THE UNIVERSITY OF
SYDNEY

DENTAL HEALTH EDUCATION PROGRAMME FOR PRE-SCHOOL CHILDREN (3 to 5 years) IN THE SYDNEY METROPOLITAN AREA

MIKE WIDJAJA
BDS (*Jakarta*)

A thesis submitted in partial requirement
for the
DIPLOMA IN PUBLIC HEALTH DENTISTRY

Department of Preventive Dentistry
Faculty of Dentistry
University of Sydney

1992

SUMMARY

Dental health education is any combination of learning opportunities designed to facilitate voluntary adaptations of behaviour which are conducive to health.

In any dental health education activity, certain priority groups have to be identified. Of these groups, pre-school children top the list because they are at the beginning of dental health problems and habit patterns are in the process of being formed, and also they can be easily reached.

In some pre-schools in the Sydney metropolitan area, dental health education is not part of their curriculum. A dental health education programme for pre-school children should be developed and should be part of the total educational plan for pre-school children. The programme should be based on the child's ability to learn at his or her stage of development. Hence the aim of this thesis is to review literature on theories and principles of learning of pre-school children, norms of development of pre-school children, appropriate personnel to carry out dental health education and appropriate dental health education programmes for pre-school children.

Dental health education for pre-school children usually begins with choosing the right toothbrush and toothbrushing technique for children, the use of fluoride dentifrice, and also the selection of correct diet and nutrition to instill good daily oral habits at a young age.

Dental health education for pre-school children can be carried out by both dental and non-dental personnel. The dentist is the crucial person, but pre-school teachers who are adequately trained could carry a major share of the task of dental health education to pre-school children. Pre-school teachers know their children and their vocabulary levels, and they know at what point in the pre-school curriculum a programme on dental health would be most appropriate.

Dental health education programmes for pre-school children should involve parents, since they are expected to reinforce what the teachers have taught. Parents should know the most appropriate toothbrush for their children. Small children should in general have a toothbrush one-quarter to one-third smaller than the adult's toothbrush. In the pre-school years the child should begin with a medium-stiffness toothbrush. The head of the child's toothbrush should be designed exactly like that designed for an adult, but, smaller and suitable for the child's size.

Parents need to assist their children in toothbrushing technique and the amount of fluoride dentifrice to be taken. Many three to five years old children cannot brush their teeth adequately at all when unsupervised. Generally, children younger than age 9 have not developed the conceptual ability. Thus the implementation of toothbrushing in a child is a direct responsibility of the parent. The technique recommended is the horizontal scrub technique as this has been shown to be the most comfortable and effective. The recommended position is to have the child stand in front of the parent, and tilt his or her head back. The parent uses one forearm to support the head while using the fingers to retract the lips. The other hand does the brushing while the child watches in the mirror. Parents should apply only a pea-size amount of fluoride dentifrice to the toothbrush bristles to avoid the ingestion of fluoride dentifrice that has a consequential effect on the risk of fluorosis.

The parents should be informed of the importance of proper diet and nutrition to improve their child's nutrition and modify undesirable dietary habits to benefit oral health. They should also be encouraged to take their children for regular dental check-ups.

The curriculum in the pre-school programme should include not only dental health lessons of the lecture type but also activities and methods of teaching that will lead to reinforcement and maintenance of dental health behaviour where this is satisfactory or a change to new behaviour that will promote and improve dental health.

In the propagation of dental health education for pre-school children, the use of the media are equally essential. Children can be taught the principles of oral health by giving information which is imparted through plays and games. Audio-visual aids such as posters, children television and video programmes, and puppet shows can be valuable aids in teaching dental health to pre-school children. Of the audio-visual materials discussed, the puppet show is the most appropriate and useful for pre-school children.

Periodic evaluation of dental health education programmes are important to determine whether the programmes are progressing satisfactorily towards the set objectives and goals.

Various dental health education activities have been broadly discussed in the thesis. The knowledge gained through dental health education, that dental disease is preventable, and that simple treatment can only be effective when it is instituted early will, hopefully, motivate pre-school children to practise good oral hygiene daily and encourage their parents to take them for routine dental check-ups.

ACKNOWLEDGEMENTS

I would like to express my deepest thanks to Professor P.D. Barnard and Dr. S. Sivaneswaran for their untiring efforts, information, assistance, and supervision throughout the preparation of this thesis; their encouragement and support, is highly appreciated and will be gratefully remembered.

I am deeply indebted to my husband and son, whose understanding, love, and support have been more than I could ever ask for or expect.

TABLE OF CONTENTS

1 INTRODUCTION

1.1 DENTAL HEALTH EDUCATION

During the 1970s, prevention and health promotion began to be advocated as strategies for improving the health of population **(Locker 1989)**. Health education is the process of change in the health behaviour of individuals which occurs as a result of learning experiences **(Manual of Health Education 1969)**.

Green (1978) defined health education as "any combination of learning opportunities designed to facilitate voluntary adaptations of behaviour which are conducive to health".

According to a **WHO (1970)** definition of health education is aimed at persuading people:

- to adopt and sustain healthful life practices
- to use judiciously and wisely the health services available to them; and
- to take their own decision both individually and collectively to improve their health status and environment.

Dental health education is a process which uses many different media, such as radio, television, the printed word, exhibits, the lecture platform, group discussion and person-to-person contact, to induce people to act in such a way as to result in better dental health for them, their families and the community **(American Dental Association 1962)**.

The primary objective of dental health education is improved dental health through a voluntary change in patient's "dental" behaviour **(WHO 1987)**.

The personnel involved in the dental health education team comprise the dentist, the dental auxiliaries who come in contact with patients, and other related health and education personnel such as physicians, nurses, home visitors, social workers, and school teachers. Community leaders can assists greatly in dental health education **(FDI 1967)**.

1.2 DENTAL HEALTH EDUCATION FOR PRE-SCHOOL CHILDREN

When a child enters pre-school, he/she has many attitudes and health practices which have been acquired at home. The role of the pre-school teacher in the area of dental health is an extremely important one. Teachers in the pre-school are in a strategic position to introduce dental health to pre-school children by teaching them the essential facts about the teeth and by encouraging them to observe the proper daily habits that will help to ensure sound teeth for a lifetime of living.

Dental health is known to affect the general health, the appearance and social adjustment of an individual throughout his lifetime. The control of dental disease and defects and the establishment of good oral hygiene habits are best accomplished during childhood. Children learn through imitating the adults around them, especially those in their family **(Manual of Health Education 1969)**.

In Sydney, the current pre-school programme, dental health education does not exist. Dental health education should be part of the total health education program of the pre-school. The program should be woven into the pre-school curriculum in such a way that it becomes part of the total educational plan for all children **(Dental Health 1974)**.

Gochman (1973) considered that a common shortcoming of most dental health education programmes is that they are not coordinated with general health education programmes.

In this thesis the author will review literature on theories and principles of learning of pre-school children, norms of development of pre-school children, appropriate personnel to carry out dental health education and appropriate dental health education programme for pre-school children in the Sydney metropolitan area.

2 PRE-SCHOOL EDUCATION SERVICES IN N.S.W.

Pre-school education services in New South Wales is part of centre-based child care service **(N.S.W. Regulation 1989)**.

The Department of Community Services is responsible for licensing child care centres in New South Wales **(N.S.W. Department of Community Services 1990)**.

According to **Information'92**, published by Bankstown City Council, there are four types of pre-schools in Sydney. Some of them provide long day care services, which operate for a minimum of eight hours per day, five days per week for 48-52 weeks per year.

The Regulations for centre-based child care services establish the minimum standards which services may operate in order to retain a licence **(N.S.W. Regulation 1989)**.

Pre-school teachers have traditionally develop their own curricula and there is no intention to prescribe a specific syllabus which all must follow. Rather, the Department of Education has issued a guidelines to assist teachers in a complex task to develop their curricula **(N.S.W. Department of Education 1987)**.

2.1 CENTRE-BASED CHILD CARE SERVICES IN N.S.W.

According to the Children's Services Information Booklet **(N.S.W. Department of Community Services 1990)** the description of centre-based child care services in New South Wales is as follows:

(1) Pre-schools

Provide a planned programme of care and educational activities for children from three to under six years of age who are not attending school. Most services operate five days a week and are run on a sessional basis, i.e. morning (9am-12noon) and afternoon (1pm-3pm). Some run one long session per day from 9am-3pm. Preschools generally follow the school terms set by the Department of Education.

(2) Long Day Care Services

Provide for the care and education for children from birth to under six years of age who are not attending school during the parents' working hours. These services operate for a minimum of eight hours per day, normally for five days per week for 48-52 weeks per year. Most Long Day Care Services offer a programme of care and educational activities similar to pre-schools.

(3) Occasional Care Services

Provide flexible care for children from birth to under six years of age, who are not attending school, on a regular basis. These services normally cater for up to a maximum of 25 children at any one time. Each child may be allowed to attend the service for a maximum of twenty-four hours care per month.

The Department of Community Services has a statutory responsibility for the regulation and licensing of children's services, with the aim being able to ensure quality child care services throughout New South Wales **(N.S.W. Department of Community Services 1990)**.

The Department of Community Services does not relate to the Department of Education in order to assist service providers to maintain satisfactory standards of care for the children. The Department of Community Services has seven Regional Offices throughout the State.

The five major functions of the Department in Children's Services at the Regional level are:

(a) Licensing

- ensuring that premise meet all current regulations and licensing guidelines.
- ensuring that adequate and suitable staff are employed.
- verifying licence applications and recommending issuance of licence.
- ensuring the provision of appropriate programmes in accordance with the children' ages and stages of development.
- ensuring that the staffing, physical standards and quality of care are maintained in accordance with the regulations and licensing guidelines.
- forward recommendations through District Managers to the Regional Director for approval and issuance of licence.

(b) Funding

- advance payments of subsidies to pre-schools, long day care services, occasional care services and vacation care.
- make payments under the Commonwealth/State Children's Capital Programme.
- ensure services meet the conditions of funding.
- ensure constitutions of services, where applicable, meet the Departmental requirements.
- monitor and evaluate funded services and funding trends within the region.

(c) Planning and Community Development

- prepare estimates of currently funded services for continuation of funding.
- plan, develop and recommend for funding for new services.
- co-ordinate services at the Regional level.
- co-ordinate in service training for Management Committees.
- evaluate existing services' performance for funding and licensing purposes.
- prepare and/or advise on submissions.

(d) Advisory services

- assessment of quality care within individual services.
- monitor committee procedures and offer professional support.
- support children's services' proprietors, lessees and staff.
- advise on appropriate furnishings, equipment, physical requirements and updating same.
- advise on educational programme planning, implementation and evaluation.
- referral and follow-up of children with special needs.
- development of extended and integrated services.
- regular visits and support of all services.
- respond to community request for information on local services.

(e) Technical Support.

- receive and assess plans in accordance with the statutory requirements of the Act and Regulations.
- advise on building layouts and environs, construction materials and safety standards for children in consultation with the Children's Services Adviser.
- provide technical advice to Children's Services Advisers when required.

2.2 PRE-SCHOOLS IN THE SYDNEY METROPOLITAN AREA

There are 4 types of pre-schools in the Sydney metropolitan area, as follow: **(Bankstown City Council 1992)**

(a) Community based pre-schools

Community based pre-schools are usually run by churches, local communities, and YMCA, and they are non profitable or charity organizations. They get subsidy from the local government, and this is limited to building and maintenance of the building. Usually they operate from 9.00am to 3.00pm and based on 2 days or 3 days groups and follow the school term. The children's parents are encouraged to be involved in various aspects of the pre-schools programme by monthly or quarterly meetings. Fees are set by the community itself and the unemployed, pensioners, and low income family are eligible for a fee relief from the state government through the Department of Community Services. The Department of Community Services will do half yearly inspection to make sure that the pre-schools quality requirements are met **(Personal Information, Mrs Carol Meyer, Bankstown City YMCA 1992).**

(b) Department of Education Pre-schools

These pre-schools are the only pre-schools that are run by the Department of School Education. They are usually part of some public schools throughout Sydney metropolitan area. They receive subsidies, financial support and other assistance from Federal and State government. Their fees are determined by the Department of School Education and they operate on 2 or 3 days groups basis, and follow the school terms. The Department of Community Services has no control over these pre-schools. **(Personal Information Ms Chalton, South Bankstown Infants School Preschool, Bankstown 1992).**

(c) Kindergarten Union Pre-schools

These preschools are run by the Kindergarten Union Children's Services, a voluntary organisation and a registered charity. It is a foundation member of the Australian Early Childhood Association and thus works in co-operation with other National and State organisations concerned with the care of young children.

Standards set up by the Kindergarten Union are maintained with regard to:

(a) Qualification of staff.
(b) Staff/child ratio.
(c) Suitable buildings and playgrounds.
(d) Selection and suitability of equipment.
(e) Advising on patterns of attendance of children to allow services to provide for the needs of parents and to allow services to be flexible to cater for the changing needs of young children and their families.
(f) Programmes and curricula.

Subsidies are received from both the Commonwealth and State governments. Financial and other assistance is received from some Local Government authorities. Parents contributions bridge the gap between the total expenditure and subsidies received, and parents are encouraged to become involved in the programme, working in partnership with the teachers and staff to ensure consistent guidance for each child and to promote understanding of children development. They operate on 2 or 3 days groups basis and follow the school terms **(Personal Information Ms Edith Chapman, KU Preschool, Georges Hall 1992).**

(d) Privately owned pre-schools

These pre-schools are controlled by the Department of Community Services but they do not receive any subsidies and financial support from the Local Government. The school fee determined by the pre-schools owner and parents with low income, unemployed and pensioners can get fee relief assistance from Federal Government through the Department of Social Security. Most of them provide long day care services and they do not follow the school terms. They operate on a 5 days basis or by agreement with the parents and provide service for 48 weeks in a calender year. **(Personal Information Ms Elizabeth Bourke, Bees Knees Pre-school, Yagoona 1992).**

The fee relief introduced by the Federal Government is limited for long day care centres and family day care and the amount is depend upon the family's income. The payment will go to the centres and the parent only pay the gap between the actual fee and the funding from the government. More lower income families receive the maximum assistance available with their child care fees, and many middle income families are also benefiting **(Department of Health, Housing and Community Services 1992).**

2.3 BASIC REQUIREMENTS FOR A PRE-SCHOOL IN N.S.W.

All requirements must comply with Local Council Ordinances and the basic requirements will include the following standards:

(A) Indoor Area

- Playrooms should be adjacent to the outdoor play area, providing easy supervision.
- Playrooms should be adjacent to the toilets. Toilets should also be adjacent to the outdoor play space.
- Children should not have to cross another playroom to get the toilet or to the outdoor area.
- Clear glass is needed on doors between rooms to facilitate supervision from each room especially between the playrooms and the outdoor areas and the playroom and the toilet area. The following heights are recommended:

Between Interconnecting Rooms	**Height from Floor**
Playrooms and passage ways	0.9 metres
Playrooms and toilet/washrooms	0.9 metres
Playrooms and outdoor area	0.9 metres
Toilet/washrooms and cloakrooms	0.9 metres
Viewing windows in office or kitchen	0.9 metres

All fixed glazing on doors and observation windows are to be 5mm thick, clear, strengthened glass, and all glazing within 450mm of floor is to be clear strengthened glass.

- The minimum indoor unencumbered playroom floor space required is 3.25 square metres per child for children two years or older, and 4.18 square metres for children under two years. More space than the minimum is preferred.
- Permanent storage areas should not be measured when assessing the amount of playroom floor space to be provided.
- Space must be allowed for shelving, furniture and equipment, etc.
- Landings, ramps, steps and stairs. A lending at least equal to the width of the door should be provided between such door and ramp, steps or stairs.
- Each playroom must have its own storeroom and bed storage area.
- Recommended store room with stretchers for 20 children is 7.24 square metres.
- Indoor storage facilities are to be provided for each child's personal belongings. Additional indoor storage needs to be provided for:
  * bed linen, blankets, towels, face washers, nappies,etc and
  * stretchers or mattresses and play materials.

Meals in Services

The Department of Health and the Department of Community Services recommend that children are provided with regular, varied, and nutritious meals and refreshments.

Kitchen Area

The kitchen should meet the minimum requirements of the local council and be completely fire isolated. There should be adequate preparation and storage space and refrigerators and washing facilities. If meals are provided, the stove should be an adequate size and there should be sufficient space for preparation and serving. The minimum size of standard kitchen is 10.5 square metres to meet local council requirements.

Appliances

It is recommended that in centre-based services all equipment such as stove, dishwasher, microwave, refrigerator and washing machine, clothes drier, etc. should be of commercial standard and should be meet the Australian Safety Standards.

Toilet and Washroom Area

These areas are required to be designed in such a way to allow children to learn appropriate hygienic practices.

Sufficient space should be provided to accommodate the following:

- Toilets of an appropriate height related to the age of children.
- Toilet roll holders, of the same number as toilets, should be appropriately located.
- Handbasins (or water trough) and taps are required to be of suitable height and of the same number as the toilets.
- Soap holders should be appropriately located and of the same number as the taps.
- Hand drying facilities are required.
- Mirrors of safety glass standard should be located above each basin, at child height.
- Where water services are accessible to children, the water shall be cold unless fitted with an approved thermostatic device.

Office

The office should be suitable for confidential interviews, and contain a desk and chairs, telephone and lockable filling cabinet or cupboard for confidential materials.

Staff Room

The staff room should include comfortable chairs for staff, facilities for tea breaks and space for personal belongings of staff.

Sick Bay

There should be adequate and suitable space provided for the care of a child who becomes unwell. The space should include a room for a sofa, stretcher or mattress in a quiet easily supervised area.

Cleaner's Facilities

For the cleaner, a cupboard with an approved childproof locking device and a cleaner's sink are to be provided.

Blinds and Curtains

Recommended for services where children have a rest period.

Lighting

Fluorescent lighting is recommended because of the even, non glare light which is produced. If incandescent lights are used, a shade should be provided.

Wall Surfaces

It is recommended that washable paints are used on walls to allow for easy cleaning.

Floors

The floor will be subjected the heavy wear so it should be made of a non-slip surface and easy to clean. Linoleum or vinyl tiles are recommended. If these are laid over a concrete floor, the floor should be damp proofed.

Wooden floor should be free from wide cracks, knot holes and splintering. They should be sanded, sealed and coated with a finish.

Floor mats or carpet should be available for children to be seated comfortably. These should be backed or finished with a non-slip material.

Flyproofing

Wire screens are recommended for kitchen doors and windows in playrooms.

Soundproofing

Consideration needs to be given to reducing noise levels by using sound-absorbing materials such as carpets, curtains, screens or plants between playrooms.

Heating and Cooling

Suitable heating and cooling will be dependent upon local conditions.

Lockers

Each child should be provided with a locker with sufficient space for personal belongings.

Display Boards

It is recommended that the playroom walls have fixed display boards for the children's work. These boards should be at child's height. A parent's notice board near the entrance is essential.

Craft Preparation Area

Consideration should be given to provision of a sink unit with cupboard and bench space, and adjacent power point.

(B) Outdoor Area

The following are the requirements for outdoor area:

- The design of outdoor play space should allow at least half the area to be unencumbered and available for free, vigorous play and development of gross motor skills.
- The minimum outdoor space required is 6.96 square metres per child for children two years and older. The outdoor paly spa shall be of such a shape as to allow constant supervision of the children.
- Outdoor areas should include a variety of surfaces such as sand, grass, soil and hard

areas for wheel toys. Outdoor areas should also include a variety of levels.

- Grass is the best soft surface on which to run and to erect climbing equipment. It is important that this area be well maintained for maximum use. However, consideration needs to be given to current developments in child safety standards regarding impact surfaces.

- Hard surface is used for a variety of activities and should be designed with these activities in mind. Concrete is preferable to bitumen which becomes very hot in the summer months.

- Landscaping of the outdoor area should be aesthetically appealing to children as well as functional. Creative use of different trees and shrubs will provide shading for play areas such as the sand pit. The sand pit should be constructed to a plan approved by the Department.

- A cover of the sand pit is required to keep animals, leaves and debris out of the sand when not in use. A light weight shade structure over the sand pit is desirable.

- Fencing must be childproof.

- The recommended height for fencing is at least 1.2 metres. Gates should be the same height, self-closing and fitted with a childproof lock.

- An outdoor tap is required.

- Outdoor play space should not be occupied by any motor vehicles during the hours of operation.

- Outdoor storage facilities should be of sufficient size and practically to accommodate all movable outdoor equipment. Consideration needs to be given to ease of access for bulky items e.g. jumping boards, trestles, slippery slides, etc.

- Outdoor storage facility should be conveniently located to the outdoor play space and the recommended size is:

    * up to 20 children : 3.9 metre x 2.1 metre x 2.1 metre high.

    * up to 40 children : 3.9 metre x 3.6 metre x 2.1 metre high.

(C) Staffing Requirements

The Authorised Supervisor is responsible for the overall planning and implementation of the daily programme for the care and education of the children in the service.

A trained Supervisor will hold a degree/diploma in Early Childhood Studies or other qualifications, or training and experience, approved by the Minister.

C.1 Staffing qualifications

The Authorised Supervisor will be a person who :

(i) has completed a full time course of not less than 3 years' duration, at a university or college of advanced education, of early childhood studies; or

(ii) has obtained a Child Care Certificate or a Certificate of Child Care Studies from a college of technical and further education; or

(iii) has other approved qualifications or other approved training and experience; and

(iv) has had sufficient experience in the provision of child care services, and is of suitable age, health and personality, to carry out the duties of the authorised supervisor; and

(v) is of good character.

C.2 The adult:child ratio

The adult child ratio stated below are the minimum staff required on the premises during the hours of operation for the care and supervision of the children.

AGE OF CHILDREN	ADULT/CHILD RATIO
Under 2 years	1:5 children
Aged 2 but under 3 years	1:8 children
Aged 3 but under 6 years	1:10 children

2.4 PRE-SCHOOL CURRICULUM DEVELOPMENT

The term 'curriculum' refers to everything that is taught in pre-school, and how it is taught **(Baxter 1983)**. No programme or centre or equipment can alone inspire children to learn. No child can learn alone and he can not learn well if conditions are unsatisfactory for his learning. Children need to be with other people to discover the world of people and what they do, to develop an awareness of themselves, their feelings, and how to get along with others. They need an environment rich with experiences and relationship which can enhance their skills and help them to effectively explore and learn from the world around them **(Langford & Sebastian 1979)**.

Every pre-school in the Sydney metropolitan area develop its own curriculum by following the Guidelines For Pre-school Curriculum Development, published by the Department of Education.

According to the Guidelines, published by the Department of Education, pre-school teachers should develop their curriculum by considering these following facts :

- the individual child as the focus of planning
- a developmental orientation
- play as a significant medium for learning in the pre-school years
- language as permeating the curriculum
- equal opportunity for all children irrespective of sex, race or cultural background
- the importance of parents and guardians in the early education of their children

2.4.1 Types and Sources of Pre-school Curriculum

A brief review of the major types of school curriculum in use in the United States **(Dunning 1986)** is presented below in order to visualise the frame into which health education may fit:

(a) The curriculum of isolated subjects

The curriculum of isolated subjects has the longest tradition in United States and is represented more extensively in schools. Health instruction finds its way into this type of curriculum only by being given a specific time allotment. In this type of curriculum, health is taught primarily as a subject, like reading, arithmetic, or history. In general, treating health as an isolated subject discourages both teacher and children from feeling that the study of health is truly vital.

(b) The open classroom curriculum

Represents a child-centred approach to learning rather than a teacher-centred authoritarian approach. There is considerable freedom in the open classroom for the child to pursue activities of his own interest within the area of study, including the design and carrying out of projects. Each child advances at his own rate, with the teacher as guide and leader.

Albertini et al (1973) describe an interesting application of dental health education in the open classroom, including role playing, inspection of each other's teeth, and simple biochemical projects.

(c) The broad-fields curriculum

This curriculum helps pupil motivation by grouping subject material into real-life patterns. An organised approach to health instruction can easily be worked out within the broad-fields curriculum. Such isolated subjects as personal hygiene, disease prevention, community hygiene, and health care of children can be combined into a single course. This programme encourages both teachers and children to make correlations more frequently than does instruction in isolated subjects.

(d) The core curriculum

This concept has arisen as a reaction against sterile instruction organized around subjects. It implies in essence that a group of children spend an important portion of the school day with teacher who is responsible for the core of their experience. Special teachers in health may exist within such a framework and work as specialists, but the basic features of the total programme are planned by consultation between the core teachers and the special or resource teachers. The content of instruction in the core is not given any subject label. The immediate needs and interests of children are given careful attention in planning for health.

In developing a curriculum for young children, the teacher has to consider a variety of factors. Some of these are **(Lillie 1975, Blenkin & Kelly 1988)**:

(a) Psychological theories of child development and learning

These theories attempt to explain how children develop and how learning occurs. These theories also help teachers to understand the types of things that children should be able to learn at different stages of development and the methods which might be most appropriately employed to foster learning. On the other hand, these theories do not generally assist in determining what should be taught.

(b) Observation of children's behaviour

This knowledge assists in understanding the child's developmental needs, the extent and kind of motivation required and the most appropriate teaching methods to be adopted if desired learning is to occur.

(c) Organised bodies of knowledge

The organised bodies of knowledge such as sciences, social sciences, music, literature, mathematics are selected to assist in the development of skills, understandings, attitudes and appreciation appropriate to the child's stage of development.

(d) Human and cultural value

This knowledge assists in developing the children to play an effective role in society and what children ought to learn in a multicultural society.

From the foregoing consideration of curricula, it will be obvious that dental health can seldom be treated as an isolated matter. It makes little difference who does the ultimate teaching, provided the dental subject material is not considered a 'stepchild,' but is transmitted with understanding and devotion **(Dunning 1986).**

2.4.2 The Pre-school Curriculum

An early childhood curriculum is based on a coherent theory of early education and should be planned for the achievement of the objectives held for the children.It should take account of the fact that children at this stage of their development are largely dependent upon concrete materials for their learning. Materials and activities presented should match the child's level of understanding **(Schwartz & Robinson 1982).**

A good pre-school curriculum will offer children opportunities to learn when they show interest and will also strive to achieve a balance between **(N.S.W.Department of Education 1987):**

- freedom and structure
- group and individual experiences
- physically active and less active experiences
- planned and spontaneous learning opportunities

In recent years, there has been increased interest in, and emphasis on, the educational approach in the prevention and control of health problems. It is a fact that oral disease is potentially preventable, so that prevention of oral disease is preferable to treatment **(Wei 1988).**

The worldwide prevalence of oral disease indicates the almost universal need for effective dental health education programmes **(Hunter 1988).**

Dental health education is not a major aspect in the current pre-school curriculum in Sydney. Priority needs to be given for pre-school children as **Hunter (1988)** says that oral disease is essentially a disease of childhood.

Dental health is known to affect the general health, the appearance and social adjustment of an individual throughout his lifetime. It is believed that the control of dental disease and the establishment of good oral hygiene habits are best accomplished during childhood. In the current world economic recession and the not-so-promising future of the social welfare system, parents are under pressure to work out the best way of supporting their children. This leads to the need for two-income families where both parents are working to maintain a reasonable lifestyle for the family. If both parents are working, there is a growing need for child care support in the form of child care centres. Since the children will spend most of their time in those centres, the current programme of pre-school education needs to be reviewed especially in the health education area.

As one of primary prevention programme, dental health education has to be implemented in the early age learning programme to maintain a non caries dentition.

By far the largest and most important organised group for dental health education to reach is to be found in the school systems. Not only are children the best learners, but they are at the beginning of their dental health problems. Dental health education, like education on any other subject, depends on the child's ability to learn and his stage of development.

3 THEORIES AND PRINCIPLES OF LEARNING

The theories and principle of learning will influence both the planning and implementation of the pre-school curriculum. Central to all the theories is the principle of individual differences which affects the application of all other principles such as: stages of development, interaction with the environment, reinforcement, understanding, and modelling. While children share much in common, differences in past experiences, for example, will influence the nature of the experience most suitable at a particular time and differences in rate of learning will influence the kind and amount of practice that is appropriate **(N.S.W. Department of Education 1987).** This chapter provides four theories of learning: conditioning theories, mediational behavioural theories, social learning theories and cognitive behavioural theories.

3.1 CONDITIONING THEORIES

Learning theories in its earliest forms restricted itself entirely to the study of objectively observable objects and events. Concepts of mind, thought, feeling and attitude were explicitly rejected. Instead, the field focused on determining the effects of environmental events on the action of people or animals, with the aim of establishing psychology as a branch of the natural sciences **(Lee 1986).**

These theories argue for a direct, lawful, relationship between an event in the environment and the response of a person to that event. And the classical-conditioning and operant-conditioning models exemplify this framework.

3.1.1 Classical Conditioning

Classical conditioning focuses on the process by which an automatic response to an environmental stimulus comes to be elicited by other environmental events which are regularly associated with the original stimulus. To produce a classically conditioned response to an event, there must initially exist a particular event which automatically elicits that response. Classical conditioning can be observed when people respond emotionally to events or objects which are in themselves neutral but which have been associated in the past with strongly positive or negative events **(Lee 1986).**

3.1.2 Operant Conditioning

Operant conditioning was an American development, associated largely with the work of **Skinner (1938).** Operant conditioning focuses on the learning of voluntary actions, rather than on automatic responses. The basic operant-conditioning paradigm states that actions which are followed by a pleasing state of affairs become more probable, and likely to be repeated, while actions followed by unpleasant state of affairs tend to decrease in probability of occurrence **(Lee 1986).**

The pleasant state is known as reinforcement. Reinforcement is initially supplied for a rough approximation of the desired behaviour; as this becomes strengthened, the conditions under which reinforcement is supplied are tightened, so that a closer approximation of the final behaviour is required.

Lee (1986) defined reinforcement *"as anything which has the effect of strengthening the target response: it might be food, money or social approval"*. Reinforcement is most effective if it is received immediately following the response being reinforced, and if the recipient understand the reason for the reinforcement.

According to **Lee (1986)** reinforcement is classified in a number of ways:

- Positive reinforcement: Involves the presentation of a positive event when the target response is performed.
- Negative reinforcement: Involves the removal of an unpleasant state of affairs when the target response occurs.
- Punishment: Involves the presentation of an event which weakens behaviour. It is sometimes confused with negative reinforcement, but the two are in fact quite different. Negative reinforcement strengthens the target behaviour, while punishment weakens it.
- Intermittent reinforcement: Involves the presentation of reinforcers on only some occurrence of the target behaviour.

The classical and operant conditioning models of behaviour are based on the concept of a direct relationship between an external stimulus and an action **(Lee 1986).** These conditioning theories have been influential with their various strategies for strengthening and weakening behaviour.

3.2 MEDIATIONAL BEHAVIOURAL THEORIES

More recently, mediational models of learning have gained in popularity. Mediational models are based on the concept that events occur inside the person or animal in response to a stimulus, and that these mediate the relationship between external stimulus and observable response.

A central concept common to these theories is that of **vicarious conditioning**, also known as **modelling (Lee 1986)**. Vicarious conditioning is considered to be the most common method by which human acquire new behaviours. It involves learning without any direct reinforcement to the learner. Rather, learning occurs through observation, either from real life examples or from video or film. In the vicarious conditioning paradigm, the person observes another behaving in a particular way, and observes that this action is reinforced. This prompts individuals to produce the behaviour themselves in similar circumstances. Modelling has been shown to be most powerful when the observed model is similar to the observer in as many salient features as possible, and when the model receives consequences which would be highly reinforcing to the observer.

Symbolic modelling is a more abstract form of vicarious conditioning, in which the subject reads or hears about, rather than observes directly, the behaviour and its reinforcement. Symbolic modelling is a useful part of mass-media campaigns to change health-related behaviour.

These theories have gained their popularity by their concepts of vicarious conditioning or modelling in producing the desirable behaviours. And reinforcement is given to those desirable behaviours.

3.3 SOCIAL LEARNING THEORIES

Social learning theories have a long story but developed as a major force following the work of **Bandura and Walters (1963).** Social learning theories reject the traditional behavioural emphasis that the environment determines behaviour in favour of a strongly interactionist viewpoint. The term **modelling** is used, and suggests that much of the child's behaviour is the result of observing the reinforced behaviour of significant adults and children **(N.S.W. Department of Education 1987).**

Marlatt and Gordon (1980) have developed and approach to addictive behaviours which argues that addictions are socially learnt strategies for coping with emotional states, and that learning more appropriate reactions will be a necessary part of effective treatment.

A social learning theories approach produces technique similar to the cognitive behaviour modification, but differs in explanatory emphasis **(Lee 1986).**

A major development from social learning theory has been the construction of **self-efficacy** theory. Efficacy expectations are beliefs about one's ability to perform certain activities. Efficacy expectations are derived from a number of sources of information available to the individual **(Bandura 1977).**

Efficacy expectations have been shown to predict success in health-related behaviour change programmes with a reasonable degree of accuracy, which makes efficacy information useful in deciding wether a client is ready to make a change or needs further education or persuasion **(Condiotte & Lichtenstein 1981).**

3.4 COGNITIVE BEHAVIOURAL THEORIES

Cognition is the means by which an individual accumulates organised knowledge of the world and the use of that knowledge to solve problems and modify behaviour **(Lowrey 1986)**.

Cognitive behaviour modification is increasingly applied to human behaviour. This change arises from a feeling of dissatisfaction with the limitations of an approach based purely on objectively observable events **(Mahoney 1974)**. Cognitive methods of behaviour change therefore focus on altering the client's interpretations or expectations of an event **(Lee 1986)**.

Modelling is also the central concept to this theory and it is useful part of mass-media campaigns to change health related behaviours.

Understanding learning concepts gives the health professional greater confidence and flexibility in setting up an appropriate dental health education programme for pre-school children.

The pre-school teacher then needs to plan an environment which allows for a variety of suitable experiences over a period of time, to be aware of the feedback the child is receiving as a result of his or her own actions.

4 NORMS OF DEVELOPMENT OF CHILDREN

Knowledge of child development helps adults observe children more precisely. Good observation is the basis of good teaching. Knowledge of child development will help adults focus on what to expect and on where special attention is needed **(Matthewson, Primosch, Robertson 1987).**

Children in the early year of age are very much the centre of their own world, learning through their own actions, interpreting the world through the effect that their actions have on things and other people, reaching out emotionally and socially towards others, yet still dependent on those close to them. Children pass through stages of development at different rates and not all children of the same age will reach the same level at the same time. Meanwhile, it is useful to consider specific aspects or areas of development. It is also essential to remember that areas of development are interrelated and integrated in the child as a whole person.

The principle of the children growing as a result of his or her own experience is seen across all areas of development, such as physical, social and emotional, cognitive, and language **(N.S.W. Department of Education 1987).**

4.1 PHYSICAL DEVELOPMENT

Physical development involves bodily growth and movement. In order to maintain appropriate rates of physical development, children need an environment which provides adequate health care and adequate levels of safety while still affording opportunities to experiment and explore.

According to **Highberger and Schramm (1976)**, there are 2 type of physical developments:

(a) Gross Motor Development

This is the development of the groups of large muscles used in gross movement. These skills develop through vigorous and energetic play which usually occurs out of doors, although opportunities, materials and equipment for such play should also exist indoors.

(b) Fine Motor Development

This is the development of the small muscles used in fine movements including hand and finger control. The children are simultaneously developing fine motor skills such as the hand-finger movement and control demonstrated in finger plays and the hand-finger control and hand-eye coordination reflected in the children's increasing skill with creative materials.

Physical coordination improves as children test their skills in an environment which offers physical challenge, including ample opportunity for continued practice in the same type of activities as well as moving on to increasing levels of difficulty. By the time a child is enrolled in a pre-school centre, gross and fine motor skills are usually quite well developed **(Baldwin 1967)**.

4.2 SOCIAL DEVELOPMENT

Social development is the process of learning the skills and attitudes that enable individuals to live easily with other members of their community. It is most intensive during childhood and adolescence and the process will continue throughout life **(Minett, Gunstone 1987)**.

Social development involve the young child's growing ability to function as a relatively independent being, as a member of family and others social groups. It occurs simultaneously and interdependently with development in other areas and, in the pre-school years, is characterised by many beginnings but few completely attained skills **(Donaldson, Grieve, Pratt 1983)**.

For many children, their first encounter with sizeable groups of same age peers occurs at preschool, or playgroup. Prior to this, their social experiences will frequently have been within their family context, and interaction with peers often confined to the children of family friends. However, attendance at preschool will lead to a change in children's social experiences, for now the child is expected to learn to interact and play with a range of other children. As children's play becomes more social, individual preferences are revealed. Children also vary in the extent to which they are able to form friendships **(Donaldson, Grieve, Pratt 1983)**.

4.3 EMOTIONAL DEVELOPMENT

Emotions are feelings such as excitement, love, happiness, worry, sorrow, anger, contentment, pride, jealousy, shyness, and frustration. Young children show all these emotions and many more.

Emotional development is influenced by two factors: inborn temperament and environment. Temperament depends on the genes the child inherits. Children vary considerably in the strength of their emotions. For example, some children are very shy, others are rarely shy. Environment means the surroundings and conditions in which the child grows up. Environmental factors that have a marked effect on emotional development include the following: **(Minett, Gunstone 1987)**

- the home. This includes the home conditions, the conduct of the people in the house and the effects of the fortunes and misfortunes that occur as a child grows up.
- training. The type of training child receive from adults will affect the amount of control they develop over their emotions.
- state of health. There is a strong link between a child's state of health and his feelings. When a child is ill, he will have different feelings from when he is well.

Emotional and cognitive development are interrelated in many ways **(Ausubel, Sullivan 1970)**. Emotions similarly precede reasoning in the phyletic scale, on the other hand cognition arising from the immediate situation as interpreted by past experience provide the framework in which an individual comes to understand and label his feelings **(Singer 1962)**.

4.4 COGNITIVE DEVELOPMENT

All aspects of the early childhood education programme offer opportunities to contribute in some way to the child's cognitive development. Children learn to think while engage in their own activities, such as seeing, doing, making, listening and talking. As children take part in activities with things and other people, they are constantly using their senses to gain information which they organise to build their own understanding of the world and then they gradually adopt more complex linguistic structures (in whatever language) to express meaningful relationships between concepts **(N.S.W. Department of Education 1987)**.

Piaget (1969) has theorised that cognitive development occurs in four stages throughout infancy and childhood:

(a) Sensorimotor (0 to 18 months)

A number of changes can be found from the child in this stage, such as: the enhancement of retrieval memory, object permanence, inhibition to novel events, and stranger and separation anxiety.

(b) Preoperational (18 months to age 7)

The child in this stage has language and is capable of symbolic thought.

(c) Concrete operations (age 7 to 12)

The children in this stage have developed a new set of rules, called "groupings", which have special logical qualities.

(d) Formal operations (age 12 onward)

The child in this stage can transcend concrete reality and think about what the consequences are. There are four important characteristics of the stage of formal operations:

- the inclination and ability to reason about hypothetical situations.
- systematic and exhaustive searching for hypotheses.
- higher-order rules.
- a mental set for detecting inconsistency in propositions.

The stages are continuous, and each is built upon and is a derivative of the earlier one.

4.5 LANGUAGE DEVELOPMENT

Speech is a function that is unique to humans and sets them apart from the lower animal forms. The attainment of speech is one of the most important achievements of childhood **(Lowrey 1986)**.

The coming of language occurs at approximately the same age in every healthy child throughout the world, strongly supporting the concept that genetically determined processes of maturation rather than environmental factors are the foundation for speech and verbal comprehension **(Sameroff, Chandler 1975)**.

During the first year, the style of communication changes from month to month. The stage of babbling or "jargon" talk starts at about six months and the first sounds are vowel-like such as [i] and [u], which are produced in the front of the mouth **(Highberger, Schramm 1976)**.

Environment does influence the use and continued practice of infants' spontaneous vocalisations. Children learn to understand language much earlier than they learn to speak, as shown by their responses to commands and this is called "passive vocabulary". Toward the end of the infancy period and through the toddler period, caregivers can influence this passive vocabulary by naming objects as children touch them, or describing activities: "We climb up the stairs." Even though human beings have a built-in capacity to develop speech, adults can help infants develop the sounds they make and the sounds they hear into an effective system of communication. By eighteen to twenty-four months most children begin to combine words to express themselves in a way already far in advance of the cleverest parrot.

Vocabulary size grows slowly at first then increasingly rapidly after the second birthday **(Winefield, Peay 1980)**. Most children experience a kind of language explosion during toddlerhood and into preschool years. In addition to rapid vocabulary growth, preschool children use increasingly complex sentences more effectively for a variety of purposes. Another obvious change during this preschool

period is the emergence of lengthier, more complex sentences. Repetition of a word's first sound or of an entire word may appear during this preschool period and this is part of speech development for some children **(Highberger, Schramm 1976)**.

Most children develop language with little difficulty and language growth is accompanied by the ability to put language to a greater variety of uses **(Highberger, Schramm 1976)**. By the time children enter primary school, they have a very good command of their native language. Indeed, their achievements in language development appear highly impressive when one considers some of the evidence concerning their cognitive limitations **(Donaldson, Grieve, Pratt 1983)**.

It is important to consider the function of speech and its relationship to the total development of the child **(Bloomer 1957)**. The function can be divided into two categories, which are interrelated and not mutually exclusive: personal and social. The personal functions of speech include emotional expression, self-communication, dramatic expression, and vocal play. The social functions of speech are more evident, but not necessarily important, than the personal ones. These include communication with others on a purely social level, the exchange of ideas or information, and the modifying influences of language on behaviour and attitudes of others.

The speech with which children acquire and make use of complexities of their language has led to an emphasis being placed on the surprising nature of their capacities. It is important to note that the development of language, and of its use to communicate with others, is by no means completed when children enter primary school. Children learn language in the first two years for coding what they know of the world of objects, events, and relations. Children apparently know a great deal more than they are able to talk about **(Bloom 1975)**.

Language has two major functions:

- to communicate with others;and
- to express and clarify ideas.

Language development involves both receptive language, where the child receives and processes the language of others, and expressive language, which is the language the child produces **(Highberger, Schramm 1976)**.

It is universally recognised nowadays that dental health education is concerned with the whole stage development of the children, and that this includes their physical well-being. The development of children can be used as a basis for planning a dental health education programme, thus it can easily be adapted for pre-school children **(Matthewson, Primosch, Robertson 1987)**.

5 DENTAL HEALTH EDUCATION FOR PRE-SCHOOL CHILDREN

During the 1970s, dental health education began to be advocated as strategies for improving the health of population **(Locker 1989)**. The prevention of dental disease is considered by many to be the primary aim of dental health education **(Ashley 1989).**

The general aim of dental health education is to promote the life-long maintenance of a dentition which is comfortable, functional, socially acceptable, and promotes good general health **(Ashley 1989)**. Comfort and function are largely determined by the individual; social acceptability relates to factors such as appearance, ability to speak clearly, and the absence of halitosis associated with oral disease. Promotion of good health is a more general concept and includes aspects such as ensuring that the children can eat an adequate diet and have a good self-image **(Murray 1976)**.

Major emphasis in all dental health education programmes should be placed on primary prevention **(WHO 1970)**. Recognition of the importance of dental health is reflected by the quantity and quality of source materials available for teaching **(Stoll 1977)**.

The ultimate goal of planned dental health education programmes is behavioural in nature,viz.,the reinforcement and maintenance of health behaviour where this is satisfactory, or a change to new behaviour that will promote and improve individual, group or community health **(WHO 1970)**.

The major component of the educational process for pre-school children are **(WHO 1970)**:

- the educator. Anyone who attempts to influence the learner, such as dentist, teacher or mother.
- the learner. The individual or groups to be influenced.
- the behavioural goals towards which the process is attempting to direct the learner.

5.1 BEHAVIOURAL OBJECTIVES

Human behaviour is complex as it is the outcome of many interacting forces and factors. Health education has largely been concerned with identifying ways of manipulating some of these forces in order to bring about changes in behaviour conducive to health **(Locker 1989)**.

A child's behaviour is a reflection of the personality and is a part of child's emotional being. Behaviour is learned and most children learn it at home. The principle of eliciting good behaviour is easily understood. When children do something right, whether at home or at school, their positive behaviour needs to be rewarded and not rewarding their negative behaviour. Children have no idea if they are doing something properly unless they are told so. Make sure the reward to the child is toward that desirable behaviour **(Foster 1992)**.

The control of dental disease and defects and the establishment of good oral hygiene habits are best accomplished during childhood **(American Dental Association 1969)**. The American Dental Association (1960) has adopted the following objectives for dental health education programmes for pre-school children:

(a) To help every pre-school children appreciate the importance of a healthy mouth.
(b) To help every pre-school children appreciate the relationship of dental health to general health and appearance.
(c) To motivate pre-school children and their parents to assume responsibility for practicing recommended procedures for oral health care.
(d) To correlate dental health activities with the total pre-school health programme.

Stoll (1977) mentions that these following objectives should be achieved in dental health education programme:

(a) Every school-age child is in a healthy condition in order to derive maximal benefits from his educational experience.
(b) Children will be educated to recognise the value of sound teeth in a healthy mouth as part of total health.
(c) Children and parents will be motivated to assume responsibility for practicing recommended procedures for dental health care.
(d) The programme will be part of the total effort toward achieving the school objectives of self-realisation and self-improvement of all children.

5.2 THE EDUCATORS

Health education is concerned with behaviour change and dental health education cannot and should not be separated from education in general **(Health Education Council 1971)**. The development of appropriate dental health education programme requires close co-ordination between the responsible health administrators and public health dentists, health educator specialists and other health personnel **(WHO 1970)**.

According to **Wong (1972)**, in any scheme, the fundamental principle to follow is the maximum utilisation of all available personnel as long as they are suitable trained to play the role expected of them. There should be flexibility in the use of personnel and there is no valid reason why any of the existing dental health personnel should only play his or her traditional role. The dental health education team concept is a measure of utilising selected personnel both dental and non-dental who work in close co-operation as a team to carry out health education activities **(Silverman 1976)**.

Every member of the dental health education team should be actively involved in the planning, implementation, and evaluation of the dental health education programmes for pre-school children. Dental health education can also be carried out by non-dental personnel, such as school teachers, school nurses and health personnel, if they are properly trained for it. Involvement of these personnel is of utmost importance to minimise loss of operating time by dental personnel **(Barmes & Bailey 1972)**.

Schools take the responsibility for teaching dental health and dental health education ought to be programmed through school teachers and health educators **(Rowntree 1959)**. For young children, the presence of the peer group form an ideal setting for acquiring dental health knowledge and developing good habits **(Wong 1976)**.

Dunning (1986) mentions that the professionally trained dental auxiliary without specialised training in education can do a great deal as a resource person and even as a coordinator of school dental health programmes.

The dental health education team must bear in mind that they are very much going to be involved in public health relations. If they want to succeed in improving the dental health status of the pre-school children, they would have to do something to help change attitudes, habits, and diets. They would have to learn to communicate with parents - how to awaken their interest in dental health of their children. Therefore, they must be sufficiently trained and should require adequate knowledge of dental health education before proceeding to work in a dental health education programme for pre-school children.

Dunning (1986) states that in any dental health education programme, the dental education team must be carefully considered. The dental health education team essentially comprises the following personnel:

(a) Dentist
(b) Dental hygienist
(c) Dental therapist
(d) Classroom teacher
(e) Parent

5.3.1 Dentist

The role of the dental profession has shifted from that of provider and presenter of the dental health lectures (**Johns & Muhler 1965, Williford et al 1967**), to that of initiator, encourager and supporter of programmes that can be used by teachers in schools (**Albertini et al 1973, Craft & Croucher 1981**).

In the dentist's role as consultant and professional resource person, he should be reasonably familiar with the authentic material available in this field. He must work both with school administrators and with school or community health councils to organize an educational programme which will reach pre-school children. He must support the dental hygienists and dental therapists in his area. He should have studied carefully the dental-health materials available locally so that he can distribute these materials to other dental health education team members. The dentist will seldom find himself in a direct teaching position into these groups of children (**Dunning 1986**).

5.3.2 Dental Hygienist

The dental hygienist can do a great deal as a resource person and even as a coordinator of school dental health programme. She should know as many classroom teachers in her area as she can, and keep them supplied with relevant literature. She can also play in role of having brief discussions on problems of dental hygiene and dental care with many children **(Dunning 1986).**

5.3.3 Dental Therapist

A therapist is not a dentist but diagnoses and treats dental disease in children under the supervision of a dentist. They are responsible for the dental care and the promotion of good oral health of both pre-school and school children **(The School of Dental Therapy 1992).** The therapist is part of a highly trained team and is responsible for the dental care of both school and pre-school children, to provide the best condition for their dentition to develop, and accept the task of assisting in the development of their general health, including their physical and emotional problems **(Finn 1973).**

Dental therapists play major roles these days in dental health education for children **(Roder, Bart 1978).** A therapist may also talk directly to the children in their classes, when permitted to do so, and may be much more successful in "levelling" with the children than a graduate dentist would be **(Dunning 1986).**

5.3.4 Classroom Teacher

The teaching of oral hygiene is and must be a primary responsibility of the classroom teacher. The teacher's interest in securing dental corrections is a major factor in developing pupil interest and action. Teachers properly instructed in the principles of oral hygiene and gifted with enthusiasm and persistence can stimulate children to seek dental service as effectively as dentists or dental hygienists. The teacher is the keystone of the arch of dental health education **(Dunning 1986). Stoll and**

Catherman (1967) even say that teachers can be motivated and stimulated to become effective tools in teaching dental health education in the classroom by proper training and acquisition of the relevant knowledge.

The dental team, with their specialised knowledge, can co-operate with teachers to make dental health education meaningful and interesting **(WHO 1970)**. On the other hand **Stoll (1977)** says that classroom teachers left to their own devices and without strong motivation from dentist and dental hygienists accept a defeatist attitude toward the health problems of their pupils. The do not have the facts or initiative to teach prevention of dental disease.

Dunning (1986) believes that the classroom teachers must be stimulated and aided by the dental health specialist in order to become effective team members in dental health education programme for pre-school children.

5.3.5 Parent

Almost every report of a dental health education campaign urges involvement of parents, and that school dental health education is difficult if not impossible to accomplish without the cooperation of the parents **(Richards & Cohen 1971)**. Parents are expected to reinforce what the teachers have been teaching the children about their dental health. Schools have been the traditional site for educating children about dental health. Thus, some investigators have sought to strengthen school programmes by involving parents **(Lee 1978)**.

Empirical evidence shows that parents are the strongest influence on a young child's life and there is a direct association between a parent's personal practices and the child's behaviour **(Rayner 1970, King 1978)**. A number of studies have highlighted the influence of parents in promoting children's dental health practices. Parents have a significant role in influencing children's behaviour in all areas of health. And the importance of parental education in dental health is widely and strongly supported **(WHO 1970)**.

The result of the pre-school dental health education programme depend considerably upon the attitudes and knowledge of the parents relating to dental health. Parents with lack of interest and knowledge about dental care require guidance and education. They must be taught the importance of the maintenance of the deciduous teeth **(Burstone 1975).**

The parent-teacher association naturally attract the more progressive parents involvement in the community. The question of the dental health of their children is always of interest. Parent-teacher associations usually meet at regular intervals and are glad to listen to qualified speakers on dental health subjects **(Dunning 1986).**

Dental health education, like education on any other subject, depends on the child's ability to learn. The level of learning of each individual varies and in most cases guidance and involvement from parents plays an important role in the early stage of learning process. Whatever dental health education received at pre-school must be understood by parents, so that what the children learn can be carried out as a practice or a new good dental health behaviour at home. This usually involves regular brushing and proper diet control which parents can monitor and be in charge of.

5.3 METHODS OF TEACHING

According to **Dunning (1986)** the primary distinction in method of teaching in the field of dental health education, is between individual instruction and group instruction. In an ideal programme, both should exist. Individual instruction is best built around experience in healthful living. On the other hand, in the handling of groups, the dental health educators need special educational experience through training programmes in dental health education.

Dental health education is effective when the conditions of learning are good and the aim of instruction is clearly recognised. Children must want to learn before any teaching method will be effective. They must be made aware of their basic health needs, not in any way that threatens them, but in a friendly matter-of-fact way that tells them for example: this is part of me, this is interesting. By providing meaningful experiences in school, related to the child's awareness of his health needs, the teacher can help the child to want to learn about dental health (**American Dental Association 1969**).

The efforts of the dental health teacher should be focused on interpreting the principles of good dental health into meaningful learning experiences for the pupil. The purposes of dental health education go beyond emphasis on information into the development of daily dental health habits and attitudes (**Stoll 1977**).

This following considerations should be carefully screened and constantly reviewed in the method of teaching to achieve the best result in dental health education programme (**Stoll 1977**):

(a) Only information that can be readily understood by pre-school children should be given at pre-school grade.
(b) Learning experiences must be relevant to the need and the interest of the pre-school children.
(c) Dental health instruction for pre-school children should be based on activities that provide opportunities for good dental health practices.
(d) Instruction in dental health education should include sufficient understanding of scientific terms to provide the pre-school children with a vocabulary adequate for intelligent reading and understanding within pre-school level.
(e) Instructional experiences in dental health should include opportunities for understanding and co-operating with the pre-school, the home and the community.

5.4 DENTAL HEALTH EDUCATION MEDIA

The term 'media' should theoretically include all vehicles for communication, wether by examples or by word. Media, however, are more usually understood to be the specific tools used for formal teaching, other than the human voice **(Dunning 1986).** These tools can be grouped in two categories: **Audiovisual Aids and Mass-media.**

5.4.1 Audio-visual Aids

In this category, are usually included flannel boards, perforated hard boards, picture study, posters, motion pictures, slides, film strips, and television. They are used as methods of building concepts. They are not meant to take the place of the teacher or to assume the actual task of teaching. If audiovisual aids are properly used they contribute to the formation of desirable concepts, provide interest for abstract ideas and tend to make learning permanent **(Stoll 1977).** In part audio-visual aids involve techniques which are attractive for audience participation. Thus children can make their own posters in an attempt to teach others to teach themselves **(Dunning 1986).**

According to a **Manual on Health Education,** issued by the Department of Public Health in New South Wales **(1969),** an effective audio-visual aid should have some of the following characteristics:

(a) It should attract attention without reducing the audience's attention to what is being taught;
(b) It should increase the audience's interest in the subject;
(c) It should help the communicator to communicate his intentions;
(d) It should increase understanding.

Some of the audio-visual aids used are:

Flannel boards

They are used during lectures since materials can be placed, removed and rearranged at will. They are convenient to use; easily transported; takes little space and all the materials can be prepared ahead of time **(Stoll 1977).**

Perforated hardboards

They are good for semi permanent exhibits. Their value are in the use of actual materials such as tooth form, toothbrushes and tube of dentifrice **(Stoll 1977).**

Picture study

This material is abundant and easy to find. The value of dental health have been illustrated in many interesting ways by professional organizations and commercial companies. The principal value of picture is to stimulate interest in collecting and discussing them, and they help children to visualise what is being taught **(Stoll 1977).**

Posters

Posters from many sources are obtainable free of charge or for a small price. They are important as visual materials in teaching dental health and have a strong influence on the public. Posters should convey a simple message, preferably illustrated with figures which the viewer would like to identify himself. Posters present perhaps the best opportunity for do-it-yourself projects in the school environment **(Dunning 1986).** They can be displayed in school corridors and halls to encourage the children to practice good oral health.

Pirrie and Dalzell (1962) say the first requirement for a successful poster is that it should attract attention to itself by its design, position, wording, originality and challenge. Children are usually attracted to a nice poster especially a colourful one. Their ever developing curiosity and consciousness will bring them through a various stage when they are exposed to a nice poster. First they become aware of a nice and colourful picture and this leads to an interest in studying the poster further. A simple to understand and meaningful dental health message can be blended in as part of other message carried in the poster.

Motion pictures, slides, film strips and television

These materials are group together because they are known as 'passive materials' in their effect on the learners. Films should be used as a teaching device rather than as a means of amusement in dental health instruction. The main value of films is that they provide realism and motion and display complicated situation step by step. Evidence has proved that people can learn skills, information and sometimes change their attitudes from films, provided they are prepared to learn **(Division of Health Education, Department of Public Health, 1969)**. It is important that the dental health educator be thoroughly familiar with a film before the showing so that he may answer questions intelligently.

Children's television can carry dental health messages at special times targeted for young audiences. The use of specialist in preparing scripts and visual effects is recommended to attract children's attention as much as possible.

Puppet show

This is an event that is the most expected by pre-school children. A simple story line with dental health care theme can be presented using characters most popular to the children. An everyday life can be portrayed in a family where parents play an important role in giving a good example and guidance for oral health habits like regular toothbrushing and toothbrushing technique. The show should be done three to four times a year with different story line each time but carrying the same dental health message.

Of all audio-visual aids discussed, the puppet show is the most appealing for pre-school children. The characters and the story-line can be selected to have the most impact to the children by using simple and easy to understand dialogue in which a dental health message can be projected. During the show, responses from the children should be encouraged as this will reinforced the message being conveyed to them.

5.4.2 Mass Media

Many studies indicate that when the mass media are used alone to motivate preventive behaviour, most individuals are not significantly influenced to act **(Green 1978)**. The mass media in common use today involves pamphlets, news papers, radio, and television. They have been used for many years in the process of education **(N.S.W. Department of Public Health 1969)**. Mass-media can convey simple facts fairly well, but because of their impersonal nature, such media may form basic attitudes and motives. Most commonly, they remind people of needs already felt and understood **(Dunning 1986).**

Pamphlets and leaflets

Pamphlets and leaflets are widely used in the attempt to disseminate knowledge to children. According to the **WHO Expert Committee on Health Education (1954)**, pamphlets and leaflets have two main functions:

(a) To familiarise rapidly a large number of people with some new or recurrent theme.
(b) To follow and reinforce advice given by word of mouth.

Such publications should be short, illustrated if possible, attractively presented, and cheaply produced. Before preparation, it should be decided exactly for whom the pamphlet is designed and exactly what idea it is intended to convey.

Radio and television

Radio and television are effective media in the propagation of dental health messages. Radio and television can carry special messages for pre-school children at special times, such as Dental Health Week, but are also very valuable on a periodic basis throughout the year. The use of a specialist in preparing scripts and visual effects is recommended. Radio is another health education tool: not a teaching process complete in itself, but a tool to be used along with press releases, pamphlets, films, demonstrations, and schools. It draws attention, quickens interest, makes action announcements, presents needed information; informs but does not educate in the full sense **(Dept. of Public Health, NSW 1969)**. However, expert health television and radio usage may gradually win public confidence by accurate material well presented, and above all, timely and useful to splendid target audiences. Personal effort by health educators, well trained in these media, is a necessity.

6 DENTAL HEALTH EDUCATION PROGRAMME

Dental health education programmes involve providing individuals or groups with educational experiences which are intended to change or enhance behaviours and improve, or at least maintain, oral health status. The traditional perspective aims to change the knowledge and attitudes of individuals or groups with a view to encouraging the adoption of health-related behaviours. This approach is commonly used in schools.

One of the most common strategies for promoting dental health is that of reinforcement **(Locker 1989)**. Programmes which use information plus positive reinforcement are generally more successful than programmes based solely on information.

From the study carried out by **Iwata and Beckford (1981)**, they found that positive reinforcement results in greater compliance and improvement in oral health, at least in the short term. **Kegeles et al (1978)** have suggested that self-reinforcement technique can be employed following tangible rewards. Self-reinforcement means that the parents reward the children with an enjoyable activity once certain goals regarding oral health behaviours have been achieved.

A dental health education programme must be carefully planned and organised in order to be effective. Planning and conducting a dental health education programme for pre-school children is a responsibility of all dental health educators.

Children can be taught the principles of oral health by giving information which is imparted through plays and games. Puppet shows have been used by the Dental Health Foundation of New South Wales and have been found to be very useful for education purposes.

The traditional approach in reducing the incidence of dental disease through health education is based on the assumption that changes in the knowledge and attitudes are a reliable indication of the effectiveness of a programme. Dental health education

programmes should be based on improvements in oral health. Toothbrushing and sugar control are part of dental health education programme and will require different approaches in order to bring about behaviour change. The majority of dental health programmes in pre-school have concentrated on improving knowledge about dental disease. Health educators should not be surprised when such programmes do not necessarily bring about an improvement in oral health.

Dental health education programme for children generally consist of toothbrushing and dietary counselling to achieve a good oral health and oral habits (**Nikiforuk 1985**).

Regular dental inspection is required to maintain daily dental health habits and attitudes. **Matthewson, Primosch, Robertson (1987)** point out that repetitive stimulus is required to sustain children motivation. Through dental inspection, concomitant counselling and effective follow up, it is hoped that this following objectives will be achieved (**Stoll 1977**):

(a) Every school-age child is in a healthy condition in order to derive maximal benefits from his educational experience.
(b) Children will be educated to recognise the value of sound teeth in a healthy mouth as part of total health.
(c) Children and parents will be motivated to assume responsibility for practicing recommended procedures for dental health care.

A dental health education programme for pre-school children usually begins with choosing the right toothbrush and toothbrushing technique for children, the use of fluoride dentifrices, and also selecting correct diet and nutrition to achieve a good daily oral habits and to control dental disease.

6.1 TOOTHBRUSHES

Everyone of us has experienced the hassle of trying to buy a good toothbrush. Some companies offer over a dozen different types and naturally each claims its toothbrush is superior to all others. By 1929, over 500 patents had been issued for different toothbrush designs **(Foster 1992)**.

Few parents realise that the toothbrush is more than just a bunch of bristle stuck on the end of a stick. Prior to 1938, toothbrushes were made of natural bristles. The thought is not very appealing but these bristles were made of the hair fibres from hogs. The best bristles came from Siberian hogs raised in a vigorous habitat and white bristles were considered superior to the dark ones. It was difficult to classify the stiffness of the toothbrush as being soft, medium, or hard because the hair fibres were all different sizes, thick and thin, all mixed together. Natural hair bristles were difficult to clean, the fibre being hollow, which easily trapped bacteria **(Foster 1992)**.

The nylon filament toothbrush we use today was introduced after World War II, and consumers soon realised, though, that the nylon lasted longer than the natural bristles. Because of the tremendously large array of designs of toothbrushes available commercially, the dentist should give sound professional advice to patients in the proper selection of a toothbrush **(Wei 1988)**.

While many attempts have been made to determine the advantages of the varying toothbrush shapes available, no clear laboratory or clinical results have been conclusively demonstrated (**Accepted Dental Therapeutics 1982**). This has been due to the fact that it is difficult to standardise many individual variables such as toothbrushing time, motions, pressures, and shape and number of tooth present **(Yankell 1987)**.

The size of the toothbrush should be prescribed according to the age and hand size. The multituft trim with three rows of bristles appears to be the most common design and has been often recommended by dentist. The bristles should be made with the

highest quality nylon, which would give the most desirable cleansing properties. The nylon bristles of a good brush are usually 0.007 or 0.008 inches (0.1778 or 0.2032 mm) in diameter. It is important to have sufficient inter-row spacing for the bristles to bend and to allow adequate drying between uses **(Wei 1988)**. According to the **American Association for Health, Physical Education, and Recreation (1956)** the toothbrush should be hung up to dry after use and it is desirable to have two brushes and to alternate their use.

The new diamond-head design with bristles of two different colours and textures are designed to brush the smooth surfaces and intersulcular spaces more effectively **(Wei 1988)**. It is generally agreed that the end of the nylon bristles should be rounded by a polishing process.

According to **Newbrun (1985)**, the limitations in size and shape are dictated by the curvilinear alignment of the teeth and anatomical structures, such as the ramus of mandible, the cheeks, and the tongue. A straight trim brush with soft, rounded, and polished bristles is preferable because it is less likely to cause tissue damage or abrasion, although the brushing habits of the individual and the abrasivity of the dentifrice are also important factors. **Foster (1992)** says, that the toothbrush should be no longer than six inches and the handle of the toothbrush should be straight and plain. Also a smaller brushing head will give much better control when brushing.

According to the **American Dental Association (1982)** and **Craig (1976)**, the life expectancy of a toothbrush is determined more by the method of brushing than by the length of time of use. The average life of a toothbrush has been stated to be three months. However, this estimate can vary greatly due to differences in brushing habits.

6.1.1 The Child Toothbrush

Small children should in general have a toothbrush one quarter to one-third smaller than the adult's toothbrush. In the pre-school years the child should begin with a medium-stiffness toothbrush. The head of the child's toothbrush should be designed exactly like that designed for an adult, but, smaller and suitable for the child's size **(Foster 1992)**. There have to be many reasons, though, when a child needs to use a soft toothbrush, such as: when new teeth are erupting, and when a child has cold sores and fever blisters, injuries to the teeth, and gingivitis (inflamed gums). A soft toothbrush during one of these episodes can make brushing more comfortable.

The design of the handle is important, so that children may be able to comfortably grasp the toothbrush during brushing. Children need a toothbrush with a shorter handle **(Foster 1992)**. A bend at the junction of the head and handle may facilitate reaching the distal surfaces of molars **(Wei 1988)**.

One of the aims of dental health education programmes is to provide children and parents the information required on the most appropriate toothbrush.

6.1.2 Formal Toothbrushing Techniques for Children

Dental caries is a multifactorial disease and is largely preventable **(Newbrun 1987)**. The role of dental plaque in dental disease is important and it is believed that proper toothbrushing technique can be very useful in removing dental plaque from the tooth surface **(Wei 1988)**.

Yankell (1987) states that the objectives of toothbrushing are as follows:

(a) To remove and disturb plaque formation.
(b) To clean teeth of food, debris, and stain.
(c) To stimulate gingival tissues.
(d) To apply fluoride dentifrice

Most children, as well as adults, do not spend enough time brushing to really clean their teeth **(Wei 1988)**. Thorough toothbrushing requires a different amount of time for each individual depending upon such factors as the innate tendency of a child to accumulate plaque and debris, the psychomotor skills, and the adequacy of clearance of foods, bacteria, and debris by saliva. A compromise is made by advocating the use of a three minute egg timer **(Wei 1988)**.

Children have limited abilities to manipulate a toothbrush and to follow the elaborate movements dictated by each of the toothbrushing techniques. Rather, a simplified approach should be encouraged. Previously, the technique of brushing using a vertical roll method was advocated extensively for children who are told to brush as the teeth erupt. However, more evidence indicates that a circular scrub technique is probably the easiest and most natural method for pre-school and young children **(American Dental Association 1982)**.

The establishment of health practices, including toothbrushing, is developed early in life and is influenced by parental attitudes and the home environment **(Loesche 1982)**. The mother has an even greater impact on the development of sound preventive health habits of children from an early childhood. The implementation of toothbrushing in a child is a direct responsibility of the parent, particularly the mother. It is also apparent that mothers who take an active role in teaching toothbrushing by personal example and regular reinforcement of the routine are most effective in transmitting the toothbrush routine to pre-school children **(Blinkhorn 1980)**.

Many 3 to 5 year old children cannot brush their teeth adequately at all when untutored and unsupervised. Most 5 year old children spend less than 60 seconds brushing their teeth, and most of the time the brush placed on the least caries-susceptible lower anterior teeth **(Rugg-Gunn & MacGregor 1978)**. Therefore, it is important to teach children the proper techniques of toothbrushing at the different age groups.

Generally, children younger than age 9 have not developed the conceptual ability and dexterity to remove plaque effectively. Although instruction does improve skills, there are strong age-related factors between the development of motor skills and the ability to brush effectively for pre-school-age **(Simmons 1983)**. It is recommended that parents assume the primary role and responsibility for cleaning their children's teeth if they are younger than 9 years of age. The recommended position for this method is to have the child stand in front of the parent and tilt his or her head back. The parent uses one forearm to support the head while using the fingers to retract the lips. The other hand does the brushing while the child watches in the mirror **(Starkey 1961)**. The brushing method suggested for parents when using above mentioned is the horizontal scrub method because this has been shown to be the most comfortable and effective **(Sangnes 1974)**.

It is also important to motivate parents to take their children at an early age to have periodic dental visits. Twice a year is usually recommended for a child to visit the dentist. However, this schedule may vary according to the condition of the child's mouth. There are several reasons why children shouldvisit the dentist at an early age and at regular frequent intervals:

(a) Defects and early symptoms of dental disease can be detected and corrected in the early stages.
(b) The dentist can observe the growth of the teeth and correct irregularities as they occur.
(c) Pain and fear of the dentist can be minimised.
(d) The cost of dental care can be reduced.

Many toothbrushing techniques have been developed and most are identified by an individual's name, such as Bass, Stillman, Charters, etc., or a term indicating a primary action to be followed such as roll or scrub. All of these techniques are applicable to the cleaning of the facial, lingual, and occlusal surfaces; all are relatively ineffective in cleaning interproximal areas. Research indicates that there appears to be little difference between these techniques in their ability to remove plaque **(Newbrun 1985)**. However, the scrub technique emerges as the simplest technique available and one that is no less effective than any other; it requires minimal manual dexterity and patient concentration **(Federation Dentaire Internationale 1983)**.

To encourage acceptance of toothbrushing and to improve its effectiveness, the pre-school children should be taught the technique that is most comfortable and need minimal manual dexterity to them. Since there is a little difference in effectiveness between the various toothbrushing techniques **(Newbrun 1985)**, the horizontal (scrubbing) stroke should be encouraged in pre-school children. It has been shown that the preferred technique of toothbrushing by pre-school children without formal instruction is the horizontal technique **(Rugg-Gun & MacGregor 1978, Sundell & Klein 1982)**.

6.2 FLUORIDE DENTIFRICES

At the beginning of this decade, results from epidemiological studies conducted in several Western countries demonstrated that dental caries was rapidly declining among school-age children **(Brunelle & Carlos 1990)**. The decline has occurred in non-fluoridated as well as fluoridated communities **(Colquhoun 1990)**. Both direct and circumstantial evidence indicates that fluoride, from multiple sources such as water fluoridation; fluoride mouth-rinses; fluoride dentifrice, is responsible for the substantial caries decline **(Ripa 1991)**.

The era of fluoride dentifrices began in the United State during the 1950s. Supported by more than 35 years of research, the benefits of fluoride dentifrices are irrefutable **(Ripa 1991)**. The benefits of fluoride dentifrices in controlling dental caries are well established, and their use is believed to be one of the factors contributing to the general caries decline **(Stookey 1987)**. According to **Rola and Ogaard (1991)** oral hygiene procedure and the use of fluoride dentifrice may thus be beneficial; the two procedures have a synergistic effect.

Jackson (1987) has examined the claim that fluoride dentifrices have played a major role in reducing dental caries, particularly in population without the benefit of fluoridated water. Clinical trials of fluoride dentifrices have produced reductions in caries increments of 0 to 50 per cent, with an average of 24 per cent. The **American Dental Association in 1986** recommended the use of fluoride dentifrices as soon as the primary teeth erupt.

More recently, there has been an increase principally in the mildest forms of fluorosis simultaneous with a decline in dental caries. Evidence shows that the ingestion of 0.5 mg F daily from shortly after birth to age three can cause fluorosis. On the other hand, in children six years and older, the consumption of 2 mg F daily, in divided doses, does not increase the risk of fluorosis. Therefore, the chronologic window of vulnerability to fluorosis involving the permanent teeth lies somewhere between birth and age six **(Ripa 1991)**.

To show a cause and effect relationship between the use of fluoride dentifrices at an early age and fluorosis, it is necessary to establish that:

(a) Young dentifrice users retain, or swallow, some of their dentifrice.
(b) The inadvertent ingestion of fluoride dentifrice has a consequential effect on the risk of fluorosis.

Although many studies indicate that fluoride do not appear to be the principal culprit responsible for the increase in the milder forms of fluorosis, their use does contribute to the total amount of fluoride ingested. Therefore, it is necessary that these products be use prudently in pre-school children **(Ripa 1991)**. One approach to reduce ingestion in pre-school children is to market a low-potency fluoride dentifrice. This following guidelines should be considered to reduce fluoride ingestion by pre-school children **(Ripa 1991)**:

(a) The use of low-potency fluoride dentifrice.
(b) Specially designed fluoride dentifrice containers that the tube should have a narrower orifice.
(c) Parents should apply the dentifrice until their children can do it properly themselves.
(d) Parents should supervise the toothbrushing activity of their children.
(e) Pre-school children should use a child-size toothbrush.
(f) Only a pea-size amount of dentifrice should be applied to the toothbrush bristles.
(g) Pre-school children must be taught to rinse thoroughly after toothbrushing.

6.3 DIET AND NUTRITION

Derived from the Greek word **"diaita"**, way of living, diet may describe the general, nourishment a person receives or a general eating habit which may be influenced by cultural background. Diet can also mean a modified eating habit made necessary by some medical condition **(Family Health and Medical Library 1991)**. While nutrition is a process by which an organism absorbs and utilises food substances **(Encyclopedia Britanica 1991)**.

During the period of rapid development, especially during the first few years after birth, if a child is not given the right food, he or she may suffer from malnutrition and the damages caused by malnutrition may be irreversible **(Harris & Marsden 1987)**. Pre-school children are growing rapidly and need sufficient food for growth and energy. They need all the foods that supply minerals and vitamins. They also need more than the usual three meals a day. Snacks given for their food value, with restriction on carbohydrates and free sugars, will be more satisfying than sugary drinks and cookies. On the list of snacks with food value are cheese cubes, milk, fruit, whole grain cereals and bread with peanut butter. Therefore, diet and nutrition cannot be treated indifferently, a balance between the two should be found so that the food that a child eats will satisfy both dental health care requirements and other medical conditions.

Food composition and dietary habits can affect caries activity. Diet is one of the three principle factors of the aetiology of dental caries.

The purposes of diet and nutrition in teaching dental health are as follows:

(a) To determine, from information gained from the parents, what these parents have done and are doing at present regarding their children dietary habits and nutrition intakes.
(b) To assist parents, teachers, and children to modify undesirable dietary and oral hygiene practices to ones that are beneficial to oral health.
(c) To help parents and teachers to improve their children nutritional and dental health lifestyles.

(Kravitz et al 1985).

Application of diet improvement comes about through the motivation required by the people. The dental health team's real contribution is to provide information and facts that can be converted into action **(Dingerson & Dingerson 1973)**. People tend to be more cooperative if the nature of the problem and the rationale for making some alteration in their dietary patterns are explained **(Nizel 1981)**.

Food habits are gradually developed from infancy through childhood by types of experiences. Eating habits, in effect, are merely the symbols of these experiences and influences such as; food supply, cost of foods, family eating practices, social customs, geographic or regional food habit patterns, emotional situations, sensory reaction and educational influences **(Nizel 1981)**.

The following factors are considered to be important in providing an appropriate diet to prevent dental disease for pre-school children:

Eating habits, with particular emphasis on between-meal snacking or frequency of eating

Bibby (1975) has cited many studies in which other investigators, have attributed high caries score to the frequency food eating factor, particularly sugar-sweetened snacks. Hankin et al. reported a correlation between the dietary pattern and caries prevalence in Hawaiian children when the frequency of daily eating ranged from three to eight food exposure periods per day **(Nizel 1981)**.

The physical characteristics of foods

The physical characteristics of food are often important in determining the extent of the cariogenic challenge **(Harris & Madsen 1987)**. The longer cariogenic carbohydrate food is retained in contact with the surface of the enamel, the greater will be the probability for longer acid production periods at the plaque-enamel interface. **Volker (1955)** strongly suggest that the physical form of the carbohydrate may be of great importance in the production of varying amounts of dental decay depending on the amount of time it is in close contact with the surface of the tooth.

The concentration and amount of added sugar to a food

Sugar is an important factor in causing tooth decay. It is therefore desirable to restrict the use of sugar in the diet. **Scherp (1970)** says, that sugar is bad, especially if the sugar is consumed frequently.

Self cleansing foods

Despite the evidence that the detergent effect of such foods as carrots, apples, and celery do not effective in removing plaque, the clinical fact still remains that when teeth are not used in chewing, there is usually a more extensive plaque and/or calculus formation that seen in the other teeth. The chewing activities help removes hazardous oral debris **(Harris & Madsen 1987)**.

Recommendations

Certain foods such as: cheese, corn chips, peanuts, milk, lettuce and cabbage should be kept readily available for children to eat as between-meal snacks.

The modification of a family's diet is difficult to achieve. The selection of food types by a family is influenced by individual preference, tradition, past experiences, social pressures, daily schedules, and income **(Nizel 1972)**.

The parent should be informed the importance of proper diet and nutrition by introducing dietary knowledge and dietary change **(Groucher, Rodgers, Franklin & Craft 1984).**

6.4 SUGGESTED TOPICS FOR DENTAL HEALTH EDUCATION

Dental health guides and syllabi exist in almost every state in Australia, such as the Dental Foundation in Sydney. They are excellent guides for classroom teachers to teach dental health. They are prepared by experts in education assisted by members of the dental profession. Much of the teaching in dental health is based on these guidelines with the result that as they become obsolete, teachers run out of materials, children run out of interest and instruction tends to lose prestige in the curriculum. Only when dental health teaching is based on the interest and needs of each class unit does the subject matter remain interesting and challenging to the pupils. The educational policies of the pre-school, the creative ability of the dental health educators and the pre-school teacher's cooperation will determine the content and the success of a dental health education programme.

Stoll (1977) suggested a number of principles which should guide the dental health educators, which are as follows:

(a) Consider the entire plan of dental health education in terms of the range of classes to be taught.

(b) Prepare a complete list of the dental health facts which the child should know when he completes his education.

(c) Divide this list into areas of learning that seem to fit into the development and interests of children at certain age levels.

(d) Prepare a list of materials that can be used as references.

(e) Indicate the desired outcomes in habit formation for each area of learning.

The following topics are suggested for dental health education for pre-school children, which are chosen on the basis of children readiness, needs, and interests **(Stoll 1977)**:

I. Orientation to dental health education programme.

A. Establish rapport with the individual child in the beginning of the pre-school year.

B. Alleviate any fears concerning dental care.

II. Dental health education.

A. Create an awareness of the importance of teeth.

a for chewing and eating.

b for speaking.

c for a good appearance.

B. Create the desire for better dental health.

a good diet and nutrition.

b regular dental visits.

c proper toothbrushing techniques.

d prevention of accidents to teeth.

III. Parental assistance.

Parent involvement should be encouraged in the following activities:

A. Cleanliness.

Oral hygiene and regular toothbrushing leading to regular habit formation, the basic facts about dental health.

B. The need for the right diet.

Counselling focus on the balance and adequacy of the diet with emphasis on less sugar consumption, avoid eating snacks between meals, and selection of food with low cariogenic potential.

C. The need to see the dentist.

The dentist can help us prevent tooth decay, only the dentist can find the little spots called cavities and put a filling into them.

D. Accident prevention in relation to teeth.

Our teeth are made for chewing food, not for chewing bones or cracking nuts; how to prevent injuring children's teeth when they are playing games.

6.5 EVALUATION

Evaluation may be defined as the attempt to determine the effectiveness of a programme in achieving its intended purpose **(Division of Health Education, Dept. of Public Health, N.S.W. 1960).**

Evaluation of dental health education programmes is extremely important, especially if the goal is to provide a basis for comparison and setting priorities among alternative programmes **(Freed & Matthias 1980).**

The evaluation of dental health education programmes for pre-school usually have three main objectives **(Towner 1984)**:

(a) Acceptability

To find out wether the programme is generally acceptable to pre-school teachers and children and wether it can be used in a variety of different pre-school.

(b) Effectiveness

To investigate the effects of the programme have on children's knowledge of dental health matters, their attitudes and their behaviour in respect to dental health.

(c) Revision of materials

To ascertain the views of pre-school teachers on the individual components of the programme, so that materials could be revised.

According to **Striffler, Young and Burt (1983)**, once educational experience has been conducted and adequate time has elapsed, appropriate evaluation of the learning objectives must occur. Evaluation of the dental health programmes is as important as implementation of the programme itself.

The report of a **WHO Working Group on Dental Health Education (1976)** states that it is necessary to establish the value or worth of any dental health education programme. Such evaluation can demonstrate the benefits of the programme to the community and indicate adjustments that may be required from time to time. Also a good periodic evaluation can be of great assistance in obtaining public and financial support.

Baseline data have to be collected prior to commencement of the programme in order to provide a basis for comparison with actual outcomes in the evaluation process. The **WHO Working Group on Dental Health Education (1977)** suggested using a combination of criteria for evaluating the success of a programme (in relation to the target population). For convenience, these criteria for evaluation are presented in three generally accepted categories as follows:

Cognitive Domain

- Knowledge of diet and the role of sugar in dental disease.
- Knowledge of good oral hygiene and the use of toothbrush.

Affective Domain

- Percentage of acceptance of dental care offered.
- Regularity and frequency of toothbrushing.
- Amount and frequency of consumption of sweets and refined carbohydrate.

Psychomotor Domain

- Ability to brush properly.
- Percentage of pre-school children able to brush properly.

The difficulties in evaluating programmes have long been recognised. However, it is possible to carry out evaluation of one dental health education programme or action, or to survey the effect of a whole series of programmes, and it is possible to say that each method of dental health education application should or could have a special method of evaluation. Ideally, while designing an education programme, its evaluation and its method should be worked out at the same time.

Evaluation, as well as carefully designed research, must assume greater prominence in health education: in spite of the inherent difficulty in achieving documented results, they are essential for progress **(Young, Striffler & Burt 1983)**.

Constant evaluation in health education is necessary:

(a) to learn to use resources economically;

(b) to become competent and efficient;

(c) to motivate dental health education by providing evidence of achievement;

(d) to define and to check on aims and programmes, and the response of the community;

(e) to decide between alternative methods;

(f) to become familiar with negative as well as positive patterns of response;

(g) to maintain ethical standards, as anyone who sets out to influence behaviour;

(h) to develop improved and simple instruments for testing public behaviour and reaction.

7 DISCUSSION AND CONCLUSION

The worldwide prevalence of dental disease indicates the almost universal need for effective dental health education programme. Although dental caries prevalence has declined in Australia, as in most industrialised countries in the past few years, this disease still affects many children and young adults.

Dental health education, like all other educational activities, is based upon the existing knowledge, beliefs, cultural patterns and habits of the population or group towards whom the educational processes are directed.

By far the largest and most important organised group for health education to reach is to be found in the school system. Not only children are the best learners, but they are at the beginning of their dental health problems and habit patterns are still in the process of being formed. Children, especially those with the highest disease levels whose families may not be able or interested in providing for their dental health needs, do not visit dental offices. Yet, virtually almost all of them attend pre-school, child care and, therefore would be exposed to a pre-school-based programme.

There has been a concern that in the Sydney metropolitan area pre-school children are not exposed to dental health care since dental health education is not covered in the pre-school curriculum. A dental health education programme for pre-school children should be developed and should be part of the total educational plan for pre-school children. The programme should be based on the child's ability to learn at his or her stage of development. Understanding learning concepts gives the health professional greater confidence and flexibility in setting up an appropriate dental health education programme for pre-school children. The stages in development of children should be used as a basis for planning a dental health education, and should be adapted for pre-school children.

The aim of the programme is to help every pre-school child appreciate the importance of a healthy mouth and to motivate pre-school children and their parents to assume responsibility for practicing recommended procedures for oral health care.

It appears that the most effective way of controlling dental disease among pre-school children is to promote dental health education using specially trained personnel. The concept of the dental health team has become well established and the team approach to preventive dentistry has so many advantages. Utilisation of personnel other than the dentist for dental health education activities will relieve some pressure off the dental profession. Pre-school teachers should carry a major share of the task of dental health education to pre-school children. Pre-school teachers know their children and their vocabulary levels, and they know at what point in the pre-school curriculum a programme on dental health would be most appropriate. Pre-school teachers should be provided with adequate knowledge in dental health before they do their job.

The parents play an important role in dental health education since they are expected to reinforce what the teachers have been teaching. Parents should know the most appropriate toothbrush for their children. Small children should in general have a toothbrush one-quarter to one-third smaller than the adult's toothbrush. In the pre-school years the child should begin with a medium-stiffness toothbrush. The head of the child's toothbrush should be designed exactly like that designed for an adult, but, smaller and suitable for the child's size. The design of the handle is important, so that children may be able to comfortably grasp the toothbrush during brushing.

Parents need to assist their children in toothbrushing technique and the amount of fluoride dentifrices to be taken. The recommended position is to have the child stand in front of the parent and tilt his or her head back. The parent uses one forearm to support the head while using the fingers to retract the lips. The other hand does the brushing while the child watches in the mirror. The brushing technique suggested for parents when using above mentioned is the horizontal scrub technique because this has been shown to be the most comfortable and effective. To encourage

acceptance of toothbrushing and to improve its effectiveness, the pre-school children should be taught the technique that is most comfortable and need minimal manual dexterity. Parents should apply the dentifrice until their children can do it properly themselves. Only a pea-size amount of fluoride dentifrice should be applied to the toothbrush bristles.

Parents should be informed the importance of proper diet and nutrition by introducing dietary and nutritional knowledge. Parents should be encouraged to take their children for regular dental check-ups. Twice a year is usually recommended for a child to visit the dentist. However, this schedule may vary according to the condition of the child's mouth.

The curriculum in the pre-school programme should include not only dental health lessons of the lecture type alone but also activities and methods of teaching that will lead to reinforcement and maintenance of dental health behaviour where this is satisfactory or a change to new behaviour that will promote and improve dental health.

Preventive dental disease for pre-school children consists of many interrelated procedures, such as toothbrushing, the use of fluoride dentifrices, and counselling about diet and nutrition.

In the propagation of dental health education, the use of media is equally essential. Children can be taught the principles of oral health by giving information which is imparted through plays and games. Audio-visual aids such as video movies, puppet shows, television, slides, and posters can help to built concepts and can be a valuable aid in teaching dental health education for pre-school children.

Of all audio-visual aids discussed, the puppet show is the most appropriate for pre-school children. Puppet shows have been used by the Dental Health Foundation of New South Wales and have been found to be very useful for education purposes. The characters and the story-line can be selected to have the most impact to the pre-

school children by using simple and easy to understand dialogue in which a dental health message can be projected. Mass media such as radio and television can be effectively used in promoting dental health.

It is of utmost importance that all dental health education programmes should be evaluated, so that their value may be objectively and precisely measured, thus providing feedback to delivery system for the improvement of services. Ideally, evaluation methods should be planned and well defined prior to programme initiation so that if a change is to be measured, appropriate baseline assessments may be made. Poorly conceived and conducted evaluations can produce information that is misleading, that can be misinterpreted, which may be misused and which may lead to false sense of security.

8 REFERENCES

ALBERTINI T, BOFFA J, KAPLIS NA (1973).
A dental health education in the open classroom: Report of a pilot study.
J School Health 43:566-571.

AMERICAN DENTAL ASSOCIATION (1960).
Dental health teaching outline.
Minnesota: Bruce Publishing Co.

AMERICAN DENTAL ASSOCIATION (1962).
A dental health program for schools.
Chicago: American Dental Association.

AMERICAN DENTAL ASSOCIATION (1969).
Dental health facts for teachers.
Chicago: American Dental Association.

AMERICAN DENTAL ASSOCIATION (1982).
Caring for the disabled child's dental health.
Chicago: American Dental Association.

ASHLEY FP (1989).
Role of dentist health education in preventive dentistry.
In: Murray JJ. The prevention of dental disease. 2nd edn.
New York: Oxford University Press.

AUSUBEL DP, SULLIVAN EV (1970).
Theory and problems of child development. 2nd edn.
New York: Grune & Stratton.

BALDWIN AK (1967).
Theories of development.
New York: John Wiley & Sons.

BANDURA A (1977).
Self efficacy: Toward a unifying theory of behavioural change.
Psychol Rev 84:191-215.

BANDURA A (1977).
Social learning theory.
Englewood Cliffs, USA: Prentice-Hall.

BANDURA A, WALTERS RH (1963).
Social learning and personality development.
New York: Holt, Rinehart & Winston.

BAXTER E (1983).
How to get the most out of your child's school.
Sydney: Fontana Books.

BARMES DE, BAILEY KY (1972).
Dental health services and manpower. First regional workshop on dental health services.
Manila: WHO Regional Office for the Western Pacific.

BIBBY BG (1975).
The cariogenicity of snack foods and confections.
J Am Dent Assoc 90:121.

BLENKIN GM, KELLY AV (1988).
Early childhood education: A developmental curriculum.
London: Paul Chapman.

BLINKHORN AS (1978).
Influence of social norms on toothbrushing behaviour of pre-school children.
Com Dent Oral Epidemiol 6:222-226.

BLINKHORN AS (1980).
Factors influencing the transmission of the toothbrushing routine by mothers to their pre-school children.
J Dent Child 8:307.

BLINKHORN AS (1981).
Dental health education.
In: Slack GL, Burt BA. Dental public health An introduction to community dental health. 2nd edn. Bristol: Wright.

BLOOM L (1975).
Language development.
Rev Child Devel Res 4:245.

BLOOMER HH (1957).
The child with speech and language disorders.
In: Smith MH. Management of the handicapped child. New York: Grune & Stratton.

BRUNELLE JA, CARLOS JP (1990).
Recent trends in dental caries in U.S. children and the effect of water fluoridation.
J Dent Res 69(Spec Iss):723-727.

BURSTONE CJ (1975).
Preventive orthodontics.
In: Bernier JL, Muhler JC. Improving dental practice through preventive measures. 3rd edn. St Louis: Mosby.

BURT BA (1983).
The prevention connection:linking dental education and prevention.
Int Dent J 33:188-195.

COLQUHOUN J (1990).
Flawed foundation: A re-examination of the scientific basis for a dental benefit from fluoridation.
Com Health Study 3:288-296.

CONDIOTTE MM, LICHTENSTEIN E (1981).
Self-efficacy and relapse in smoking cessation programs.
J Clin Psychol 49:648-658.

CRAFT MH, CROUCHER RE (1981).
Whole healthy or diseased disabled teeth?
London: Health Education Council. Monograph Series No.4

CRAIG TT (1976).
Family oral health survey.
J Amer Dent Assoc 92:326-332.

DENTAL HEALTH (1974).
Prepared by Dental Health Education and Research Foundation of the University of Sydney: Health Commission of New South Wales.

DEPARTMENT OF HEALTH, HOUSING AND COMMUNITY SERVICES (1992).
Parent's Page. Australia: Pirie.

DINGERSON AJ, DINGERSON MR (1973).
The role of the dentist. Practice management in preventive dentistry.
Philadelphia: Lippincott.

DONALDSON M, GRIEVE R, PRATT C (1983).
Early childhood development and education.
Padstow: Basil Blackwell.

DUNNING JM (1970).
Principles of dental public health. 2nd edn.
Cambridge: Harvard University Press.

DUNNING JM (1986).
Principles of dental public health. 4th edn.
Cambridge: Harvard University Press.

FEDERATION DENTAIRE INTERNATIONALE (1967).
Guideline for developing dental health education programmes - 1967 Paris.
In: Policy statements of the Federation Dentaire Internationale, 1952-1969.
London: Federation Dentaire Internationale.

FINN S (1973).
Textbook of clinical pedodontics.
Philadelphia: Saunders.

FOSTER MS (1992).
Protecting our children's teeth: a guide to quality dental care from infancy through age twelve.
New York: Plenum Publishing Corporation.

FREED JR, MATTHIAS RE (1980).
Evaluation of dental health education programmes.

GOCHMAN DS (1973).
A context for dental health education.
Int J Health Educ 16:37-41.

GRAVE RC (1987).
Dental public health programs.
In: Harris NO, Christen AG. Primary preventive dentistry. 2nd edn.
Connecticut: Appleton & Lange.

GREEN LW (1978).
Determining the impact and effectiveness of health education as it relates to federal policy.
Health Educ Monogr 6 (Suppl 1):28.

GROUCHER RE, RODGERS AI, FRANKLIN AJ, CRAFT MH (1984).
Results and issues arising from an evaluation of community dental health education: The case of the 'Good Teeth Programme'.
Com Dent Health 2:89-97.

HARRIS NO, MADSEN KO (1987).
Nutrition and the plaque diseases.
In: Harris NO, Christen AG. Primary preventive dentistry. 2nd edn.
Connecticut: Appleton & Lange.

HEALTH EDUCATION COUNCIL (1971).
Consolidated report of the conference of dental health education.
London: Health Education Council.

HIGHBERGER R, SCHRAMM C (1976).
Child development for day care workers.
Boston: Houghton Mifflin Co.

HUNTER P (1988).
Review of methods of identification of high caries risk groups and individuals.
Int Dent J 38:177-189.

INFORMATION'92 (1992).
Sydney: Bankstown City Council.

IWATA B, BECKFORD C (1981).
Behavioural research in preventive dentistry:educational and contingency management approaches to the problem of patient compliance.
J Applied Behaviour Analysis 14:111-120.

JOHNS CK, MUHLER JC (1965).
Can dental health education reduce permanent tooth loss?
J Am Dent Assoc 71:35-38.

KEGELES S, LUND K, WEISENBERG M (1978).
Acceptance by children of a daily home mouthrinse programme.
Soc Sci Med 12:199-210.

KING JM (1978).
Patterns of sugar consumption in early infancy.
Com Dent Oral Epidemiol 6:47-52.

ORD P, SEBASTIAN P, et al (1979).
Early childhood education and care in Australia.
Australia: Australia International Press & Publications Pty. Ltd.

LEE AJ (1978).
Parental attendance at a school dental program: its impact upon the dental behaviour of the children.
J School Health 48:423.

LEE C (1986).
Learning theories in health care.
In: King NJ, Remenyi A. Health care a behavioural approach.
Australia: Grune & Stratton.

LILLIE DL (1975).
Early childhood education: An individualized approach to developmental instruction.
Chicago: Science Research Associates.

LOCKER D (1989).
An introduction to behavioural science and dentistry.
London: Tavistock.

LOESCHE WJ (1982).
Preventive treatment of philosophies.
Ann Arbor: University of Michigan Press.

LOWREY GH (1986).
Growth and development of children. 8th edn.
Chicago: Year Book Medical Publisher Inc.

MANUAL OF HEALTH EDUCATION (1969).
Sydney: Division of Health Education, Dept. of Public Health, N.S.W.

MARLATT GA, GORDON JR (1980).
Determinants of relapse: Implication for the maintenance of behavior change.
In: Davidson PO, Davidson SM. Behavioural medicine: Changing health lifestyles.
New York: Brunner/Mazel.

MATTHEWSON RJ, PRIMOSCH RE, ROBERTSON D (1987).
Fundamentals of paediatric dentistry. 2nd edn.
Chicago: Quintessence.

MURRAY JJ (1976).
Fluorides in caries prevention.
Bristol: Wright.

NIZEL AE (1981).
Nutrition in preventive dentistry. Science and practice. 2nd edn.
Philadelphia: Saunders.

N.S.W. DEPARTMENT OF COMMUNITY SERVICES (1990).
Children's services information booklet.
Sydney: Department of Community Services.

N.S.W. DEPARTMENT OF EDUCATION (1987).
Guidelines for pre-school curriculum development.
Sydney: N.S.W. Department of Education.

N.S.W. REGULATION (1989).
Centre-based child care services regulation 1989.
Sydney: Gazette.

NEWBRUN (1985).
Chemical and mechanical removal of plaque.
Comp Cont Dent Educ 6:110.

PERSONAL INFORMATION (1992).
Mrs. Carol Meyer. Bankstown City YMCA.

PERSONAL INFORMATION (1992).
Ms. Edith Chapman. KU Pre-school, Georges Hall.

PERSONAL INFORMATION (1992).
Ms. Chalton. South Bankstown Infants School Pre-school Bankstown.

PERSONAL INFORMATION (1992).
Mrs. Elizabeth Bailey. Bee's Knees Pre-school Yagoona.

PIAGET J (1969).
The psychology of the child.
New York: Basic Books.

PIRRIE D, DALZELL AJ (1962).
A textbook of health education.
London: Tavistock.

RAYNER JF (1970).
Socioeconomic status and factors influencing the dental health practices of mothers.
Am J Public Health 60:1250.

RICHARDS ND, COHEN LK (1971).
Social sciences and dentistry: Critical bibliography.
Netherlands: A. Sijthoff.

RIPA LW (1991).
A critique of topical fluoride methods (dentifrices, mouthrinses, operator-, and self-applied gels) in an era of decreased caries and increased fluorosis prevalence.
J Public Health Dent 51:23-41.

RODER DM, BART SM (1978).
Evaluation of dental health education in a school dental care program.
J Public Health Dent 38:44-45.

ROWNTREE FStD (1959).
The braintree experiment.
Int J Health Educ 11:73-76.

ROWNTREE FStD (1959).
The braintree experiment.
Br Dent J 107:238-240.

RUGG-GUNN AJ, MacGREGOR IDM (1978).
A survey of toothbrushing behavior in children and young adults.
J Periodont Res 13:382.

SAMEROFF AJ, CHANDLER MJ (1975).
Reproductive risk and the continuum of care-taling casualty.
Rev Child Devel Res 4:187.

SANGNES G (1974).
Effectiveness of vertical and horizontal toothbrushing techniques in the removal of plaque.
J Dent Child 41:119.

SCHACHTER S (1959).
The psychology of affiliation.
Stanford: Stanford University Press.

SCHERP HW (1970).
Why another conference?.
J Dent Res 49:1191.

SCHWARTZ SL, ROBINSON HF (1982).
Designing curriculum for early childhood.
Boston: Allyn & Bacon.

SINGER JE (1962).
Cognitive, social and psychological determinants of emotional state.
Psychol Rev 69:379-399.

SILVERMAN RH (1974).
The method of increasing clinical output to provide education and other related activities.
Manila: WHO Regional Office for the Western Pacific. Document WPR/ORH/76:5.

SKINNER BF (1938).
The behavior of organisms.
New York: Appleton - Century - Crofts.

STARKEY P (1961).
Instruction to parents for brushing the child's teeth.
J Dent Child 28:42.

STOLL FA (1977).
Dental health education. 5th edn.
Philadelphia: Lea & Febiger.

STOLL FA, CATHERMAN JL (1967).
Dental health education. 3rd edn.
Philadelphia: Lea & Febiger.

STOOKEY GK (1987).
Topical fluoride therapy.
In: Harris NO, Christen AG. Primary preventive dentistry. 2nd edn.
Connecticut: Appleton & Lange.

SUNDELL SO, KLEIN H (1982).
Toothbrushing behavior in children: A study of pressure and stroke frequency.
Pediatr Dent 4:225.

THE SCHOOL OF DENTAL THERAPY (1992).
A career in dental therapy.
Sydney: N.S.W. Health Department.

TOWNER EML (1984).
The 'Gleam Team' programme: development and evaluation of a dental health education package for infant schools.
Com Dent Health 1:181-191.

VOLKER JF (1955).
Relation of oral biochemistry of sugars to the development of caries.
J Am Dent Assoc 51:285.

WEI SHY (1988).
Pediatric dentistry: Total patient care.
Philadelphia : Lea & Febiger.

WHO (1954).
Report of Expert Committee on Health Education of the Public.
Geneva: WHO Tech Rep Series No.89.

WHO (1970).
Dental health education: Report of a WHO expert committee.
Geneva: WHO Tech Rep Series No.449.

WHO (1987).
Prevention of oral diseases.
Geneva: WHO Offset Publication No. 103.

WILLIFORD JW, MUHLER JC, STOOKEY GK (1967).
Study demonstrating improved oral health through education.
J Am Dent Assoc 75:896-902.

WINEFIELD HR, PEAY MY (1980).
Behavioural science in medicine. 1st edn.
London: George Allen & Unwin.

WONG HD (1972).
Dental health education.
Report on the first regional workshop on dental health services.
Manila: WHO Regional Office for the Western Pacific.

WONG HD (1976).
Guidelines for organizing a dental health education service.
Working group on dental health education.
Manila: WHO Regional Office for the Western Pacific. WPR/ORH/76:8. p1-7.

YANKELL SL (1987).
Toothbrushing and toothbrushing techniques.
In: Harris NO, Christen AG. Primary preventive dentistry. 2nd edn.
Connecticut: Appleton & Lange.