1, 3, 5, 8, 16, 21, 24, 25, 27, 30, 31, 41, 42, 44, 47, 64	A 4, 6, 17, 18, 29, 43, 67	A 75	
	B 2			
	C 1, 4, 5, 6, 7			
Causes	A 15, 19, 22, 23, 28, 34, 48, 62	A 7, 9, 10, 14, 40, 45, 46, 55, 57, 69, 70	A 11, 26, 53, 68	A 20, 39, 56
		C 8(4), 9(2)		
Consequences	A 33, 52	A 2, 12, 13, 32, 59, 63	A 37, 38, 49, 50, 51, 54, 71, 74	
	B 6, 9	B 3, 5, 7	B 8, 10	
	C 2, 3, 11, 14(3)	C 10(4), 13	C 12(2), 15	
Control		A 36	A 35, 58, 60, 61, 65, 66, 72, 73	
			B 1, 4	

APPENDIX - ~~III~~ V

Background information of the sample selected for pilot study

Sl. No.	Name of the Schools Selected	No.of pupils	Boys	Girls	Type of management	Type of school	Area
1.	Sri Avinashilingam Higher Secondary School for Girls	50	-	50	Private	Girls	Urban
2.	S.R.P.Ammani Ammal Corporation High School for Girls	50	-	50	Corporation	Girls	Urban
3.	Corporation High School for Boys, Selvapuram	50	50	-	Corporation	Boys	Urban
4.	Corporation High School, Ramalingam Colony	50	25	25	Corporation	Co-education	Urban
5.	Government Higher Secondary School for Boys, Asokapuram	50	50	-	Government	Boys	Rural
6.	Government Higher Secondary School for Girls, Asokapuram	50	-	50	Government	Girls	Rural
7.	Government Higher Secondary School, Kuniamuthur	50	25	25	Government	Co-education	Rural
8.	Swathanthra Higher Secondary School, Vaiyampalayam	50	25	25	Private	Co-education	Rural
9.	Thambu Higher Secondary School, Press Colony	50	25	25	Private	Co-education	Rural

APPENDIX - ~~IV~~ VI

Achievement Test on Population Education Concepts (I)

A. Choose the right answer by putting a tick mark (√) against it

1. What is the world population according to the 1987 census?

   a. 8 billion b. 5 billion c. 6 billion d. 3 billion

2. Why are we afraid of the growth in the world population?

   a. due to food problems
   b. due to economic problems
   c. standard of living is reduced
   d. due to all the above

3. How many children are born in the world in every second?

   a. 150 b. 100 c. 250 d. 175

4. In which continent do we have less population?

   a. American b. Asia c. Oceania d. Africa

5. What is the population of India according to 1991 census?

   a.680 million b.840 million c.780 million d.884 milli

6. Which country's population do we add to our population in a year?

   a.Greenland b.Australia c.England d.South America

7. What is the fundamental reason for the variations in the world population densities?

   a. Political reasons
   b. Cultural reasons
   c. Industrial reasons
   d. Environment is not fit for living

8. What is the world land area in which 2 out of 3 parts of the world population live?

   a. in 1/3 b. in 1/7 c. in 1/4 d. in 2/5

9. When the birth rate is remaining constant, if the death rate is reducing what will happen to the growth rate?

   a. remains constant
   b. increases first then reduces
   c. increases
   d. reduces

10. How many times more is the growth rate of the developing countries compared to that of the developed countries?

    a. 2 times b. 3 times c. 1 1/2 times d. 4 times

11. When growth rate is not under control, in how many years will the population double?

    a. 30 b. 40 c. 50 d. 60

12. What is the reason for the developing countries to have low standard of living?

    a. illiteracy
    b. general insanitation
    c. unemployment
    d. due to all the above

13. What is the reason for our low National income compared to developed countries?

    a. indifference of our government
    b. government's expenditure scarcity
    c. governments expenditure and population in direct proportion
    d. governments expenditure and population in indirect proportion

14. What is the reason for the increase in world population in 19th century compared to the early years?

    a. increasing bith rate and decreasing death rate
    b. decreasing birth rate and increasing death rate
    c. both increasing
    d. both decreasing

15. How many children are born in the world in a day?

a.2,20,000 b.3,20,000 c.3 billion d.4,00,000

16. How many times is the number of population living in the northern hemisphere more than that living in the southern hemisphere?

a. 5 b. 1.5 c. 3 d. 2

17. Which continent has the maximum population of the world?

a. Asia b. Africa c. America d. Australia

18. What will be the population of India in millions by 2000 AD?

a. 898 b. 1200 c. 900 d. 1000

19. How many children are born in every 3 seconds in our country?

a. 1 b. 1.5 c. 3 d. 2

20. For every 1000, if 22 are born and 10 die what is the growth rate?

a. 12% b. 32% c. 22% d. 10%

21. How many live in a square kilometer on an average in the world?

a. 2 b. 12 c. 22 d. 32

22. What is the life expectancy in India?

a. 53 b. 50 c. 48 d. 60

23. How many children are born in every year in the world?

a.100 million b.67 million c.80 million d.60 million

24. What percentage of people live in the northern hemisphere?

a. 60 b. 75 c. 47 d. 90

25. What is the population density in Australia?

a. 100 b. 30 c. 2 d. 1

26. Death rate remaining constant, if the birth rate is increased what will happen to growth rate?

a. becomes less
b. will increase
c. remains constant
d. increase first then decrease

27. What percentage of the world population live in Asia?

a. 26 b. 52 c. 38 d. 36

28. How many children are born in India in a day?

a. 4,000 b. 44,000 c. 40,000 d. 41,000

29. How is the world population distributed?

a. unevenly
b. evenly
c. in higher amounts
d. in lower amounts

30. Where do we have high population density?

a. South part of Europe
b. Equatorial region
c. South America
d. South Asia

31. Where do we have less population density?

a. South part of Europe
b. African coastal regions
c. South east Asian river valley
d. Hot desert

32. In a country of villages like ours why do we have pollution problem?

a. More production and more use
b. Illiteracy and poverty
c. Erosion of nature
d. Sewage not treated

33. For how many persons do we have one doctor in our country?

a. 400 b. 1000 c. 1500 d. 1600

34. What is the percentage of 'young dependents' in our country?

a. 30 b. 10 c. 42 d. 50

35. What are the objectives of giving population education to our school pupils?

a. to understand the problems of population
b. to develop attitude towards checking population growt
c. to adopt small family norm
d. for all the above

36. What is meant by awareness about population explosion?

a. social and demography changes
b. social and democratic changes
c. economic and political changes
d. economic and social changes

37. What is the important reason for the unemployment problem in India?

a. less natural resources
b. mechanisation
c. more population and low capitation
d. low quality products in international markets

38. Which out of the following does not reflect social growth?

a. more young dependents
b. progress in industrial growth
c. high per capita income
d. more production

39. Population growth rates during the years of 1970, 1975, 1980 and 1985 has been found to be 1.0, 1.1, 2.2 and 3.5 respectively. Which year denots doubling of population?

a. 1970 b. 1975 c. 1980 d. 1985

40. For the above data, what is the nature of growth of population?

a. growth is less
b. growth is more
c. growth is balanced
d. no change in growth rate

41. In India, once in how many years do we take census?

a. 7 b. 8 c. 10 d. 5

42. Which state of our country has the least population?

a.Madhya Pradesh b.New Delhi c.Nagaland d.Tamil Nadu

43. Which state of our country has the highest population?

a. Kerala b. Tamil Nadu c. Bihar d. Gujarat

44. What is the percentage of India in world land area?

a. 2.4 b. 4.2 c. 8.1 d. 6

45. In cities like New Delhi and Bangalore, between 1951 and 1981 how many times has the population increased?

a. 1 b. 3 c. 4 d. 5

46. What is the percentage of Indian population in the world population?

a. 20 b. 30 c. 25 d. 17

47. Which country has the highest population density?

a. Africa b. South America c. Canada d. Korea

48. What is the age of marriage in India for male and female?

a. 16, 14 b. 21, 18 c. 28, 21 d. 18, 16

49. What is the importance of human beings in?

a. production of food
b. distribution of food
c. consumption of food
d. collection of food

50. Which out of the following needs to be totally removed?

a. effluents from the industries
b. pesticides and insecticides
c. noise from aeroplanes
d. food adulteration

51. What is the relationship between the human beings and nature?

a. become servant to nature
b. live with nature integrated
c. defeat the nature
d. afraid of nature and hate it

52. In 1921 every 9th man was living in cities but in 1981, every - man has come to live in the cities?

a. 4th b. 7th c. 13th d. 8th

53. A developed country will have which of the following?

a. high death rate birth rate and infant mortality rate
b. high birth rate and infant mortality rate and low death rate
c. low birth rate, death rate and infant mortality rate
d. low birth rate and death rate and high infant mortality rate

54. Though our national income has increased, our standard of living has not increased to that extent. Why?

a. people without planning spend money on luxurious items
b. need to pay more income tax
c. spend more money on importing food
d. young dependents percentage is high

55. By which age group the young dependents ratio increased?

a. below 15 years
b. 65 years and above
c. 45 - 65 years
d. below 15 and above 65 years

56. If the growth rate is 1% in how many years will the population double?

a. 50 b. 100 c. 70 d. 200

57. What is meant by 'zero population growth' of a country?

a. reduction in population
b. population remains the same
c. birth rate is less than the death rate
d. no one dies

58. Considering the national level, what should be given importance in population education?

    a. population growth and socio-economic development influence each other
    b. birth rate cannot be changed
    c. population growth is the cause for all problems
    d. growth of population

59. What is the important reason for the development of slums in towns?

    a. migration of people from villages
    b. scarcity of living area in towns
    c. in slums the rent and tax are less
    d. it is easy to get place in slums

60. What is the most immediate objective of population education?

    a. implementation of family planning methods
    b. to slowly decrease the population
    c. to give the information about problems at individual and national levels
    d. to implement small family norm

61. What is the most important aspect of the research in population education at national level?

    a. to prepare curriculum for population education and orienting the teachers
    b. to organise population education cells and distribute pamphlets and books through such centres
    c. to teach sex education, conduct research and explain small family norm
    d. to explain the growth in population from different dimensions

62. What is the average number of children in an Indian family?

    a. 6.2 b. 2.3 c. 4.2 d. 5.0

63. What is the reason for the progress of the developed countries?

    a. scientific and technological growth
    b. natural resources
    c. economic development
    d. less population

64. India is the world perspective stand in which position?

a. first place in population number
b. first place in population density
c. second place in population density
d. second place in population number

65. Delayed marriage helps in what?

a. for more saving
b. physical and mental maturity
c. reduction in number and increased economic growth
d. all of the above

66. Why should one register the birth of a baby in municipality?

a. to know the astrological implications
b. to get claim the ancestral property rites
c. to claim ones right in the country
d. as announced in TV and radio

67. How is the average density of India when compared to world density of population?

a. lesser
b. double
c. same as that of the other
d. nearly 7 times more

68. What is the total family size?

a. number of children born for a woman
b. number of children born in her reproductive age
c. total number of members in the family
d. father, mother and number of children in the family

69. Which state in India has the least birth rate?

a. Punjab b. West-Bengal c. Kerala d. Maharastra

70. Were do we have the least age of a girl at marriage?

a. Maharastra b. Kerala c. Rajasthan d. Misoram

71. Which out of the following does not show economic development?

a. young dependency ratio
b. industrial progress
c. per capita income
d. more food production

72. In how many days should the birth be registered in the Municipality?

a. 7 b. 15 c. 20 d. 30

73. Within how many days should the death be registered in the Municipality?

a. 14 b. 25 c. 30 d. 45

74. What are the consequences of over population in the community?

a. conflicts
b. food scarcity
c. depletion of resources
d. all the above

75. How will be the population by 2001 year?

a. double as that of the present
b. get reduced
c. would grow enormously
d. same as at present

B. Say whether right or ~~work~~ wrong in the space provided

1. Man if he wants to be successful, he should exploit the nature to his advantage. [ ]

2. If we do not control the present population there is the danger of our population supersiding China by 2020. [ ]

3. Unchecked ever growing population in our country is the reason for our inability to enjoy the fruits of our growth. [ ]

4. To meet our present day needs, the best action will be to exploit the national resources, forgetting the future generation. [ ]

5. In order to meet our food needs, if we over use the cattle, it would not affect the food chain. [ ]

6. Soil erosion, floods, land slide are due to depletion of natural resources. [ ]

7. Ozone depletion is due to the rays of sunlight only. [ ]

8. In order to meet the fundamental needs of the people, it is not ~~among~~ wise to convert fertile lands and forests to industries. [ ]

9. Per calorie consumption of less than 20 g in the developing countries is not due to over population. [ ]

10. Adopting small family norm can lead to the eradication of poverty and raise the standard of living. [ ]

C. Answer the following.

1. Define - population density

2. Define - ecosystem

3. What is meant by food chain?

4. What is meant by birth rate?

5. What is meant by death rate?

6. What is meant by growth rate?

7. What is meant by average life expectancy?

8. Give four reasons for the increasing birth rate in our country?
   a.
   b.
   c.
   d.

9. Give any two reasons for the migration of people from villages to cities?

   a.
   b.

10. Give 4 important consequences of population growth.

    a.
    b.
    c.
    d.

11. What is meant by environmental pollution?

12. Give 2 reasons for environmental pollution?

    a.
    b.

13. What is the relationship between population growth and environment?

14. How are the following polluted by population growth?

    a. Land
    b. Water
    c. Air

15. What is the change effected in the Ozone layer due to population growth?

APPENDIX - VII (I)

SCORING KEY FOR THE ACHIEVEMENT TEST ON POPULATION EDUCATION CONCEPTS (VIDEO LESSON)

A.

1.	b	26.	b	51.	b
2.	d	27.	c	52.	a
3.	a	28.	d	53.	c
4.	c	29.	a	54.	d
5.	b	30.	d	55.	a
6.	b	31.	d	56.	b
7.	d	32.	b	57.	b
8.	b	33.	c	58.	c
9.	c	34.	c	59.	b
10.	a	35.	d	60.	d
11.	b	36.	d	61.	d
12.	d	37.	c	62.	d
13.	d	38.	a	63.	d
14.	a	39.	c	64.	d
15.	a	40.	b	65.	c
16.	c	41.	c	66.	c
17.	a	42.	c	67.	b
18.	d	43.	a	68.	d
19.	d	44.	a	69.	c
20.	a	45.	c	70.	c
21.	d	46.	d	71.	a
22.	a	47.	d	72.	b
23.	c	48.	b	73.	c
24.	d	49.	a	74.	d
25.	c	50.	d	75.	c

B.

1.	Wrong	6.	Correct
2.	Correct	7.	Wrong
3.	Correct	8.	Wrong
4.	Wrong	9.	Wrong
5.	Wrong	10.	Correct

C.

1. It is the number of people living on one square kilometre area of the land.

2. The physical environment and the organisms which live therein constitute the ecosystem.

3. In an ecosystem, the energy travels from one source to the other is known as food chain.

4. The number of children born per 1000 people is known as birth rate.

5. The number of persons die per 1000 people is known as death rate.

6. The difference between the number of children born and the number of persons die.

7. The average life-span of a person is known as average life expectancy.

8. a. birth rate increasing
   b. death rate declining
   c. life expectancy increasing
   d. taboos, misbeliefs etc.

9. a. employment
   b. agriculture failure

10. a. lower standard of living
    b. low per capita income
    c. inadequate health services
    d. pollution

11. The introduction of harmful matter into air, water and soil is known as environmental pollution.

12. a. transport
    b. industrial waste

13. Growth in population leads to more pollution and imbalance in nature

14. a. Land
    i. agricultural chemicals
    ii. mines
    iii. garbage dumps

    b. Water
    i. Industrial waste entering into water
    ii. Sewage water
    iii. fertilisers washed off from crop lands

    c. Air
    i. Oxides of carbon
    ii. Oxides of sulphur
    iii. Oxides of nitrogen

15. The air pollution caused by the population growth create holes in the ozone layer allowing the harmful rays from the sun leading to many diseases in human beings

APPENDIX 8

Achievement Test II (Tape slide lesson)

A. Answer the following by putting a tick (√) mark against the right answer.

1. What change will occur if the concentration of carbon-di-oxide increases in air?
   (a) rise in temperature (b) chemical change (c) environmental pollution (d) biological change.
2. What is the harmful effect of radioactivity? (a) skin cancer (b) leukemia (c) loss of sight (d) all the above.
3. What enters into the liver of the smokers?
   (a) Carbon dust (b) nicotine (c) tar (d) carbon-di-oxide.
4. Name the insecticide which affects the growth of earthworm. (a) DDT (b) dieldrin (c) carboryl (d) B.H.C.
5. Which part of the body of the man is affected by the insecticide pollutants?
   (a) heart (b) nervous system (c) eyes (d) skin.
6. How many times a year are the insecticides sprayed?
   (a) 1-7 (b) 2-7 (c) 1-5 (d) 2-6.
7. In which of the following the radioactive disintegrating substances cause disorders?
   (a) body (b) heredity (c) sanitation (d) environment.
8. Name the gas which caused the Bhopal tragedy. (a) ethyl isocyanate (b) methyl isocyanate (c) methyl cyanide (d) ethyl cyanide.

9. Name the gas that changes the temperature of the earth's crust.

(a) carbon monoxide (b) sulphur dioxide (c) carbon dioxide (d) nitrogen dioxide.

10. What is the symptom of the fluorosis disease?

(a) yellow stain in teeth (b) difficult to move joints in legs (c) difficult to turn the neck (d) all the above.

11. What will you get if you burn a fuel in the absence of air

(a) carbon dioxide (b) carbon dioxide and element carbon (c) carbon monoxide (d) carbon monoxide and element carbon.

12. Which of the following does not reduce the amount of oxygen in air?

(a) rust formation (b) photosynthesis (c) combustion of natural gas (d) respiration of living organisms.

13. Name the gas which prevents haemoglobin from carrying oxygen in the blood.

(a) nitrogen peroxide (b) carbon monoxide (c) carbon dioxide (d) sulphur trioxide.

14. What happens to the remaining in cowdung tanks?

(a) wastes (b) electricity (c) compost fertilizer (d) all the above.

15. What is acid rain?

(a) hydrochloric acid + water (b) chlorine + water (c) sulphuric acid + water (c) nitric acid + water.

16. Which rays of the sun are filtered by the ozone layer?
(a) VIBGYOR (b) ultraviolet (c) infrared (d) all the above.

17. What is the main reason of marble erosion?
(a) environmental pollution (b) alkali rain (c) acid rain (d) carbon-di-oxide.

18. What is the harmful effect of lead compounds when it enters into the human body?
(a) brain disorders (b) heart problems (c) damage of liver (d) disorders in pancreas.

19. Name the gas that evolves while the crackers are fired.
(a) sulphur dioxide (b) carbon dioxide (c) nitrogen dioxide (d) all the above.

20. Name the substance that is added with petrol and used as a fuel in automobiles. (a) lead (b) tetra ethyl lead (c) tetra methyl lead (d) nitrate.

21. Give the nature of sulphur dioxide
(a) odourless (b) garlic smell (c) suffocating smell (d) rotten egg smell.

22. Name the disease caused when we inhale cigarette smoke continuously. (a) jaundice (b) liver cancer (c) tuberculosis (d) breast cancer.

23. Name the gas which evolves when lightning occurs (a) oxides of nitrogen (b) oxides of carbon (c) oxides of sulphur (d) all the above.

24. Give the other name of dispersed carbon dusts in air.
(a) cloud (b) acid gas (c) smoke (d) dust.

25. Which gas is ejected first from the automobiles smoke?
(a) nitrogen peroxide (b) nitric oxide (c) nitrogen dioxide (d) nitrogen trioxide.

B. Answer the following in brief.

26. How will you prevent the excess concentration of carbon monoxide in air?

27. Mention any two harmful effects of water pollution.

28. Give any two consequences of the decrease of oxygen dissolved in water.

29. How can radioactive waste be disposed by a safe method?

30. what are the health hazards of nuclear pollution?

APPENDIX - 9

Scoring key for tapeslide lesson

1. a
2. d
3. b
4. a
5. b
6. a
7. a
8. b
9. c
10. d
11. d
12. b
13. b
14. c
15. c
16. b
17. c
18. a
19. a
20. b
21. c
22. b
23. a
24. c
25. b
26. (i) to ensure complete combustion
    (ii) to use efficient car engines.

27. (i) viral diseases
    (ii) bacterial diseases

28. (i) ~~diYorea~~ cholera
    (ii) typhoid

29. (i) sealed in appropriate containers and discharged
    (ii) mixing it with special glass substance and buried in a suitable place.

30. (i) genetic disorders
    (ii) cancer of the skin, blood cancer.

APPENDIX 3

Content covered in tape slide lesson

Tapeslide lesson on 'Chemistry and Environment' included the following concepts:

1. Implications of population explosion leading to environmental disasters-non-availability of drinking water facilities, non-availability of safe houses, insanitation, unremoval of sewage water, non-availability of medical facilities, air, water and land pollution, illiteracy and low standard of living.

2. Definition and meaning of environmental pollution.

3. Relation between population growth and environmental pollution-flow chart.

4. Air Pollution.

4.1. Ill effects of air pollution - respiratory, cardio vascular disease, neurological damage, and cancer.

4.2. Sources of air pollution - discharge from domestic chimneys, exhaust gases produced by automobiles, chemical factories and other industrial processes

Main atmospheric pollutants - carbon dioxide, carbon monoxide, oxides of sulphur, oxides of nitrogen and some particles.

4.3. Carbon dioxide - hazards like change of climate. etc.

4.4. Carbon monoxide - formation, sources, hazards, efforts taken to avoid incomplete combustion.

4.5. Oxides of sulphur - formation, health hazards, other hazards like corrosion of metals and buildings like Taj Mahal. Pollutant gas that is given out when lighting crackers, acid rain, methods to control the pollution due to sulphur dioxide.

4.6. Oxides of nitrogen - formation, health hazards like respiratory diseases etc.

4.7. Solid particles in the air - formation, hazards like respiratory problems, lung cancer etc., methods to control this type of pollution.

APPENDIX - VI

Scale of attitude towards checking the population growth

Read the following statements and give your opinion against the appropriate level by putting a tick mark (/) :

Statements	Totally accepted	Accepted	Neutral	Not accepted	Totally not-accepted
Small family norm :					
1. Small family is like a park, large family is like a boat entangled in a cyclone.					
2. Giving birth to one child is a bright future, giving birth to many children is full of problems.					
3. Small family leads to the care of children in the best possible way.					
4. Large family is a warfare.					
5. Parents need a boy child in order to reach heaven after death.					
6. Getting married after the age of twenty and giving birth to only one child are pleasant.					
7. A mother needs to work less in a large family.					
8. Getting more children is the best wealth which cannot be destroyed.					
9. Large family is an index of poverty.					

Statements	Totally accepted	Accepted	Neutral	Not accepted	Totally not accepted
10. More children is more income					
Social development :					
11. Count the number of children before giving birth and not think of counting the number after giving birth.					
12. Murder, stealing, burglary are the social problems that arise due to population growth.					
13. Giving birth to children is the blessing of God.					
14. Citizens who cannot take care of the children they give birth to, are answerable before the law for their irresponsibility.					
15. 'Only if they give birth to many a few might survive' this feeling of parents is correct.					
16. Delaying the age of marriage will reflect the social responsibilities of citizens.					
17. No religion favours the checking of the population growth.					
18. Whether big or small - a boy is a boy.					

Statements	Totally accepted	Accepted	Neutral	Not accepted	Totally not-accepted
Economic development					
19. More numbers in a country's population is the best capital of that country.					
20. Population growth enables the power to buy the raw materials for production in a nation.					
21. Unemployment is not the product of over-population.					
22. Under employment in the villages is definitely due to our enormous growth in population.					
23. Cultivated lands getting divided is not due to our growth in population.					
24. All the nation's efforts for the development of the citizens is spoilt due to our over population					
25. Per capita income of a nation does not reflect its progress/development.					
26. Over population is not a hindrance for a country's progress.					
27. Let us reduce our population growth and grow in the international front.					

Statements	Totally accepted	Accepted	Neutral	Not accepted	Totally not-accepted
Health and Nutrition					
28. Healthy mother and child are the prizes of a small family.					
29. Over population makes the people to shed tears for the sake of water.					
30. Ever growing over population is the fundamental reason for our food problems.					
31. Early child-hood deaths in our country is due to inadequate medical facilities available.					
32. There is no danger for the health of the mother, even if many children are born with proper spacing.					
33. Our aim is not only to get good food for all our people, but also to get balanced nutritious food for all.					
Demography					
34. Let us increase the age of marriage and reduce the birth rate.					
35. We feel proud to say that every sixth man in the world is an Indian.					
36. Let us reduce the growing population and reduce the number of accidents.					

Statements	Totally accepted	Accepted	Neutral	Not accepted	Totally not-accepted
37. Having more number of young dependents is not a load for the country.					
38. We need not register the births and deaths in the municipality.					
39. Though we have increased the transport facilities, our increasing growth rate makes it not enough for all.					
Environment					
40. Unchecked growing population leads to reduction in the environmental resources.					
41. Unchecked growing population leads to innumerable disturbances in the environment.					
42. Let us reduce our population and conserve mineral resources.					
43. Due to growing population, if we cut a few trees here and there, it will not disturb the balance in nature.					
44. Deforestation is only due to population explosion.					
45. As our planet earth is big it can sustain any amount of population growth.					

Statements	Totally accepted	Accepted	Neutral	Not accepted	Totally not-accepted
Education					
46. Let us open the eyes of wisdom of our people and reduce the growth in population.					
47. Growth in population will lead to a low quality education.					
48. Let us reduce the growth in population and thereby reduce the length of 'Q' in our schools.					
49. The increase in the percentage of illiterates in our country is not due to the growing population.					
50. There is no relation whatsoever between education and the size of a family.					

APPENDIX - ~~VII~~ XI

SOCIO-ECONOMIC STATUS SCALE

Sex :

Age :

Caste :

1. Name of the pupil and class
2. Name of the father
3. Name of the mother
4. Education of the father
5. Education of the mother
6. Occupation of the father
7. Salary per month
8. Occupation of the mother
9. Salary per month
10. Income from other sources (specify) (per month)
11. Number of people in the home
12. Place of residence : Rural/urban :
13. Do your parents own the house you live in? : Yes/No
14. Do you live in an independent house? : Yes/No
15. Do your parents pay income tax? : Yes/No
16. Do your parents host guests frequently? : Yes/No
17. Do your family has the habit of going to picnics and summer resorts? : Yes/No

APPENDIX - ~~VIII~~ XII

Weightage for the socio-economic status scale

Sl. No.	Factors	Categories	Weighted score	Maximum possible score on the factor
1.	Income level of parents	A. For urban families		
		Rs.050 to 125	1	
		Rs.126 to 150	2	
		Rs.151 to 700	3	
		Rs.701 to 1350	4	
		Rs.1351 and above	5	
		B. For rural families		
		Rs.050 to 100	1	
		Rs.101 to 150	2	
		Rs.151 to 700	3	
		Rs.701 to 1000	4	
		Rs.1001 and above	5	5
2.	Literacy level of parents	For both urban and rural families		
		1. Illiterate and primary education	1	
		2. Secondary education	2	
		3. Collegiate education	3	
		4. Post-graduate education	4	
		5. Professional and doctorate	5	5
3.	Occupational level of parents	1. Unskilled	1	
		2. Skilled and semi-skilled	2	
		3. Clerical	3	
		4. Supervisory and middle managements	4	
		5. Professional and management	5	5
4.	Family size	1 to 2	2.50	
		3 to 4	2.00	
		5 to 6	1.50	
		7 to 8	1.00	
		9 and above	0	2.50
5.	Social status	1. Owning house	0.50	
		2. Living in independent house	0.50	
		3. Paying income tax	0.50	
		4. Hosting feasts frequently	0.50	
		5. Going to resorts for taking rests	0.50	2.50
				20.00

APPENDIX - 13

Means of the adjusted post test achievement scores in video strategy sub-area wise

	Urban			Rural			Total
	Girls	Boys	Combined	Girls	Boys	Combined	
Statistics							
Control	17.49	17.26	17.37	18.09	17.63	17.86	17.62
E_1	19.84	19.60	19.72	20.18	21.00	20.59	20.16
E_2	22.01	22.36	22.19	22.23	20.58	20.90	21.55
E_3	18.44	19.19	18.18	19.87	17.90	18.89	18.85
Total	19.84	19.60	19.52	19.84	19.28	19.56	
Causes							
Control	14.56	15.60	15.08	16.74	15.23	15.98	15.53
E_1	17.18	18.46	17.82	17.59	18.74	18.16	17.99
E_2	18.15	20.24	19.20	19.57	19.03	19.30	19.25
E_3	15.65	17.12	16.38	16.24	17.38	16.81	16.60
Total	18.38	17.85	17.11	17.54	17.60	17.57	
Consequences							
Control	18.43	18.62	18.52	18.77	19.04	18.91	18.71
E_1	24.64	23.42	24.03	20.08	23.41	21.74	22.88
E_2	25.32	24.39	24.85	24.15	23.25	23.70	24.28
E_3	20.86	19.84	20.35	20.02	19.13	19.58	19.96
Total	22.31	21.57	21.94	20.75	21.21	20.98	
Control							
Control	5.39	4.91	5.15	4.32	4.21	4.26	4.71
E_1	6.63	6.28	6.46	4.85	5.57	5.21	5.83
E_2	6.73	6.94	6.84	6.84	6.37	6.60	6.72
E_3	4.75	6.04	5.39	4.63	4.70	4.67	5.03
Total	5.88	6.04	5.96	5.16	5.21	5.18	

APPENDIX - 14

Means of the adjusted post-test attitude scores sub area wise

	Urban			Rural			Total
	Girls	Boys	Combined	Girls	Boys	Combined	
Small Family							
Control	33.14	30.12	31.63	28.59	30.00	29.30	30.46
E_1	37.76	32.75	35.25	31.33	29.90	30.62	32.93
E_2	37.61	33.68	35.65	32.42	35.80	34.11	34.88
E_3	35.07	29.31	32.19	29.91	33.38	31.64	31.91
Total	35.89	31.46	33.68	30.56	32.27	31.42	
Social Development							
Control	25.93	24.40	25.17	25.14	23.80	24.47	24.82
E_1	31.16	28.10	29.63	25.07	27.87	26.47	28.05
E_2	32.45	27.86	30.15	27.89	28.72	28.31	29.23
E_3	27.91	23.98	25.95	23.99	25.48	24.74	25.34
Total	29.36	26.09	27.73	25.52	26.47	25.99	
Economic development							
Control	28.95	26.37	27.66	26.44	26.83	26.64	27.15
E_1	33.11	30.50	31.81	29.01	31.19	30.10	30.95
E_2	34.27	32.88	33.57	31.39	30.14	30.76	32.17
E_3	32.13	25.60	28.86	25.71	28.44	27.07	27.97
Total	32.11	28.84	30.48	28.14	29.15	28.64	
Health and Nutrition							
Control	21.35	17.86	19.61	17.87	17.83	17.85	18.73
E_1	24.83	21.56	23.19	19.13	21.29	20.21	21.70
E_2	24.48	23.76	24.12	22.01	22.34	22.18	23.15
E_3	23.14	18.27	20.71	18.71	18.65	18.68	19.69
Total	23.45	20.36	21.91	19.43	20.03	19.73	
Statistics							
Control	19.92	16.70	18.31	18.29	17.71	18.00	18.15
E_1	22.82	20.17	21.50	19.65	19.77	19.71	20.60
E_2	23.36	21.56	22.46	21.75	23.59	22.67	22.56
E_3	21.94	17.38	19.66	17.82	19.10	18.46	19.06
Total	22.01	18.95	20.48	19.37	20.04	19.71	
Environment							
Control	20.49	17.44	18.96	17.08	16.90	16.99	17.98
E_1	24.08	19.86	21.97	19.62	18.95	19.29	20.63
E_2	24.33	23.11	23.72	20.95	21.31	21.13	22.42
E_3	22.08	17.43	19.75	18.16	17.93	18.04	18.90
Total	22.74	19.46	21.10	18.95	18.77	18.86	
Education							
Control	18.03	15.30	16.66	15,35	15.20	15.27	15.97
E_1	19.64	18.00	18.82	16.39	17.16	16.78	17.80
E_2	20.09	19.81	19.95	19.63	19.22	19.43	19.69
E_3	19.88	15.16	17.52	15.85	16.51	16.18	16.85
Total	19.41	17.07	18.24	16.81	17.02	16.92	