Chapter VI

Summary and Conclusion
CHAPTER - VI

SUMMARY AND CONCLUSION

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6.1 INTRODUCTION

Education refers to any act or experience that has a formative effect on the personality of an individual. It also refers to the process by which the society deliberately transmits its cultural heritage, accumulated values, knowledge and skills from one generation to another. So education is indispensable for individual as well as for social development. In the modern world, it is realised that investment in education is most vital. Hence, the developing countries have given top priority to the investment on education. Even though education is as old as human race, the meaning and objectives of education have undergone “Metamorphosis”.

“Educare” is a Latin word and it means to nourish, to bring up, to raise etc., accordingly, it means nourishing or bringing up the child to certain ends or aims.

“Educare” has another meaning “to lead out” or “to draw out”. Accordingly, it means to draw out what is inordinate in the child or leading him out of darkness into light.

There are different perceptions on Education:

- Education makes a person self-reliant and selfless - Rig Veda.
Education as the end product of which is salvation - Upanishad.

Education makes a person good charactered and useful to the world - Yajna Valkya.

Pestalozgi opines that Education is the natural, harmonious and progressive development of a person's innate power.

According to Froebel, education is the un-foldment of what is already enfolded in the genes. It is the process through which the child makes internal and external development.

John Dewey considers education as the development of all those capacities in the individual which will enable him to control his environment and fulfil his possibilities.

To Redden, education is the deliberate and systematic influence exerted by the mature person upon the immature, through instruction, discipline and harmonious development of the human being, according to the individual and social needs and directed towards the union of the educated with his creator as the final end.

From the above, it can be concluded that education is an everlasting and an integrating process which helps to discover lasting values, modify the behaviour and performs the transmission of life by the living to the living. Education is the only potent tool by which social transformation and national reconstruction can be made possible.
Even in his times, Aristotle perceived that education is the creation of a sound mind in a sound body. Therefore it is imperative that soundness of mind and soundness of body are interdependent. With this in mind, the Government of Tamilnadu had launched mid-day meal scheme to the school-going children. For maintaining good health and physical efficiency, adequate amounts of all nutrients are essential.

6.1.1 Need and Significance of this Study

National family health survey (1998 - 99) points out that almost half of the children under three years of age and more than one third of the women in the age group of 15 - 49 years are undernourished, half of the women and three fourths of the children are anaemic. Hunger and malnutrition are concomitants of poverty. Nearly half of the population of India is living below the poverty line. Being culturally deprived and engrossed in their life of toil and hardships, they remain unconscious of their misery and its causes. Most of them believe that the accident of birth has determined their status in life and it cannot be changed. Poverty drives mostly the rural children to a position of not paying more attention to education.

The imperative character of education for individual growth and social development is now accepted by everyone. Investment in education of its youth is considered most vital by all developed countries. Education, broadly speaking, refers to any act or experience that has a formative effect on the
personality of the individual. John Dewey speaks of "education as that reconstruction or reorganisation of experience which adds to the meaning of experience and which increases ability to direct the course of subsequent experiences; Education proceeds from birth to death. School is one of the agencies that imparts education. Through education ideas change, attitudes and skills undergo an alteration.

Poverty forces people to toil in some working place in order to earn their daily bread. This deprives them of the benefit of getting education at the early stages of their life. If rural people do not have early school education, they may have to remain illiterates till the end of their life. This is the plight of the majority of the children of the poverty-stricken families. Another set of poor children, enter the schools, pursue their studies up to the secondary or Higher secondary schooling level or up to the level of free schooling offered by the Government and social welfare organisations. These rural student mass are poor in their academic achievements due to malnutrition or undernutrition. Poorly nourished people are too sick to avail of the educational opportunities open to them when compared with well-fed students.

Malnourished students are shorter in height having reduced brain cells, (brain size) and are poor in their academic performance. Advanced researches highlight that malnutrition in school days affects learning ability and behaviour. Hence balanced nutritious diet are essential at the school life.
6.1.2 Scope of the Study

Diet and nutrition surveys conducted at State and National level show that the diet consumed by the rural school children in pre- and post-adolescent ages are very much deficient. Deficiencies of calories, proteins, vitamin A, riboflavin and folic acid and iron have been encountered with a wide prevalence of symptoms for them.

Economic backwardness of these rural students contributes more to the malnutrition and thereby to their poor educational attainments. Since the rural student population is outnumbering their urban counterparts, their problems cost heavily on the economic side. The State Government is implementing noon meal schemes to the children below the poverty line. This is to combat malnutrition, to maintain sound health and to show the ways to achieve academic excellence by the student community. Only at the schooling stage, the child learns the objectives of life and how to cope with life's problems. These children should be constantly supervised for their psychological and physical happenings. Hence, the children must be supplied with needed nutrients in order to prevent malnutrition.

6.1.3 Statement of the Study

The actual nutrients intake of the rural children are very low when compared with the students of the urban areas. They are starving for stipulated calories and the nutrient ingredients.
Most of the parents of the rural students are below the poverty line and they are not able to purchase nutritious diet. Hence the investigator planned a strategy to influence the nutritional level of the students by using locally available rural plant resources, which are of low and affordable costs.

The food should be locally and easily available and should not be of high cost. Even if such conditions are fulfilled, it should be palatable and also easy for proper management. With this aim, a study was undertaken among the students belonging to V to X standards. Thus an attempt was made to provide naturally available food like Gingelly, Groundnut cakes, Amla, Guava, Banana fruits and Herbs and Greens, etc. inter alia, the food supplied (Mooligai milk, herbs) in the noon meal. The effect of the food supplied under this strategy was studied to identify the effect of nutritional intervention strategy on scholastic improvement of the rural students.

6.2 SYNTHESIS OF REVIEW OF RELATED STUDIES

Malhotra A. K. and Rao P. N. (1984) observed that many school-going children were anaemic due to iron deficiency. Scrimshaw et. al. (1968) Ashworth (1982) and Kadam (1983) in their study on school children found that there is a positive correlation between nutrients intake and health from their nutrients intake. Rao et. al., (1987) in their study on the nutrient intake of students of different age groups observed that
prevalence of protein energy malnutrition, vitamin - A deficiencies, vitamin B - complex deficiencies occurs mostly in pre-school and school - going children. Srikantia (1972), Easwarn (1974) studied the effect of socio - economic status on nutrient intake and found that there was a positive correlation between the nutrients intake and socio - economic status, and also children belonging to high income group are heavier and taller than the undernourished children (low income group). Nandini Devi (1983) studied the effect of iron on lactating and pregnant women of urban low income group and found that less iron intake causes deficiency of iron to all the women folk. Chevez and Martinez (1982) stated that growth will be affected by protein energy deficiency. Kadam, Salumkhe. D. K., Yadav, Raji Bhosale (1983) found that prenatal nutrition will have a significant influence on the total growth and mental development.

Devika R. (1995) studied the effect of balanced nutrition diets on memory of VII standard hostel students and suggested a balanced nutrition at cheaper rates that can give good health and memory power. Begum et. al. (1970), Gopalan et. al. (1970), in their study found that addition of extra-calories with cereals, fat and sugar along with conventional diets for pre school children improves their growth-rate. Multipurpose food developed by CFTRI Mysore blended with low fat groundnut and Bengalgram flours fortified with vitamin A and vitamin D, Thiamine, Riboflavin and Calcium carbonate found to increase
the growth and nutritional status of pre-school children. Gopalan et. al. (1973) proved that the wheat flour sugar and edible oil supplement to the undernourished will improve the physical growth and health condition of pre school children. Rajammal P. Devadoss et. al. (1984) found that the intervention in the form of cheap, easily available local foods within the eating pattern of the community improved the nutritional profiles of pre schoolers and helped them in better learning. Pass More et. al. (1986) showed that the malnutrition affects the endocrine glands which play a major role in controlling growth and development. Wink and Ross (1968) concluded that malnutrition reduces the brain weight which is a permanent one causing poor memory. Birch (1972), Coursin (1972) confirmed that malnutrition affects central nervous system which is responsible for mental capability.

From the above findings it is clear that malnutrition is a major health problem which has to be eliminated with great care. Perfect and good nutrition is fundamental to health maintenance. This can be achieved by educating the people to get awareness of this problem and finding the solutions to solve this problem without incurring any additional expenditure.

6.3 Nutrient Intervention Strategies

Major nutritional surveys are indicating that whatever may be the economic status, the Indian children’s diet are calorie - based and at the same time they are not provided with
appropriate quantity of proteins, energy, vitamins and minerals giving food like vegetables, milk products, greens, pulses and nuts. Their nutrient intake are not upto the standard prescribed for their age group which are given below.

The actual intake of the rural children are very low compared with the standard recommended by the ICMR (1989) RDA. The stipulated amount of calories and the ingredients are not provided to the children in general, particularly the children of rural areas. This havoc is mainly because of lack of awareness and poor economy.

In this research study, the investigator followed the strategy of utilising and supplementing the rurally available low cost or affordable cost plant resources to fulfil the required calories and other vital ingredients so as to improve the level of nutrients intake. The major consideration is that these are all within their economic reach.

Due to illiteracy and ignorance our rural population do not pay enough attention to their children's diet with ICMR standard. Their financial position does not permit them to provide the opportunity to give a complete balanced food to their children which may involve additional expenditure.

Hence there is an urgent need to minimise or reduce the burden of the economic constraints of rural children who are undernourished, by an intervention strategy of including locally
available plants and plant resources which would be the main substitute for their development.

6.4 OBJECTIVES

The objectives of the study were

1. To identify the level of nutritional status of rural students;

2. To identify and to find out the level of nutrient deficiencies of the students;

3. To design and implement effective programmes for combating nutritional deficiencies among rural students through rural plant resources management;

4. To identify the impact of the rural plants and plant resources on the scholastic achievement of the rural students.

6.4.1 Hypotheses

Following hypotheses were formulated in this research.

1. There will be a significant difference between the mean scores of students' achievement in the pre-test and interim test.

2. There will be a significant difference between the mean scores of students' achievement in the interim test and the post-test.
3. There will be a significant difference between the mean scores of students' achievement in the pre-test and the post-test.

4. There will be a significant difference between the mean scores on memory of the students in the pre-test and the post-test.

5. There will be a significant difference between the R.D.A. of nutrients and the mean intake of nutrients before implementation of intervention strategy.

6. There will be no significant difference between the R.D.A. of nutrients and the mean intake of nutrients after implementation of intervention strategy.

7. There will be a significant difference between the weights of the students before and after the experiment.

6.4.2 Assumptions

Following are the assumptions of this research study

1. Students are accustomed to adopt some strategies to take nutrients from various food sources.

2. Their academic achievement is dependent on the nutrient intervention strategies.

3. There is a possibility to design and develop nutrient intervention strategies with rural plant resources to enhance the academic achievement.
4. Students could be oriented towards the utilisation of nutrient intervention strategies.

5. The academic achievement of the students could be enhanced by using nutrient intervention strategies with rural plant resources.

6.4.3 Delimitations

Following are the delimitation of this research study.

1. In the present study, only students who were undergoing courses V to X standard were selected as the sample.

2. The investigation is confined only to V to X resident students of Vallalar Illam, A. Mathur, Pudukkottai District.

3. The achievement scores in all the five subjects were considered to measure their level of academic achievement.

4. Cooked food data were used to find out the nutritive value of each nutrients taken by the students; wherever cooked food data were not available for some vegetables and fruits, nutritive values for raw foods were used.

5. Only 12 nutrients in food items were taken for the purpose of calculation.

6. This study was conducted for a period of 6 months only.

7. This study is confined only to boy students in the age group of 10-15 years.
8. Students were provided with specified amount of different foods in their diet schedule depending upon their nutrient deficiencies.

9. Locally available low cost rural plant resources alone were considered and utilised with the dietary practices of the rural students.

6.4.4 Experimental Design

The investigator has employed Single Group Pre-test treatment - Post-test design for his research.

Here the investigator administered pre-test to measure academic achievement, memory and body weight before the commencement of the experiment. Experimental treatment was given for six months and post-test was administered at the end of the experiment.

Although this design does have weaknesses, it has become necessary to use it in the present situation in which it is not possible to have a control group because the hostel does not have differential provision of services. In this treatment the maturation threat was eliminated.

The adequacy of experimental designs is judged by the degree to which they eliminate (or) minimize threats to experimental validity. Experimental validity depends on many factors. The extraneous variables are carefully controlled and then the study is internally valid. There are usually many possible ways to explain the outcome of a study in this design.
Validity of an experiment is very much important to make significant contribution to the development of knowledge, and that experiment must be valid. According to Campbell and Stanley (1966) there are two types of validity:

i) Internal Validity and
ii) External Validity

6.4.5 Threats to Validity

6.4.5.1 Internal Validity

Internal validity means that the changes encountered in the dependent variable are due to the effect of the independent variable and not to some other unintended variables.

Campbell and Stanley have identified various variables that can threaten internal validity.

(a) Threats to Internal Validity

(i) Selection

Differences between the subjects or classes in the groups may result in outcomes. The random assignment of subjects to experimental and control group ensures, according to the laws of probability that the groups compared do not significantly differ from one another in their composition. The subjects should be equal in all respects.

In this study all the students were assigned to the same group. The group is only from “Vallalar Illam”, A. Mathur, Pudukkottai District. So this threat was nullified.
(ii) History

Unexpected or unforeseen events may occur during the research and affect the results. Such events are referred to in educational research as “history threat”.

During this experimentation unexpected events did not occur. Hence this threat was eliminated.

(iii) Testing

The effect of one test upon the scores of a subsequent test is called testing threat. In experimental studies it is common to test subjects at the beginning and end of the study. If considerable improvement is found in the post-test scores, the researcher may conclude that this improvement is due to the experimentation.

In this investigation, same kind of tool was used for pre-test, interim test and post-test for all the students. Hence this threat was eliminated.

(iv) Statistical Regression

An effect may be due to respondents being identified on the basis of extremely high (or) low scores. The subjects should be selected in equal numbers from all levels of scorings.

In this experiment all the students were assigned to the same group. So this threat is eliminated.
(v) Instrumentation

Differences in results due to changes in the measuring instrument between the pre-test and post-test may constitute a threat to the internal validity. Suppose if the pre-test was tough, post-test was easy. Naturally students score well.

The same pattern of achievement tests were conducted during the whole session of this study. The investigator validated and conducted all the tests. The tests were conducted by the concerned teachers.

(vi) Maturation

A number of factors associated with the passage of time not envisaged in the investigation might cause clashes in subject scores. This is known as “maturation threat”.

The total duration time of the study was 6 months. So this threat was eliminated.

(vii) Mortality

The loss of subjects that may occur sometimes during the study is called mortality threat.

During this experiment such subject loss did not occur.

(viii) Selection Maturation Interaction

The effect of maturation not being consistent across the groups because of some selection factor constitutes this threat.
The subjects selected were similar in all respects (e.g. age, gender and level of study). In all the tests, the same group of students were involved. Hence this threat was eliminated.

6.4.5.2 External Validity

External validity refers to difficulties in generalizing the findings of experimental research.

a) Threats to External Validity

(i) Interaction Effects of Selection Biases and the Experimental Treatment

This refers to the effect of some selection factor of intact groups interacting with the experimental treatment, that would not be the case if the groups had been randomly formed.

All the available subjects were selected from one and the same group of students. So this threat was eliminated.

(ii) Interaction Effect of Testing

Pre-testing interacts with the experimental treatment and causes some effect such that the results will not generalize to an unpre-tested population.

All the students were subjected to this type of programme. If at all any interaction effect occurs, it would be common to all students involved.

(iii) Multiple Treatment Interference

When the same subjects receive two (or) more treatments, there may be a carry-over effect between treatments such that the results cannot be generalized to single treatment.
Only one treatment was given to all the students throughout the study. Hence this threat was eliminated.

The experimental design is determined on the basis of attaining maximum internal validity and external validity. The selection of this experimental design is based on the purpose of the experiment. The type of variables involved in this study and the limiting factors under which it is conducted a suitable experimental design is selected. This design deals with the selection of subjects, the way in which variables are manipulated and controlled, the method of data collection and the type of statistical analysis employed in interpreting data relationships.

6.4.6 Variables

The present research is an attempt to find out the effect of intervention strategies with rural plant resources on the academic achievement.

And hence in this research:

a) Application of nutrient intervention strategies with rural plant resources is an independent variable;

b) Academic achievement scores, memory and body weight are the dependent variables; and

c) Control of extraneous variables:
i) Location: Investigation is carried out in the Vallalar Illam hostel, A. Mathur, Pudukkottai District for rural students.

ii) All the selected students belonging to Vallalar Illam have proper drainage and good shelter facilities.

iii) Students in the age groups of 10-12 and 13-15 years have been chosen.

6.4.7 Definitions of the Key Terms

According to Oxford Advanced Learner's Dictionary of current English,

Utilization : Make use of or find a use for utilizing or being utilized.

Management : Managing or being managed, skillful treatment.

Rural : Characteristic of suitability for the countryside or agriculture.

Plant : Living organism which is not an animal, especially the kind smaller than trees and shrubs.

Resource : Wealth, supplies of goods, raw materials etc., which a person, country etc., has or can use.
Intervention : Intervening - interfere so as to prevent or change the results.

Strategy : The art of planning operation, in wars, especially of the movement of Armies and Navies into favourable position for fighting, skill in managing any affair.

Enhance : Add to (the value, attraction, powers, price etc.).

Students : Person who is studying at a College, Polytechnic or University, boy or girl attending school, anyone who studies or who is devoted to the acquisition of knowledge.

Academic : Of teaching, studying, of schools, colleges, etc., scholarly, literary or classical (contrasted with technical or scientific).

Achievement : A thing done successfully, especially, with effort and skill.

6.4.8 Operational Definitions

Utilisation

Consumption of the food materials in day-to-day diet as a food stuff to prevent malnutrition.
Management

Method adopted by the investigator to preserve and use the unseasonal food materials like Amla, groundnut, gingelly, etc for a long period of time without affecting its nutritious value and palatability for regular uninterrupted supply.

Rural Plants Resources

Plants and plant parts, locally and easily available generally, at their area of habitation at an affordable cost or at no cost and familiar to the rural population which are rich in required nutrients and help to prevent malnutrition.

Intervention Strategy

It is the method followed by the investigator by using different components of diets or nutrition which nourishes the body through which malnutrition is prevented and deficiency level is narrowed down.

Enhancing

Raising, improving, making development.

Rural Students

Students belonging to rural areas.

Hailing from villages, generally from inaccessible areas.

Academic Achievement

It means marks scored by the students in five different subjects viz - Tamil, English, Mathematics, Science and Social Science in the school level examinations.
6.4.9 **Experimentation in Phases**

This experiment was conducted in the following phases:

**Phase - I**

2. Surveying and selection of target areas among rural schools.
3. Identification of factors related to malnutrition.

   3 a. Identification of factors leading to malnutrition and poor mental make up.

**Phase - II**

4. Surveying the level of consumption of basic nutrition.
5. Assessing the level of deficiency of basic nutrients that are to be balanced.
6. Surveying and identification of appropriate and site specific nutritional substitute available in the form of plant resources.

**Phase - III**

7. Designing of nutritional ‘Chart’ for nutritional supplements in comparison with ICMR standard.
8. (a) Conducting Pre-Test in academic achievement and in memory to assess the performance before the experimentation.

(b) Physiometric observations was also taken before the experiments.

Phase - IV

9. Conducting of experiment over a period as per the 'Chart' along with indigenous nutritional substitute.

10. Duration of the treatment was for six months.

Phase - V

11. Administering the interim test after the completion of third month to enable the investigator to assess and monitor the experimentation.

12. (a) Administering the post-test in academic achievement and memory after completion of the experimentation.

(b) Psychometric tests, physiometric tests conducted, observations were also completed after the experimentation.

13. Entering, categorizing and analyzing the pre-test, interim test and post test scores of all the academic tests.

6.4.10 Sample for the Study

Location

The present investigation was carried out in "Vallalar Illam" Hostel at A. Mathur in Pudukkottai District.
Selection of the Sample

All the 52 students in the hostel studying at various levels were taken for investigation. Among the 52 students, 9 students were studying in V Std. 11 students in VI Std. 18 students in VII Std. 6 students in VIII Std. 5 students in IX Std. and 3 students in X Std. contributed the sample for the study. Since all the 52 residential students of standard V to X were considered for the study, specific sampling technique could not be applied.

Duration of the Treatment

The investigator adopted utilization of Rural Plant Resources as an Intervention strategy to the students for a period of 6 months.

6.4.11 Tools for the Study

a) Tools used for Achievements Test

The tools for the Pre-test, Interim-test and Post-test were constructed by the concerned subject teachers who are experts in their particular fields were used by the investigator to measure the academic achievement.

b) Tools used for Memory Test

For the memory test the investigator used the tool constructed by PG I Smirit Parishan Prasath.
Tools used for Nutrient Analysis

For the nutrient wise analysis the investigator adopted a questionnaire designed by the Rosalind S. Gibson.

6.4.12 Validity of Tools

Validity of Tools for Pre-Test and Post-Test

Validity of a test is defined to be the accuracy with which a test is measured. The purpose and validity of a test are closely associated. Hence, a research tool must have reliability and validity. The content validity is defined to be the extent to which the test measures a representative sample of the subject matter of content and behavioural change under consideration. In this experiment the content validity of pre-test, interim-test and post-test were established by the experienced subject teachers. The questions were prepared by subject teachers and they were examined and modified by the subject experts; Based on it, necessary changes were done on the question paper. Thus, the content validity of the tool was confirmed.

Validity of Tools used for Nutrient Analysis

Questionnaire designed by Rosalind S. Gibson was used in this research study on nutrition and it was valid. Moreover, most of the nutrition research was based on this questionnaire which was confirmed in the review of literature.

Validity of tools used for memory test: For the memory test the investigator used PG1 memory scale developed by
Smirit Parishan Dwarka Prasad and Narendranath and it was a valid one. Moreover, many researchers in the field of education used this memory scale for their research.

For the pre-test, the reliability value was found to be 0.8 for tools on Tamil, 0.76 for English, 0.71 for Mathematics, 0.74 for Science and 0.70 for Social studies.

For the post-test, the reliability value was found to be 0.73 for Tamil, 0.74 for English, 0.73 for Maths, 0.72 for Science and 0.73 for Social Studies.

It implies that the tool used by the researcher is reliable; the method of rational equivalence technique was used to get an estimate of the reliability loss free from objections raised against other methods of analysis.

The reliability of the memory test was also established by the same method of the rational equivalence.

6.4.13 Data Collection

Students of Vallalar Illam, A. Mathur Village in Pudukkottai District in the age group of 10 - 15 years were subjected to this investigation.

The sample was drawn from the inmates of the Vallalar Illam wherein the students are fed by the Illam. As per ICMR classification, the total sample of 52 students were grouped according to their age (i.e.) 10 - 12 and 13 - 15 years with 38 and 14 pupils respectively for these groups. A pre-test on
academic achievement in all the five subjects and memory test and body weight recording was conducted for these groups before the commencement of this study. A mid period (Interim) test in academic achievement in all the five subjects was conducted after the intervention strategy was adopted. At the end of (six months) the study period, a post-test on academic achievement in all the five subjects and memory test and body weight recording were conducted. Scoring was done during the three test periods. Experimental error was minimised since the treatments imposed were only on the male students of the Vallalar Illam.

6.4.14 Scheme of Data Analysis

In the present study, the relevant data obtained from achievement test scores of 52 students in the pre-test, interim test, post-test and the scores of memory tests and the weight of the students have been analysed as follows.

6.4.14.1 Descriptive Analysis

This generates information about the nature of a particular group of individuals. Mean and standard deviation were calculated to determine the central tendencies and dispersion of variables.

6.4.14.2 Differential Analysis

This tool involves determination of statistical significance of difference between groups with reference to selected
variables. It involves ‘t’ tests to determine whether there was any significant difference between the mean of achievement scores in the pre-test, interim test, post-test and the mean of memory tests. ‘$\omega^2$’ values were also calculated to find out the percentage of contribution of the independent variable (nutrition) on the dependent variables (achievement score) and memory test scores. Effect size was also calculated between any two groups to compare the results of different experiments.

6.5 SUMMARY OF FINDINGS

The following are the major findings derived from this study:

1. The students’ achievement scores had increased in the interim test when compared to the pre-test due to the implementation of the intervention strategy (by supplementing nutrients).

2. The students’ achievement scores had increased in the post-test when compared to the interim test due to the implementation of the intervention strategy (by supplementing nutrients).

3. The students’ achievement scores had increased in the post-test when compared to the pre-test due to the implementation of the intervention strategy (by supplementing nutrients).

4. The students’ memory test scores had increased in the post-test when compared to the pre-test due to the
implementation of the intervention strategy (by supplementing nutrients).

5. Comparing with the R. D. A, the deficiency in nutrients intake of the students has narrowed down in the post-test than that of the pre-test due to the implementation of the intervention strategy (by supplementing nutrients).

6. The students had gained more weight in the post-test than in the pre-test due to the implementation of the intervention strategy (by supplementing nutrients).

6.5.1 Discussion

In this study, supplementing nutrition through rurally available plant resources had increased the memory power. A similar study conducted by Devika R. (1995) on “the Effect of Balanced Nutrition Diets on Memory of 7th Standard Hostel Students”, suggested that a balanced nutrition with cheaper rates can give good health and memory power.

Begum et. al. (1970), Gopalan et. al. (1970), in their study found that addition of extra calories through cereals, fat and sugar along with conventional diets for pre-school children had enhanced their growth rate.

Similarly in this study, supplementing additional nutrition, which is available in rural areas with conventional diets, for the Vallalar Illam hostel students, has increased the intake of calories, though not to the RDA level and in turn, a gain in their body weight and scholastic achievement.

Gopalan et. al. (1973), proved that the wheat flour, sugar and edible oil supplement to the undernourished has improved
the physical growth and health condition of pre-school children.

This study reveals that supplement nutrition to the malnourished and undernourished students had improved their physical growth (weight) and memory power.

6.6 EDUCATIONAL IMPLICATIONS

1. In general rural students are not excelling in their academic achievement. There are so many factors for their poor performance. Among them, the nutritional deficiency factor plays a major role by pulling down the performance level in their academic achievements. The low level consumption of nutrition than the RDA is inseparably connected with many factors. First of all, they are lacking in the awareness about nutrition.

2. This study reveals that the academic achievement of students from rural areas could be enhanced by supplementing with nutrients in an appropriate form. Implementation of the strategy (i.e.) supplementing the students with nutrients made them gain their body weight.

3. This study makes it very clear that the mental faculty such as memory (level) of rural area students can be increased by supplementing nutrients to them.

4. It is possible to supplement the nutrient levels of students with locally available, medicinal plants and vegetables.

   To achieve the goal, the rural students and their parents need motivation on the use and benefits of awareness on food
habits and making changes in their dietary intake. Since there is abundant availability of rural plant resources with high nutrient contents nearer to their habitations and also scope for their utilization by proper management at an affordable cost, the question of spending huge sum on nutrients may not be a valid argument any longer.

Therefore, the level of academic achievements of rural students could be enhanced, by the intake of nutrients. By motivation, awareness may be created of nutrients and the availability of such nutrients with RPR which are available at their habitation itself. By adopting proper management practices the nutrients available in the RPR which are user friendly, enriching the poor diet of low cost into a nutritious diet of affordable cost to the rural children. Brain and body are intimately linked by hormones, neuro transmitters and other chemicals. By giving healthy and nutritious diet through RPR the level of consumption of nutrients with RDA are comparably enhanced at low or affordable cost.

6.6.1 Suggestions for further research

1. A similar study can be extended to other rural areas.
2. A longitudinal study can be conducted on this centre "Vallalar Illam" on the same population and this can be extended to other areas also.
3. A further study can be made on urban students.
4. Factors related to the food consumption level i.e. socio-economic status, cultural, parental support can also be studied.

5. A comparative study may be conducted with non-residential school students.

6. The research may be made at primary, higher secondary and higher education levels.

7. The investigation may be extended to girl students.

8. The level of consumption of food may be supplemented to 100% RDA.

9. A comparative study also can be made on different subjects with different levels of nutritional consumption.

10. A comparative study can be attempted among the vegetarian and non-vegetarian diets.

11. Physio- and psychometric study could also be made on different nutritional consumption level.

12. Effect of individual nutrients on achievements may also be attempted.

13. Nutrition level studies on subjects under different environment, like day scholars and hostellers, private and government school students, urban and rural school students may help to arrive at a strong conclusion on nutrient intake level and their impact on education.

14. A series of studies on nutrition and economy; economy and education; education and social justice will help in policy planning on the rural upliftment programme.
Figure - 5: Consumption Level of Nutrients with RDA (in Percentage) Before and After the Experiment - Age Group 13-15 years
6.6.2 Conclusion

A study was conducted in the Vallalar Illam, A. Mathur Village in Pudukottai District with pupils from V to X standards with the sole objective of increasing the academic performance of these rural students. Hence, a supplementation of nutrition strategy consisting of cheap and locally available food material was imposed on the pupils.

This intervention strategy with supplementation of nutrition could bring about expected changes in their physical health, academic performance and mental faculties.

There are multiplicity of causes for the malnutrition. Among them, major factors such as lack of awareness and economic conditions are predominant. Cheap and easily available nutritional foods can make it handy to tide over the undernutrition problems since these are not costly but affordable. Through the use of such locally available nutrient plant resources it is possible to bring down the cost of additional nutrition to one third of other means. Management strategies should orient towards continuous availability of these nutrients throughout the year so as to provide nutrients that may be needed to maintain optimum health.

Palatability and preservation without much loss of nutrients should be established and are to be user friendly.
Further, the managements of hostels, schools, residential schools should come forward to educate the students on the importance of nutrition. The glamour for fast food should be curtailed as it is full of chemicals and synthetic preservatives, which will spoil the health. Instead it should be their endeavour to promote locally available, cheap nutrient foods, and should come down heavily on the use of the low grade synthetic and artificial foods. From this study, it is quite apparent that educational and scholastic achievements among the rural students are possible only with the supplementation of nutrition with locally available user friendly and cheap food from rural plant materials. It could also be planned to fit in this supplementation of nutrition within the main food without incurring any additional economic burden. By this the low-cost low value food could be converted into high value food at affordable cost.

General concept of food for hunger in the third world countries has changed to provide enough calories to the individuals in the developing nations. But, in advanced countries this has further changed, and it is for further fulfilment of nutritional standards. The general deficiency observed in the rural children are inadequate calories, protein, fat, iron, vitamin A and C. These deficient nutrients are very well available in the plants and plant resources which are available near their habitations. India can use the locally available food materials of plant origin, with proper planning to
counter the deficiencies. Malnutrition can be eradicated and thereby a very strong nation of healthy people can be built. The rural mass deserves this adequate nutrition since the rurals form the backbone of the agrarian economy.

In India, the rural school going children form more than 60% of the Indian population. But their academic achievement and economic placement is very meagre when compared with their urban counterparts. The rural children hail from peasantry group who constitute the backbone of the country. Development is not possible unless the rural children are given due attention and the progress of the nation depends on the health care and academic achievement of these children. Though there are many factors which contribute to the low academic progress, the low level of academic standard is found to be mainly due to undernutrition and malnutrition. By creating proper awareness, among the rural people, of the locally available rural plant resources, the major constraint on the supplementation of deficient nutrition i.e. cost can be overcome. The cost involvement in the existing dietary schedule which gives 60% level of RDA is around Rs. 8/- per day. By the intervention strategy the cost involvement, if we adopt the existing system, for supplementation works out roughly from Rs. 4 to 5.50. But by the adoption of intervention strategy with R. P. R. the researcher could supplement the 20% additional level of RDA at an extra cost of Rs. 1.50 to 2.00.
From this it is concluded that cost involvement of nutritional addition will be around only 30 to 40% cost of other means. Therefore, it won't be a burden on the exchequer to set right the deficiency problem only the proper planning and management are the urgent needs. Thus, the challenge posed by the long persisting malady affecting the rural poor - malnutrition and undernutrition - could be effectively met and the academic achievement and advancement of the rural students could be ensured by the adoption of intervention strategy with rural plant resources.