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2.3.1 Selection of subjects for games interests appraisal.

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2.5.8 Administration of the two tests.

2.5.9 Statistical analysis of the data.

2.6 Games developed.
Effective teaching requires an appreciation of the background of the learner and his/her knowledge and level of understanding. The didactic educational approach needs to be strengthened and enlivened by a more non-formal participatory approach. This would facilitate learning by capturing the learner's attention, sustaining interest and, thereby motivate learning - both among those who do not enjoy the typical classroom situation as also such of those who love to learn. The learning materials need to be country, culture and community specific. Games provide an imaginative, creative, experiential learning wherein the learner 'learns by doing'.

Prior to initiation of the educational programme the investigator experienced the need to study the following:

1) Identification of adolescents' (13-15 years) games interests.

2) Assessment of adolescents' nutrition knowledge needs.

3) Identification of 'gray' areas of learning in nutrition.

4) Delineation of nutrition concepts to be learnt by adolescents in a sequential order of priority.

2.1 Infrastructure Available for Study

Initially, a preliminary survey was carried out in
Tirupati to study the infrastructure available in eleven Government recognised High schools. An interview schedule was drawn out and information collected through observation and the personal interview technique, from the Headmasters/ Principals of the respective schools (ref. appendix II for interview schedule and list of schools). The schedule had queries pertaining to the type of school, medium of instruction, general facilities available, teacher-pupil ratio and so on. This information was utilized to study the feasibility of using games as a medium for nutrition education.

2.2 Nutrition concepts identification

The syllabi of Biology, Health Education (H.E.) and Socially Useful and Productive Work (S.U.P.W) subjects taught at the high school level for classes VI - X were examined. Both, the syllabi prescribed by the Chittoor District Common Examination Board (C.D.C.E.B.S) and National Council of Educational Research and Training (NCERT), 1987 were examined. These in turn were compared with the nutrition concepts recommended by Interagency Committee on Nutrition Education (ICNE, Leverton 1967). These concepts had been widely used by Dwyer et al., (1981) Cooper et al (1976) and Prefontaine (1975) in different studies. Thus, four basic nutrition concepts were included for the development of the nutrition games kit for the adolescents. The concepts also took cognisance of the
need for nutrition as expressed by the high school students in Tirupati. The four concepts are

1) Nutrition is the process of acquisition, consumption and utilization of food.

2) Food is made up of different nutrients needed for growth and health.

3) The specific nutritional requirements of an adolescent girl and boy.

4) Nutrition is directly related to health.

These four nutrition concepts were selected bearing in mind, the need for nutrition education to be simple, practical, realistic and appropriate so as to create interest and awareness regarding importance of good nutrition amongst adolescents. The integration of nutrition concepts in the school curriculum was stressed at the workshop on Child Health and Nutrition for University teachers by NIPCCD (1986). They discussed the thrust areas in research and field work at the University level. One of the areas specified was - "Teaching of Nutrition at various levels—primary school, middle school, 'high school', evaluation of the existing curriculum and incorporation of concepts on child health and nutrition".

Motivation of adolescents to 'eat right' can be effected by

1) Reaching out to them at their level.

2) Basing the approach on the needs and wants of
the adolescents or else, to get through to
them becomes near impossible.

3) Directly involving them in solving their
eating/nutritional problems without prea-
ching to them.

4) Recognising the adolescents' desire for
group activity and

5) Including socially and culturally relevant
experiences which would initiate and sus-
tain the adolescents' interests.

In nutrition education, these points were duly emphasized
by Spindler (1963) too.

2.3 Appraisal of games

An interview guide for an appraisal of adolescents'
games interests, was prepared in english. It was drawn
by studying various books on play and development
(Iona et al 1969; Rama Reddi, 1969 and Mitchell et al, 1941)
and observation of adolescents' at play. The guide was
tested for content validity by physical education, child
development and extension education subject specialists.
Consequently, it was translated into the local language
(telugu), and scrutinized for language appropriateness by
local language (telugu) experts including a high school
telugu teacher.
The interview guide included questions under the following sub classes:

1) Personal identification of students.
2) Interest in games.
3) Types of games played both at home and school.
4) Time spent on playing games.
5) Facilities available for play at home and in school.
6) Peer influence on games.
7) Awareness of nutrition related games (See appendix III for interview guide).

Permission was sought and granted for making an appraisal of the adolescents' games interests in all the eleven Government recognised high schools.

The interview guide was initially pilot tested in three schools (geographically representative of Tirupati). A random sample of five students each from classes VIII and IX respectively was taken. The total sample was thirty, 14 boys and 16 girls. Each interview lasted thirty minutes.

The pilot study established the validity of the interview guide. It also indicated that all income groups were fairly well represented in this study and that the peer group had the same interests as the adolescents who had been interviewed.
2.3.1 SELECTION OF SUBJECTS FOR GAMES INTERESTS' APPRAISAL

The results of the preliminary survey revealed the total number of high school adolescents to be 4454. Out of 4454 adolescents, 220 were randomly selected; (i.e. 1/20 of the total high school adolescent population) for an appraisal of their games' interests. The sample selection was restricted to the VIII and IX class students. This was due to the VII and X standard students being engaged in preparing for the public examinations. The standardised interview guide was used to collect information from the students. Each student was interviewed for 20 minutes. Of the eleven schools, 8 were co-educational, one boy's exclusive and two were girl's exclusive. Therefore, the total sample consisted of 103 boys and 117 girls. Home visits were also made to observe and record the games facilities available at home.

2.3.2 ANALYSIS OF ADOLESCENTS' GAMES INTERESTS APPRAISAL

The entire data collection (development of schedule, pilot testing and final survey) and analysis took 2 months. The data was subjected to percent calculation to note the difference among the english and telugu medium students of either sex for:

1) Awareness of nutrition games.
2) The adolescents' games interests — both indoor and outdoor.
3) Facilities available for playing games at home and in school.
4) Peer group interest and participation in the adolescents' games interests.
5) Number of members in the family.
6) Income of the family/pocket money given.
7) Time spent on play both at home and school.

Chi square tests were carried out to note for any, association between the adolescents' games interests and the following:

1) Monthly income of the family.
2) Number of members in the family.
3) Games facilities available at home.

The adolescents' games interests were thus identified. On the basis of the nutrition concepts identified and appraised games interests, a nutrition games kit was developed.

2.4 Development of Nutrition games kit

The development of nutrition games is presented in the Fig. 3.
Fig. 3  SEQUENCE OF EVENTS IN THE DEVELOPMENT OF NUTRITION GAMES

- **Study of relevant literature**
  - Dearth of sequential (conceptwise) Nutrition games
  - Identification of 4 relevant nutrition concepts to be included for adolescents

  - Appraisal of adolescents' (13-15 years) games interests N=220 (Girls 117, Boys=103)
  - Facilities available for playing games - at home and in schools
  - Development of 20 Nutrition games (incorporating the 4 relevant nutrition concepts for adolescents) Catering to adolescents' interest, locally popular.

<table>
<thead>
<tr>
<th>Games</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal/Non verbal</td>
</tr>
<tr>
<td>Individual/Group</td>
</tr>
<tr>
<td>Indoor/Outdoor</td>
</tr>
<tr>
<td>Equipmental/Non-equipmental</td>
</tr>
</tbody>
</table>

  - Scrutiny by experts in Nutrition, Education and Psychology
  - Translation into telugu (local language)
  - Pilot test 20 games in 3 Government recognised High schools on 50 adolescents (25 girls, 25 boys) Control group
  - 3 schools
  - 80 adolescents (40 girls, 40 boys)

  Kit of 16 games used in final experiment in 5 Government recognised High Schools on 126 adolescents (61 boys, 65 girls).
The nutrition concepts identified earlier as also the games popular among adolescents (13-15 years) were included; along with certain other games which would fit in with the nutrition concepts for evolving the nutrition games kit. Appropriate games were developed to facilitate learning of the nutrition concepts. As the complexity of the concepts increased, proportionally, the games included were also made more difficult (in terms of playability rules and comprehension). The nutrition games kit had concepts and games which were built in a logical sequence i.e. Concept I to II, to III and to IV.

The games included were verbal, nonverbal, indoor and outdoor, group and individual, equipmental and non-equipmental type. These games were evolved primarily to suit the infrastructure available in schools and facilities at home for play. The aim being to develop a feasible, low cost, viable, effective nutrition education communication package; to facilitate student centred learning by discovery and enquiry. These games would arouse curiosity and creative imagination, initiate and sustain interest, motivate the adolescent to think intelligently, to select, appreciate and learn the benefits of eating nutritious food from what is locally available. In other words, to relate nutrition, health and hygiene.

The total number of games developed were twenty. They were subjected to scrutiny by Nutrition, Education
Psychology and Communication subject experts for evaluation. Thus the content and construct validity were established. The games were translated into the local language for administering in telugu medium schools.

2.4.1 BASIS FOR DEVELOPMENT OF NUTRITION GAMES KIT

2.4.1.1 Multiple realities in games. In the development of these games, the following 'multiple realities' have been taken into consideration:

1. Recognition of the complex ways in which a given game is not the same experience for everyone and may not be the same experience for anyone (Greenblat & Gagnon, 1979).

2. "The tendency to think and write about the learning from the experience of a game must give way, in the first place to recognition that, what the person is looking for; the detailed 'shape' of the experience, the nature of the person; opportunities to practice; similarities of that experience to other experiences; the intrinsic pleasantness/unpleasantness of the experience" (Bredemeier and Greenblat, 1981). All these variables will obviously affect what the adolescent learns from a game.

2.4.1.2 Caution exercised in the study. There is every need to appreciate the philosophy underlying each game.
The learner should be aware of

1) 'Why' a particular game is being played.
2) Expected outcomes of the game.
3) Their role in playing the game.

Specification of the game should not lead to prior awareness of the learning outcomes - as it would definitely result in 'set' (stock/biased) outcomes from the learners. Hence, initially the investigator prudently chose to introduce the games in a sequential order suiting the complexity of the Nutrition concepts to be learnt. Nowhere had the objectives of the game been stated openly. On the completion of each game, a small assignment based on the learning outcome of the game had been included. On completion of the assignment, the group gathered for a debriefing session with the researcher, who discussed the assignment drawing upon the groups' answers. This provided on the spot feedback and offered the learner an opportunity for self assessment. He/she was thus motivated to improve his/her position or continue to maintain it. From this viewpoint, the self developed evaluation tools for knowledge and practices offered a genuine assessment of the adolescents' discovered learning-outcomes through the nutrition games kit. Through discussion, the learner's generalisations and symbolic meanings would give way to concrete experiences. He/she would be constantly
attempting to organise their ideas and experiences, thereby enhancing learning. This is crucial in determining true learning.

2.4.1.3 Individual differences. The variable categories proposed by Smith (1987) like stimulus, response, sequential content and finally subject and general variables were also favourably considered in designing the Nutrition games kit. These variables gain further significance when nutrition educators realise that not all nutrition games will necessarily have the same effect on learning (Sleet, 1985). No two individuals are alike. Mindful of these realities, the investigator evolved a kit which included locally popular games for either sex with the assumption that familiarity with the games would build their confidence. They would thus be stimulated to try to work out solutions, motivated to learn, seek out the unknown and discover. Such a kind of experiential learning required examination of Bowen's (1987) principles for their design.

2.4.1.4 Bowen's principles in design of experiential learning. The most important being

1) "Learning has a greater impact when it is accompanied by an optimal level of emotional arousal.

2) What the student learns is at least in part inevitably unique to each individual.

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3) An environment of safety and reduced risk fosters learning. The games were played in a spirit of competition and co-operation. There was no classroom pressure of tests and exams.

4) "Select or design exercises where the format is appropriate for the learning outcome desired" (Bowen, 1987). Therefore, exercising caution, appropriate games were developed to suit the concept to be learnt and understood.

5) "The fact that an activity may lead to expression of strong emotion does not necessarily preclude and may indicate its use is appropriate.

6) Exercises need to be tailored to the needs and style of the instructor and the students.

7) A mixture of teaching techniques (read as games in the present context) is probably best, as no single approach is equally applicable for all topics, instructors or students" (Bowen, 1987).

Besides all these principles, many educators have cautioned against using games as learning exercises to merely amuse or entertain a group.

In light of the above stated principles, the researcher felt it would not be feasible to limit the number of games to five only or eight only. Instead, it would be more viable to develop games for each concept on the
basis of the complexity of the concept. Certain concepts required to be broken down to simpler, smaller units to facilitate learning i.e., a sequential build up to a culmination. The games were a mixture of known and unknown, familiar and unfamiliar, helping him/her to break new ground, by learning through hitherto unknown games also.

Moreover, this particular modes operandi of research in India being very limited (if not totally absent); the researcher felt it would be prudent to exercise restraint, and not be too ambitious in trying to study - which kind of game is most conducive to learning. Instead, the cumulative impact of learning through an alchemy of familiar and unfamiliar games was sought to be studied. Learning experiences through games were provided to the adolescents in the context of their environment. At no stage did the researcher attempt to overwhelm the ‘adolescents’ through nutritional commandments. Instead, the messages themselves emerge from the information presented through the nutrition games.

2.4.2 PILOT TESTING OF NUTRITION GAMES KIT

A pilot test was carried out to screen the kit of 20 games. Of the eleven high schools in Tirupati, three were randomly selected to constitute the control group and three for the experimental group. In the control group,
totally eighty adolescents - 40 boys and 40 girls (including 20 English medium and 20 telugu medium for either sex respectively) were chosen. In the experimental group fifty adolescents of IX standard (25 girls and 25 boys) were randomly selected. The pilot study was completed in a month. The time frame of the pilot study is given below.

<table>
<thead>
<tr>
<th>Name of the school</th>
<th>Medium of instruction</th>
<th>Day's Time Table for games</th>
<th>Total No. Of Days</th>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navabharat High School</td>
<td>English</td>
<td>2.40- 4.40 P.M.</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Sri Padmavathi Girls High School</td>
<td>Telugu</td>
<td>2.45- 4.45 P.M.</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Sri Venkateswara Boys High School</td>
<td>Telugu</td>
<td>10.15-12.15 Noon</td>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

It may be noted that all the 3 schools were visited thrice in a week, during the games and S.U.P.W. periods.

The results of the pilot study revealed that the nutrition games kit did indeed make a definite impact on the adolescents' nutrition knowledge and practices. It was observed that four games, i.e., the question and answer/game, dots game, sets (cards) game and food and Nutrition dominoes were not well received. Hence, these four games were excluded for the final study. The reason given by the adolescents for disliking these four games was that they were not learning anything new through these games. Rather, they felt
that these four games were mere repetitions in terms of their nutrition knowledge content. Thus, of the twenty games developed, four were discarded and only sixteen games were used for the final study.

2.4.3 IMPLEMENTATION OF PILOT TESTED KIT IN SCHOOLS

The pilot tested games were implemented in five Government recognised High Schools (2 English and 3 Telugu medium). A total of 126 subjects were randomly selected inclusive of sixty five girls (42 Telugu and 23 English medium) and sixty one boys (38 Telugu and 23 English medium) as the experimental group. The control group which was fixed for the pilot study, continued to be the control for the final study too. The schedule for implementation of the nutrition games kit in the five high schools is presented here:

<table>
<thead>
<tr>
<th>Name of the School</th>
<th>Medium of Instruction</th>
<th>Day's Time Table for Games</th>
<th>Total No. of Days</th>
<th>Total No. of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sri Govindaraja Swamy High School</td>
<td>Telugu</td>
<td>8.00-10.00 A.M.</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Nehru Municipal High School</td>
<td>Telugu</td>
<td>10.30-12.30</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>KJECs High School</td>
<td>English</td>
<td>2.00- 4.00 P.M.</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Tanguturi Prakasam Pantulu Municipal High School</td>
<td>Telugu</td>
<td>2.45- 4.45 P.M.</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>S.V.U. Campus High School</td>
<td>English</td>
<td>2.40- 4.40 P.M.</td>
<td>8</td>
<td>16</td>
</tr>
</tbody>
</table>
The implementation of the nutrition games kit along with the pre and post situation assessment covered a period of three months. It must be noted here that the first 3 listed schools were visited daily so as to complete the implementation before the winter vacation. This was possible due to the Principal's of these 3 schools granting the researcher permission to do so. The reason being, the students having just completed their half yearly examination and only 12 working days left before the winter vacation, no regular teaching classes were being held for the students.

In the remaining two schools, the nutrition games kit was implemented in a month after the winter vacation, i.e., January to February. Each school was visited twice a week.

2.5 Development of evaluation tools

To test the efficacy of the nutrition games kit, two evaluation tools and, one checklist for practices were developed by the researcher. The sequence of events in development of two evaluation tools and one checklist for practices is drawn in Fig. 4. The tools for assessment were basically aimed at ascertaining whether the objectives of the research had been realised and for providing feedback of learning process. Due care was taken to avoid unrealistic expectations. Thus, what had been learnt would
Study of relevant literature

Identification of 4 relevant Nutrition concepts for inclusion in Nutrition games kit.

Same 4 concepts formed basis for evaluation tools.

Construction of multiple choice test format for Nutrition knowledge, practices and open-ended questions for checklist on Nutritional practices at home.

Discussion of all 3 instruments with 3 Nutrition subject experts - for content validity

Establishment of content and concurrent validity by post-graduate students majoring in Nutrition (N = 10) and Humanities (N = 10).

Translation of all 3 instruments into Telugu (local language)

Pilot test of instruments in 3 Government recognised high schools (N=50 - 25 boys, 25 girls).

Final study - all 3 instruments used to test efficacy of games kit in 5 Government recognised high schools N=126 (61 boys, 65 girls).
lay the foundation for developing higher level skills, and, that which had been learnt to a lesser extent could be reemphasized. It was realised that the evaluation of the adolescents' performance would be a reflection of the researchers' mode of communication, in this instance, through games specifically.

2.5.1 VARIABLES IN THE STUDY

The nutrition games kit was considered to be the 'independent' variable. The adolescents' nutrition knowledge and practices were the 'dependent' variables.

The need to establish a baseline from which the adolescents' gain in nutrition knowledge could be measured resulted in administration of pre tests. If we are truly trying to measure a students' knowledge as a result of participation/attendance in a specific class, we must have a measure of knowledge and practices prior to taking such a class (Mayer, 1986). To take care of other influences likely to have an impact on adolescents learning, the control group was also considered, so that any change in the experimental group could be attributed to the Nutrition games alone.

The researcher herself, personally administered the games and tests (pre, post and repeat) to the adolescents. It was followed up with home visits (checklist for practices both at the pre and post test stages.)
2.5.2 TARGET GROUP

Mindful of the age, size and background of the target population, and, intellectual skills of the group, questions were framed and situations outlined to assess comprehension of concepts learnt, ability to reason, analyse, utilize and identify situations. The experimental and control group were matched for age, class, socio-economic strata. Intelligence levels were taken care of by a random selection of the adolescents and assigning to the experimental and control group.

2.5.3 GUIDELINES FOR TEST CONSTRUCTION

While developing the evaluation tools Mayer's (1986) guidelines for tests construction were followed. The main guidelines stated were

1. "Group all items of similar format together.
2. Arrange items in order of difficulty.
3. Separate items for ease of reading.
4. Complete items on the same page on which they begin.
5. Select a format.
6. Ensure recording of students' data.
7. Review instructions.
8. Proof read the test.
9. Strive for clarity and avoid the ambiguous.
10. The length of the test is also important."
Tests given immediately after a concept has been taught will raise the students score significantly, because, this is the time students are most likely to answer questions correctly. In turn, this immediate success promotes retention of correct understanding. Hence, the adolescents were tested at three stages - pre, post and retention.

2.5.4 FACTORS CONSIDERED IN FORMAT ADOPTION

The format adopted for the tests was the multiple choice items. It is the most versatile of all objective type test items. A multiple choice item consists either of a direct question or a incomplete statement, followed by a number of possible responses, usually 3-5. Depending on the question or statement, which is known as a stem, the student chooses the response that is either the correct or best answer or statement for completing the stem. All of the choices are known as foils.

1. The undesired foils are referred to as 'distractors' which must 'distract' the higher ability students and 'attract' lower ability students.

2. The length and precision of correct answers should not provide a 'clue'.

3. Arrange correct answers randomly.

4. There should never be less than 3 or more than 5 answers in order to optimise testing of knowledge and minimise guessing.
Multiple choice items are regarded as higher level, applicable, assessment devices. They can assess a student's ability to discriminate and make correct choices, to comprehend principles, generalisations and concepts, to make judgements about and select among various alternative courses of action, to infer and reason, to compute, to interpret new data or new information and to apply information and knowledge (Mayer 1986, Assoc. of Indian Universities 1976).

2.5.5 NUTRITION KNOWLEDGE AND NUTRITION PRACTICAL SITUATION TESTS

Multiple choice items were included in the nutrition knowledge test (appendix V) and nutrition practical situation test (appendix VI). For the framework (basis) of the tests, the same four nutrition concepts were included as those used in the development of nutrition games kit. The break up of the questions for each of the four concepts is presented in appendix V and VI. The nutrition knowledge test included thirty two questions and the nutrition practical-situation test had twenty nine questions of which twenty five were of multiple choice kind and four were open-ended. For the construction of these two tests, related adolescent and consumer nutrition knowledge tests developed by Skinner et al (1983), Dwyer (1981), Wodarski et al (1980) and Spitze (1976) respectively were referred.
2.5.6 CHECKLIST FOR ADOLESCENT'S NUTRITIONAL PRACTICES
AT HOME

Consumption surveys are not made just to know what people eat; but to provide a basis for measures to improve food consumption and dietary practices. Neuh (1962) has emphasized that such measures will not be effective unless they take into account factors which underlie and influence food consumption. One important measure - education in nutrition is particularly dependent for success on knowledge and understanding of these factors.

Therefore, the checklist for adolescents' nutritional practices (appendix - VII) had all open-ended questions distributed under eight sections dealing with:

1) Socio-economic background of the adolescents' family (size of family, income, education of parents, and occupation).

2. Frequency of food groups intake at home (daily/alternately/weekly/monthly).

3. Adolescents' snack pattern.

4. Nutritional vulnerability of the adolescents.
   i) Special foods given when sick.
   ii) Foods demanded/given in extra amounts in view of second growth spurt.

5. Adolescents' food likes and dislikes.

6. Selection of foods at home.
7. Nutrition topics discussed at home (related to interaction between adolescent and family members).

8. Importance of nutrition as expressed by mothers—need for it.

2.5.7 ESTABLISHMENT OF VALIDITY FOR ALL 3 INSTRUMENTS

All three instruments were discussed with three Nutrition subject experts for content validity. The nutrition knowledge and nutrition practical situation tests were further tested for concurrent validity amongst ten postgraduate students majoring in nutrition and ten students majoring in Humanities. Thus the validity of the three instruments was established.

The instruments were then translated into the local language (telugu) and used in the pilot study to test the efficacy of the nutrition games kit. They were administered at the pre and post stages to both the experimental and control groups.

Later, the validity established through the pilot test, the 3 instruments were administered to the experimental subjects of the final study. The checklist (appendix VII) for nutritional practices at home was used for the home visits and questions were usually addressed to the mother.
2.5.8 ADMINISTRATION OF THE TESTS

The nutrition knowledge and nutrition practical situation tests were administered at the pre/post and repeat test phases, personally by the researcher. This was advantageous in that the researcher had an opportunity to establish rapport, to explain the purpose of the study, and to explain the meaning of any item which called for clarification, by the adolescents. On an average 25-30 minutes were required to complete the nutrition knowledge test and 40 minutes for the nutrition practical situation test. The score value was 'one' for the correct response and 'zero' for the wrong. The school going adolescents were familiar with multiple choice test format. To rule out the possibility of unfamiliarity with the test format affecting the performance of the individuals; a dummy multiple choice test having 10 questions on General Knowledge was given to the experimental and control groups (See Appendix IV). The items were such that they offered an even chance for the average student to perform well. This dummy test established familiarity with the multiple choice test format, for the subjects.

To evaluate the potential of the kit in terms of retention of what had been learnt through the games, a repeat test was also carried out. Exactly a month after the post test, the same nutrition knowledge and nutrition
practical situation tests were again administered to the adolescents to study their retention capacity. It also served the purpose of assessing whether games which interest the adolescent did indeed have any long term impact on their retention of what had been learnt.

The nutrition practical situation test was administered to all the experimental group subjects of five schools. To study the nutritional practices at home, a random sub-sample of subjects from three schools was selected. Totally sixty subjects' families (mothers' specifically) were selected. This included families of 30 boys and 30 girls who were interviewed prior to and after intervention. They included a fairly good representation of the different socio-economic groups. Classification into four socio-economic groups was based on the aggregate score obtained from four parameters namely the family income, family size, occupation and education of parents (group I - 16-18; group II - 12-15; group III - 8-11, group IV - 4-7). In all the families only the father was educated and working, therefore only his income and education were taken into consideration.

A functional analysis of the nutrition games was also carried out. For this purpose, a tool developed with the help of an expert in clinical psychology was used, to assess the cognitive, affective and sensory-motor abilities underlying each game. The tool and the
functional analysis are written in greater detail in the section 3.11 in the chapter on results and discussion.

2.5.9 STATISTICAL ANALYSIS OF THE DATA

Mode of presentation of data: The results will be presented throughout on the basis of comparison between the control and experimental groups, sexes and medium of instruction.

The format of presentation of data throughout is as follows:

<table>
<thead>
<tr>
<th>Nutrition concept</th>
<th>Medium of instruction</th>
<th>TELUGU</th>
<th>ENGLISH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td>Group</td>
<td>C</td>
<td>E</td>
<td>C</td>
</tr>
<tr>
<td>Number</td>
<td>20</td>
<td>38</td>
<td>20</td>
</tr>
</tbody>
</table>

I

II

III

IV

Note: C - Control, E - Experimental, K - knowledge, P - practices.

The data was pooled and subjected to appropriate statistical analysis to note the efficacy of nutrition games in imparting
nutrition education to adolescents. Standard statistical formulae/procedures were followed (Garett, 1981).

1. The means and S.Ds' were calculated for the Nutrition knowledge and Nutrition practical situation tests to compare the control and experimental groups performance at the pre, post and retention phases.

2. The means and S.Ds were also calculated to note the difference in performance, between the control and experimental groups for each of the 4 concepts in the nutrition knowledge, nutrition practical situation tests for the pre, post and retention phases.

3. The percent of the total scores were calculated to observe the difference in the pre to post phase and the post to retention phase - to compare between the control and experimental groups.

4. Analysis of variance was performed to observe the significance of difference between the means of the experimental and control groups for the pre, post minus pre scores, and repeat minus post scores.

5. Analysis of variance was done to observe for any significant difference between the means of the experimental groups for the repeat minus pre test scores.
6. Further, the least significant difference values were calculated to draw the table of means and differences of the experimental and control groups.

7. 't' tests were carried out to note the significant differences in performance among the experimental and control groups for the nutrition knowledge and nutrition practical situation tests.

8. 't' tests were also done to observe the significant difference among the experimental and control groups for each of the four nutrition concepts included in the nutrition knowledge and nutrition practical situation tests.

9. 't' tests were carried out to observe for any significant difference in performance between the two sexes. 't' tests were also done to observe for any significant difference in performance between the subjects receiving instruction in different mediums/languages.

10. The data on the eight sections of information in the checklist for practices at home was subjected to percentage calculation to compare the pre-post situation at home for any change in the right direction.
2.6 Games developed

The nutrition concepts, sub-units and learner objectives will be elaborated in section 3 - results and discussion.

JIGSAW PUZZLE - Concept I

Rules of the game

No. of players 1 - 3
Time to complete one puzzle - 10 minutes.
Score - for each correct puzzle - 10 marks.

Background of the game  The players are required to sort out the pieces of the jigsaw puzzle, fit them correctly to form a complete, meaningful picture. From the picture emerges a message, which the players should comprehend and study. This game emphasizes on segregation and classification of foods under the 3 functional groups.

Assignment: Observe and list the foods eaten at home. Group the foods as per their three main functions.

HEADS AND TAILS - Concept I

Rules of the game

No. of players = 2 - 4. (two players/team)
Score - Each time a coin is tossed, for calling 'heads' correctly - 5 points for 'tails' - no points will be given.
Time allotted for each round 5-8 minutes.

Total number of rounds for each player/team - 6.

On a cardboard sheet, 6 coloured blocks will be placed 'face down'. Each of the six blocks has 3 pieces marked as $H_1, T_1, M_1; H_2, T_2, M_2; H_3, T_3, M_3; H_4, T_4, M_4; H_5, T_5, M_5; H_6, T_6, M_6$ - wherein 'H' stands for heads, 'T' - tails and 'M' - Message. The numbers 1 to 6 indicate 6 coloured blocks. The players will have to move from number 1 to 2 to 3 upto 6. The two teams/two players will each toss the coin 6 times. After each toss, the player will turn 'face up' the 'Heads' or 'tails' block in each of the six blocks. He or she will read the message on it and relate it to the pictures drawn alongside. On completion of each round, the players/teams will turn 'face up' the message 'M' marked for that particular block. The message 'M' in each block covers both the messages given in the 'H' and 'T' pieces of the respective block. Thus, even it both the players/teams call 'Heads' only or 'Tails only', each time, the 'message' will cover the points in both 'H' and 'T'. Each message is suitably illustrated for better understanding. The messages in each block are given below:

**BLOCK ONE**

$H_1$ I take more of potatoes, rice, chapati, ragi rotis groundnuts, maize, sweet potatoes, jaggery and whole
grams and less of poories, sugar, ghee, cool drinks and sweets.
I get energy from these foods to work, play and study
I don't feel tired.

T₁ I take more of poories, sweets, pakodas, ghee, sugar and cool drinks.
and less of rice, chapati, ragi rotis, whole grams, groundnuts,
maize, potatoes and sweet potatoes.
I don't enjoy my meals. I feel full, weak and sleepy

M₁ Take more energy rich foods like rice chapati, ragi, maize, whole grams; groundnuts, potatoes and less of fried foods, sweets, ghee and sugar.

BLOCK TWO

H₂ I eat more of fish, eggs, milk, meat, cheese, whole grams, soyabean, dhals, peas.
These protein foods build my muscles, bones and help me grow.

T₂ I take more of poories, pakodas, sweats, rice, cool drinks.
I don't like eggs, meat, milk, fish, dhals, soyabean whole grams.
I am thin, weak, ral! sick often compared to my friends.
Take more of protein rich foods like whole grains, dhals, soybeans, meat, etc, fish and milk for your bones and muscles to grow and maintain your body.

**BLOCK THREE**

**H₃** I eat plenty of dark green leafy vegetables, gogu, carrots, cucumber, mango, papaya, tomatoes. These fruits and vegetables protect my body from disease, keep my eyes sparkling and skin smooth and clear.

**T₃** I don't like to eat greens, gogu, mango, pumpkin, carrots, papaya and tomatoes. My skin is rough and cracked. I cannot see properly in the evenings.

**M₃** Eat plenty of dark green leafy vegetables, orange-yellow vegetables and fruits for sparkling eyes and clear, smooth skin.

**BLOCK FOUR**

**H₄** I eat plenty of amlas, bananas, orange, mango, guava, grapes, jamoon, watermelon, sweet lime. All these fruits protected my body against diseases to keep me healthy.

**T₄** I don't like fruits like sapotas, papaya, sweet lime, mango, watermelon, banana, jamoon, amlas, orange, grapes. I catch a cold, fall sick often. My skin
is not smooth and clear.

Eat some fruit at least once in a week to protect your body and keep good health.

**BLOCK FIVE**

**H₅**

I drink plenty of water daily.

So even if I sweat, I do not feel tired and weak.

**T₅**

I drink few glasses of water daily.

When I sweat,

I feel weak, thirsty, my lips become dry and my throat is parched.

**M₅**

Drink plenty of clean, drinking water to make up for water lost through sweat.

**BLOCK SIX**

**H₆**

Daily, I eat a mixed diet of dhal, rice, chapati, meat, egg, fruit, mixed vegetables, curry, milk, greens and water. I eat a nutritious diet, therefore I am strong and healthy.

**T₆**

I take whatever I want, and whenever I want - sweets, butter, samosas, poories, chocolate, cool drinks. I feel tired, weak, fall sick. I am not healthy and strong.

**M₆**

Good nutrition is important for good health. A mixed diet, plenty of drinking water gives energy, builds and protects the body.
Rules of the game

1. You are given a sheet on which three puzzles are there.
2. The clues for the foods are depicted in the big model chart. Fill in the empty squares in each word to get the complete name of the food.
3. Each correct word (food) will be given 2 points.
4. The time limit is 15 - 20 minutes.
5. The player who completes all 3 puzzles correctly will be the winner.

PROTECTIVE FOODS
Assignment:
After completing the 3 puzzles, list down separately the plant and animal sources which perform the following functions.

<table>
<thead>
<tr>
<th>Functions</th>
<th>Energy</th>
<th>Growth</th>
<th>Protective giving</th>
<th>Promoting</th>
</tr>
</thead>
</table>

Animal sources
Plant sources

**GROWTH PROMOTING FOODS**

![Diagram of GROWTH PROMOTING FOODS with letters and numbers representing different sources]
ENERGY GIVING FOODS

NUTRIENT SEARCH - Concept II

Rules of the game

1. Search for the following nutrients in the given square.
   a) Carbohydrates  c) Fats  e) Water
   b) Protein  d) Vitamins  f) Minerals

2. The nutrient may be found forward (→ )
   backward (← ) straight across (→ )
   Straight down (↓ ) and diagonally (↖↓) too.

3. Once the nutrient is located mark it.

4. For each correct location of the nutrient 2 marks
   will be given.

5. The first player to search for the maximum number
   of nutrients will be the winner.
6. The time limit is 10 minutes.

7. It is a individual game.

<table>
<thead>
<tr>
<th>C</th>
<th>W</th>
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<td>E</td>
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</tbody>
</table>

ASSIGNMENT

List down the six major nutrients and try to discuss the functions of each nutrient. Teach the names of these six nutrients to your best friend.
**Rules of the game**

Rewrite the jumbled words to get the correct words.

Total time given is 10 minutes. Scoring - 2 marks for each correct word. The clues are given at the side of each word.

1. NYEEGR -- Cereals like rice, wheat, sugar, ragi and banana are rich in this nutrient.

2. TAFS -- Oils, butter and ghee are very rich in this nutrient.

3. TEPROSIN -- Dhals, whole grams, meat, fish, eggs, cheese and milk are very good sources of this nutrient.

4. MIVISTAN -- Carrots, amla, green leafy vegetables, guava, mango and orange are excellent sources of these nutrients.

5. RIMAINSE -- Iron, calcium, phosphorous present in green leafy vegetables are classified under these particular nutrients.

6. TWARE -- This nutrient is available in fruits, vegetables and can be got from taps, wells, lakes and streams.

**ASSIGNMENT**

Write down on a separate sheet of paper the names of the six nutrients you have learnt. Against each nutrient write down at least four rich food sources of the nutrient. Do you include these foods in your daily diet?
NUTRIENT BUILDING - Concept II

Rules of the game

1. From the six nutrients given, build the different food sources which are rich in each of the nutrients. You should use any one of the letters of the alphabet given in each nutrient listed. You may also use letters from the names you have build for each nutrient.

2. There is a worked out example given to help you understand how to play the game.

3. For each correct food source built, 2 points will be awarded.

4. The player who builds the maximum correct food sources in the given time will be declared the winner.

5. The time limit is 10 - 15 minutes.

Example: From the word VEGETABLES, build the names of different vegetables.

C A B
R P E
R O A
O T P N
VEGETABLES
R O T R A
E M O I D S
E A N I
ONION T J E
S O A S
L F
S I N G E R
Now that you have seen and studied the example, you build your own food sources for each nutrient from what you have learnt so far.

**Discussion**

The game will be followed by a discussion to cross compare the nutrients built by all the players (a) who has built the most number of correct food sources, (b) merits and demerits of each food source.

**RIDDLE ME, RIDDLE ME - Concept II**

**Rules of the game**

1. Each player is required to read the riddle carefully and solve it. The nutrient is present in the foods eaten everyday (performing either protective/body building or energy giving function for the body).

2. This game can be played individually or in two groups. Minimum - 3 players Groups - 2 - each group 2 players.

3. Time: - 15 minutes.
1. **Riddle me Riddle me. I am a thirteen letters word.**

   My first letter is present in car but not in bar.
   My second letter is in affect but not in effect.
   My third letter is in rose but not in pose.
   My fourth letter is in bill but not in till.
   My fifth letter is in omit but not in emit.
   My sixth letter is in hush but not in rush.
   My seventh letter is in yell but not in hell.
   My **eighth** letter is in drink but not in brink.
   My ninth letter is in run but not in sun.
   My tenth letter is in ace but not in ice.
   My eleventh letter is in talk but in walk.
   My twelfth letter is in eve but not ave.
   My thirteenth letter is in sit not in wit.

   Who am I? I give you energy? ____________

2. **I am a four letter word**

   My first letter is in 'fish' but not in 'dish'.
   My second letter is in 'and' but not in 'end'.
   My third letter is in 'tap' but not in 'cap'.
   My fourth letter is in 'smile' but not in 'mile'.

   Who am I? __________________________

   I provide your body with energy.

3. **I am an eight letter word. What am I?**

   My first letter is in 'pear' but not in 'wear'.

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My second letter is in 'row' not in 'bow'.
My third letter is in 'owl' but not in 'awl'.
My fourth letter is in 'ten' but not in 'pen'.
My fifth letter is in 'empire' but not in 'umpire'.
My sixth letter is in 'into' but not in 'onto'.
My seventh letter is in 'nice' but not in 'pice'.
My eighth letter is in 'silly' but not in 'billy'.
I promote your body's growth and maintain it.
I am ______________________

4. I am an eight letter word, who am I?
My first letter is in 'van' but not in 'can'.
My second letter is in 'if' but not in 'of'.
My third letter is in 'tank' but not in 'bank'.
My fourth letter is in 'ire' but not in 'are'.
My fifth letter is in 'milk' but not in 'silk'.
My sixth letter is in 'ill' but not in 'all'.
My seventh letter is in 'null' but not in 'hull'.
My eighth letter is in 'salt' but not in 'malt'.
I protect your body's health, I am ______________________

5. I am a five letter word, who am I?
My first letter is in 'water' not in 'cater'.
My second letter is in 'at' but not in 'it'.
My third letter is in 'tower' but not in 'power'.
My fourth letter is in 'etch' but not in 'itch'.
My fifth letter is in 'rain' but not in 'vain'.
I am ______________________
I protect your body's health.

6. I am an eight letter word. What am I?
   My first letter is in 'mint' but not in 'pint'.
   My second letter is in 'ice' but not in 'ace'.
   My third letter is in 'novel' but not in 'hovel'.
   My fourth letter is in 'eve' but not in 'ave'.
   My fifth letter is in 'rattle' but not in 'cattle'.
   My sixth letter is in 'aunty' but not in 'bunty'.
   My seventh letter is in 'love' but not in 'dove'.
   My eighth letter is in 'simple' but not in 'dimple'.
   I am ____________________________
   I protect your body's health.

Assignment: List down all six major nutrients present
in your food - their functions and 4 important food sources of each nutrient.

NUTRIENT RICH FOOD LISTING - Concept II

Rules of the game

No. of players: 5 in each group.

1. The leader of the group will call out the names of each of the six nutrients, one at a time, i.e.,
   i) Protein
   ii) Carbohydrates
   iii) Fats
   iv) Vitamins
   v) Minerals
   vi) Water
2. Each player is given 3 minutes to write down the names of the foods which are rich in the nutrient listed on his/her own sheet of paper.

3. The leader will say 'stop' after 3 minutes, and call out the names of the food sources listed on her/his own sheet.

4. The food sources which are present commonly in all the players' lists will be crossed out.

5. Then, the food sources which are remaining on the individual player's sheet will be scored as follows:
   a) Food sources shared by 4-5 players will be given 1 mark.
   b) Food sources shared by 3 players will be given 2 marks.
   c) Food sources shared by 2 players will be given 3 marks.
   d) Food sources only one player's list will be given 4 marks.

6. The player with the highest number of points is declared the winner.

7. The time taken for completing each round is 5 minutes. Totally 6 rounds will be played.

   TELEPHONE - Concept III

Rules of the game

No. of players: 3 - 5.

Time allotted for each round: 4-5 minutes.
Scoring: For each correct answer 1 mark.

Background of the game This is a locally popular game similar to 'passing the secret'. It has been adapted to play the game of 'listing down of one/two nutrient requirements per day for the adolescent; each member of the group. The list is passed on till it is complete. The list will be as given below.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the nutrient</th>
<th>Recommended daily allowance for (13-15 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Calories</td>
<td>Boy 2660 Girl 2360</td>
</tr>
<tr>
<td>2.</td>
<td>Protein - grams</td>
<td>Boy 52 Girl 43</td>
</tr>
<tr>
<td>3.</td>
<td>Vitamin A (retinol) µg</td>
<td>Boy 750 Girl 750</td>
</tr>
<tr>
<td>4.</td>
<td>Vitamin C (ascorbic acid) mg</td>
<td>Boy 40 Girl 40</td>
</tr>
<tr>
<td>5.</td>
<td>Calcium - mg</td>
<td>Boy 600-700 Girl 600-700</td>
</tr>
<tr>
<td>6.</td>
<td>Iron - mg</td>
<td>Boy 25 Girl 35</td>
</tr>
<tr>
<td>7.</td>
<td>Water - glasses</td>
<td>Boy 8-10 Girl 8-10</td>
</tr>
</tbody>
</table>

These nutrients listed on a card will be given, one each to all the players. Each player will have to learn the nutritional requirements per day for an adolescent boy and girl. Ten minutes will be allotted for learning. After this, they will form groups of 3-5 as per their convenience. They will sit in a circle with a sheet of paper and pencils/pens. The game will be played once in the clockwise, then in the anticlockwise direction, and finally the third round
by passing the paper alternately (skipping one person in between). The first player will start by writing any two nutritional requirements and pass it on to the 2nd, and then to the third. The last in the group will check the complete list and call out if there is any incorrect entry. The groups will be accorded scores as per the number entered correctly. The researcher will discuss with the group at the end of each round, to reinforce the correct answers and check immediately the incorrect answer. Therefore there is immediate feedback. The team with minimum wrong entries, will be declared the winner.

**Assignment** Write down the nutritional requirements (for yourself) per day. In your meals today, were rich sources of each of these nutrients available? Examine.

**NUTRITION CODE** - Concept III

**Rules of the game**

Assemble the following nutrients with the help of clues (hints) given alongside to get the correct nutrients. Scoring each correct answer will be given 2 marks.

1. This energy nutrient is present in rice, ragi, wheat, sugar, potatoes and bananas. **DESIPIZESEUFT**

The correct letter in the nutrient can be got by writing
the letters of the alphabet which comes immediately before (precede) the ones given in this word.

2. This nutrient is essential for body growth, maintenance and repair. Write the letters of the alphabet which come immediately after the letter (succeed) given in this word. This nutrient is present in eggs, milk, fish, meat, dhals, whole grams and groundnuts.

3. You can get this nutrient from the tap, well, river, streams, fruits, fruit juices. You should drink plenty of this nutrient (fluid). It is a 5 letter nutrient.

4. This nutrient is vital for your eye sight. You can get in green-yellow coloured vegetables and fruits. The numbers of the alphabets are given. You must find out the letters of the alphabets which stand for the numbers given.

5. This nutrient has many components (thiamine, riboflavin and niacin) but one common name. It helps your nerves to function. It is got from cereals and milk you will get the correct nutrient
by writing the letters of the alphabet which occur immediately after the ones given in the word.

6. This nutrient protects your gums, helps in healing cuts and wounds, and is present in amla, lemons, oranges and greenleafy vegetables. You must find out the letters of the alphabet for occurring immediately before (precede) the ones given in the code letters.

7. This nutrient promotes **skeletal growth**. If you write the missing letters in the word you will get the complete nutrient and the fourth letter of the alphabet. If you do number (5) and (6), you will find this easy.

8. This energy nutrient is present in butter, ghee, oils, fried foods. You will get the correct nutrient if you write the letters of the alphabet which occur immediately before (precede) the letters given in the word.

9. When this nutrient is deficient in the body, anemia occurs. **[Hint: this is an instrument used by the dhobi to press the clothes]**. It is present in liver, green leafy vegetables and ragi.
10. Two important nutrients that strengthen the bones and teeth and are found in milk, green leafy vegetables, cheese and cereals. Write the letters of the alphabet which represent (stand for) these numbers.

The second nutrient can be got by writing the letters of the alphabet which occur immediately after the ones given in the word.

NAME, NUTRIENT SOURCE, QUANTITY AND FUNCTIONS - Concept III

Rules of the game

1. The game requires 4 - 6 players

2. Time - Each round 1-2 minutes.

3. Each player will get a chance to call out the name of any one nutrient. All the players will write down that particular nutrient's sources, quantity required per day [boys/girls] and function of that nutrient. The game will be continued till all the important nutrients have been covered. Totally, 4 column entries will be made/round.

Score: For each correct round - 4 points are awarded.

3 if 3 columns are correct.
2 if 2 columns are correct.
The player who gets the maximum points is declared the winner.

Assignment List the foods eaten at home. Against each food write the main nutrient available from it, its function and quantity required by your body. Examine your own/friend's lunch box and do the same.

**FOOD RELAY - Concept III**

**Rules of the game**

Minimum 2 teams. Each team - 3-6 players.

The field placement of the teams will be as shown here

START
\[ A_1 \ldots A_2 \ldots A_3 \]
\[ B_1 \ldots B_2 \ldots B_3 \]
\[ C_1 \ldots C_2 \ldots C_3 \]

FINISH
Nutritionally adequate diet.

wherein A, B, C represent the teams and their respective runners.

Each runner is required to write down on the sheet of paper (instead of the baton) 3 rich food sources of any one of the following

a) Carbohydrates  d) Minerals
b) Proteins  f) Water
c) Vitamins  g) Finally, check whether all nutrients have been adequately covered.

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The aim being to have a nutritionally adequate diet. Each runner will write on any two nutrients and pass it on to the next one. The last runner will have to check the list and run for the finish.

Scoring

The team having the best diet in terms of nutritional adequacy using locally available foods will be declared the winner. For inclusion of each correct food in terms of nutrition representation - 1 mark will be awarded. The team which reaches the finish line first gets 2 marks. Thus the total points will be added up and the best team declared the winner.

BUILDING THE GOOD NUTRITION PYRAMID - Concept III

Rules of the game

No. of players in each group 2 - 3

Time allotted for completion - 10-15 minutes.

Each group will be given a set of 52 cards on which certain foods will be drawn along with a joker card.

Scoring

Each group will be assessed by the other groups and graded, placing them at either I, II or III position. The
groups grades will be collected and scored as

I grade - 15 points
II grade - 10 points
III grade - 5 points

Based on the highest aggregate scores, the groups will be declared winners.

Each group is required to build a 3 tier pyramid. The base (Ist tier) should include foods to be eaten most regularly and in plenty. The II tier should include foods to be eaten moderately and the III tier - foods to be eaten least or in minimum quantities. Low cost nutritious foods rich in the nine nutrients ie., protein, carbohydrates, water, vitamin A, B, C and calcium and iron should be included in the I tier. Moderately priced foods, fruits, vegetables and animal foods to be included in the II tier, and costly foods, sweets, ghee, butter, fried foods, savories are to be placed in the III tier.

CHAIN - GANG GAME - Concept IV

Rules of the game:

The players are given a message card each. Each player is required to learn the message on his/her card within 5 minutes. Then he/she will locate 3 other players who will have the same coloured badge as the one worn by
the player. The four individuals will then form a group, learn and teach each other their messages and reassemble in class, take a test based on the messages they have learnt and taught each other in the group. If they do not perform well in the test (score full marks) they will have to regroup, teach each other the card messages and again take the test again.

NOTE: Only that particular message will be given to the group, which has not been understood correctly, when they regroup to learn once more.

No. of players -- -- 8

Time -- -- 20 - 25 minutes

Equipment -- -- Paper, pen, cards with messages.

The messages are as follow:

1. You need energy to work and play. If you do not eat sufficient amount of energy rich foods you will suffer from calorie/energy malnutrition called Marasmus. You have low body weight, do not grow, muscles are wasted. Now, write down the names of 3-4 energy rich foods.

2. Proteins are important for building your bones and muscles and repairing them. If your diet lacks protein you will get Kwashiorkor - a protein malnutrition You will not grow, you will have diarrhoea, hair will
be discoloured, and you will have a potbelly. NOW write down the names of 3-4 protein rich foods.

3. Vitamin 'A' is important for your eyesight. If your diet lacks Vitamin 'A', you will get night blindness, your eye ball will be affected and you may even become blind. Name any 4 important vitamin 'A' rich foods.

4. Iron is important for blood formation in your body. If you lack iron in your diet, you will get iron deficiency anaemia. Your skin will be pale, your nails and tongue will be pale. You will feel tired easily and, even breathless. Name any 4 iron rich foods.

5. Calcium and phosphorous help in your bone and teeth formation. If your body lacks both these minerals, your bones will be deformed, you will have rickets and your teeth will also be weak. Name any 4 calcium rich and phosphorous foods.

6. Vitamins thiamine (B₁), riboflavin (B₂) and niacin are important for your nerves function, for a healthy tongue, skin at the corners of the mouth and nose. Otherwise you will have a sore tongue, scaly skin at the corners of your mouth and nose. Name 4 vitamin 'B' complex rich foods.
7. Vitamin 'C' is important for healthy gums. If your diet lacks vitamin C your gums will be soft and will bleed/scurvy. Your wounds will not heal quickly. Name any 4 vitamin 'C' rich foods.

8. Vitamin 'D' is important for your skeletal functions. If your diet lacks vitamin D, your bones will be poorly formed - you will have rickets. Name any 4 vitamin D rich food sources.

FOOD HURDLES GAME - Concept IV

Rules of the game

1. There will be 2 teams of 5 players each.

2. Each team will elect a leader who will run the race.

3. Instead of the hurdles, the remaining 4 players of each team will stand at equal distance from each other in a single line.

4. Each of these four players will have particular nutrient deficiency situations.

5. When the leader comes to the 1st player, the player and leader will discuss the situation, write down the solutions on the sheet of paper.

6. The leader will then run to the 2nd player, 3rd player and finally the 4th player, solving each of the situations posed thereof.
7. Having solved the 4th situation, the leader will run towards the finishing tape.

8. Whichever team gives the most correct solutions to each of the 4 situational problems will be declared the winner.

9. Each correct solution will be given 2 points.

EQUIPMENT NEEDED:

1. A sheet of plain paper and pen.

2. 8 situational problems - written on different papers.

SITUATION

1. You are thin, tired and weak. You are irritable and have no energy to work and play. Your body growth is stunted. Which nutrient deficiency do you suffer from?

Name it.

Name 4 foodstuffs which will help you in this situation.

2. You cannot see clearly in the evening. Your eyesight is bad. Your skin is also rough, dry and cracked. Which nutrient deficiency do you suffer from? Which 4 important food sources will help you?

3. Your skin and nails are pale. Your blood haemoglobin level is low. You feel tired and have lost weight. Which nutrient deficiency are you suffering from? Which 4 important food sources will help you.
4. You need these 2 minerals for strong bones and teeth. Due to deficiency of these minerals, your teeth and bones are weak. You also have low legs. Name these 2 minerals. Which 4 important foods will help you solve this health problem.

5. For building your muscles and bones and maintaining your body - which nutrient do you require most? Name 4 foods which are rich in this nutrient.

6. Two important nutrients give you energy to work and play. Name these two nutrients and 6 foods which are rich in these 2 nutrients.

7. You have bleeding gums/scurvy. Your wounds do not heal quickly. Which nutrient is lacking in your body. Which 4 important foods will help you in this situation.

8. Which nutrient will help you in proper functioning of the nerves and preventing the skin around your nose and lips from cracking/roughness. Which 4 foods are rich in the nutrient.

SURVIVAL - Concept IV

In this game, the participants play against all odds pool their resources together to fight against nutrient deficiency. Thus, the emphasis is not on winning the game rather on battling together against odds for survival.
Rules of the game

No. of rounds - 4

1. It's a team game - 3 in each team.

2. Each player is given a card on which certain nutrient rich foods are given.

3. Each team is given a particular problem - a nutrient deficiency.

4. The three players in each team will have to pool their foodstuffs together and present a combination of foods to overcome the nutrient deficiency.

5. Each team will be graded after every round.

6. The total marks of each team will be added up - The team with the highest marks will be declared the winner.

Equipment needed

12 cards, 12 sheets of white paper, pencil or pen.

Time for each round - 5 minutes.

Scoring

Each correct answer - 6 marks.

The twelve cards will have the following:

a) Rice, wheat; pongal, meat, eggs, curd and whole grams.

b) Red gram dhal, green gram dhal, black gram dhal, whole gram, ghee, curd; oils, and sweets.

c) Idly, pessarattu, dosa; cheese, milk, fish; butter and sugar.

d) Green leafy vegetables, carrot, gogu, grapes and mango.
e) Beetroot, Cauliflower, lime, amla and butter.

f) Cabbage, orange, papaya, liver and ghee.

g) Jaggery, groundnuts, liver, apple and guava.

h) Liver, pulses, gogu, orange and tamarind chutney.

i) Green leafy vegetables, cheese, grapes and banana.

j) Fish liver oils, cereals, ragi, sugar, and jaggery.

k) Eggs, green leafy vegetables and papaya.

l) Butter, milk, groundnuts, cheese and mango.

The nutrient deficiencies problems will be as follows:

a) Calorie – protein malnutrition.

b) Vitamin A and C deficiency.

c) Iron – protein deficiency.

d) Vitamin D, calcium – phosphorous deficiency.