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CHANGES IN EDUCATION

AND THEIR RELATION TO

THE EDUCATION OF DENTAL PERSONNEL

This thesis, based on a review of the literature, is submitted in partial fulfilment of the requirement for the

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INTRODUCTION

During the past two decades, rapid forward strides have occurred in the fields of Science. Innovative and imaginative concepts in the field of education have kept pace with the development of Science.

The future is changing at an ever rapid pace that shifts our values and shrivels our roots. Thus, it is important to look at change closely by everyone who experiences it.

It is no longer sufficient to think merely of tending the sick: one must also introduce positive concepts of preventive health care and of the preservation of wellness and harmony of living in a community. We must think of man as an individual, as a member of society and in relation to his environment.¹²⁸

Dental health needs and demands are rising. Gross increase in population, urbanization, and demand due to stimulation by dental profession have further aggravated the dental health needs and demand. Cost to deliver dental health care is enormously increasing. Furthermore, there is insufficient dental manpower to cope with the increasing dental health need and demand.

The dental profession must view the situation in the above light and take positive and appropriate measures to face the problem as the profession has a moral duty and responsibility for the community.
A complete orientation in the education of the dental personnel - dentists and dental auxiliaries - should be directed towards a preventive philosophy. The dental personnel must consider themselves first and foremost as teachers of Dental Health Education to the community.

A dental student after graduation will pursue his dental career in a salaried position, Government institution, private practice or in a University.

In future, changes in the concept of dental education towards community and preventive dentistry would be taking place. Also, increasing number of Governments all over the world are encouraging the setting up of community health centres by way of funds and active support. Thus, more and more dentists would be seeking a career in Government institutions.

Dental auxiliaries both operative and non-operative, would be trained in increasing numbers. Most of them would be working within the confines of a school and often to a classroom situation. In addition, they come in close contact with school teachers whose co-operation in the implementation of a preventive dental philosophy is essential.

Thus, it would be advantageous if the dentists, dental educators and dental auxiliaries consider the role of a teacher, changes in the concepts of education, techniques of education, and their relationship to the training of dental personnel.
Social and behavioural sciences, community dentistry, continuing education are some of the formats which should be considered as they would be an integral part of any future dental curriculum.

It is within these perspectives that the changes in education must be related to the education of the dental personnel.
1. CHANGES IN THE CONCEPT OF EDUCATION

Change - constant, accelerating, ubiquitous - is the most striking characteristic of the world we live in and that our educational system has not recognized this fact. The abilities and attitudes required to deal adequately with change are those of the highest priority and that it is not beyond our ingenuity to design school environments which can help young people to master concepts necessary to survival in a rapidly changing world.126

Alfred North Whitehead pointed out in Adventure of Ideas: "Our Sociological Theories, our political philosophy, our practical maxims of business, our political economy and our doctrine of education are derived from an unbroken tradition of great thinkers and of practical examples from the age of Plato.....to the end of the last century. The whole of this tradition is warped by the vicious assumption that each generation will substantially live amid the condition governing the lives of its fathers and will transmit these conditions to mould with equal force the lives of its children. We are living in the first period of human history for which this assumption is false."

Having recognised change, it is important to look at schools which are greatly responsible to consciously giving a better perspective of changes in everyday matters.
1.1 Bureaucracy in Schools

The existence of bureaucracy in a school is one important problem. Bureaucracy of their seemingly indispensability, are by their nature highly resistant to change. The motto of most bureaucracies is "Carry on, regardless". Bureaucracies rarely ask themselves, Why? but only How? John Gardner, President of Carnegie Corporation explained bureaucracies in the following manner.

"To accomplish renewal, we need to understand what prevents it. When we talk about revitalizing a society, we tend to put exclusive emphasis on finding new ideas. But there is usually no shortage of new ideas; the problem is to get a hearing for them. And that means breaking through the crusty rigidity and stubborn complacency of the status quo. The aging society develops elaborate defences against new ideas. As a society becomes more concerned with precedent and custom, it comes to care more about how things are done and less about whether they are done. The man who wins acclaim is not the one who gets things done but the one who has an ingrained knowledge of the rules and accepted practices. Whether he accomplishes anything is less important than whether he conducts himself in an appropriate manner.

The body of customs, convention and 'reputable' standards exercises such an oppressive effect on creative minds, that new developments in a field often originate outside the area of respectable practice."
In other words, bureaucracies are the repositories of conventional assumptions and standard practices. Schools should take the responsibility to educate an individual broadly, to encourage social responsibility and critical thought. Matthew Arnold and John Stuart Mill rejected a form of education too narrowly tied to vocational objectives on the grounds that the learning of technical information did not train men to face either personal or intellectual uncertainty. This tradition of thought has persisted in many educational systems throughout the world providing the rationale by which education in the humanities is seen as a necessary complement to scientific training. Indeed, some observers argue that training for such fields as engineering also requires education in the traditional humanities or social sciences. They argue that since technical information is enlarging and changing so rapidly it is important to train students to cope with and evaluate a man of information - a capacity that is central discipline of the humanities.¹⁷³
1.2 Teacher vs Learning

The traditional concept of teaching is not applicable today. In the old system, the major responsibility for the students' progress rests with the teacher, not the student. The teacher plays the active role, the student a passive one. The teacher is the authority figure, the storehouse of a body of knowledge; the student is the empty storage cabinet into which information must be transmitted. The teacher lectures, the student listens; the teacher judges, the student is judged.

Today, such a concept of education is entirely inappropriate. It is hardly necessary to mention that today's student is far from passive. He is actively questioning, even challenging, all forms of authority. Our teachers, with all due respect for their competency, can no longer boast of real authority, even in limited areas of knowledge. The new concept of education transfers major responsibility to the student and he assumes primary responsibility for his own action. 82, 15, 136
1.3 Transfer of Mental Skills

An inquiry environment must be created. It activates different senses, attitudes and perception; it generates a different, bolder and more potent kind of intelligence. Thus, it will cause teachers and their tests and their grading systems and their curricula to change. It will cause college admission requirements to change. It will cause everything about education to change.

One has to work hard and one wants to at discovering patterns and assigning meanings to one's experiences. The focus of intellectual energy becomes the active investigation of structures and relationships. Most traditional learning environments are arranged to facilitate the sending and receiving of various story lines. That is why teachers regard it as desirable for students to pay attention face front, sit up in their seats and be quiet.126,82,15,136

The lecture method, which traditionally has been used for dissemination of information, is not a most suitable method for developing mental skills and for applying them to the solution of the problems. Mental skills, like physical skills are acquired through a process of observation, imitation, repetition, trial and error, criticism and correction. Habits of minds are not developed through didactic instruction; they are the result of practice and conditioning.14

The older school environments stressed that learning is being told what happened. The inquiry environment stresses that learning is a happening in itself. The
inquiry teacher is interested in students developing their own criteria or standard for judging the quality, precision and relevance of ideas.\textsuperscript{136}

To confirm that standard of grading is a wrong approach, R. Rosenthal reported after tests that rats performed better when the experimenters were told falsely, that the rats had been specially bred for intelligence. He did similar tests on schoolchildren and obtained the same results. Professor Rosenthal believes that his tests provide important evidence supporting the common thesis that many children, particularly minority group children, turn out dull because their teachers expect them to be dull.\textsuperscript{134}

'The student is expected to acquire independently information available in text books, reference works, the scientific literature....The teachers' role is to co-ordinate and evaluate the student's efforts in obtaining information and to design learning situations in which the student can demonstrate practical application of the knowledge he has obtained. The teacher's relation to the student is that of tutor, counsellor or adviser rather than lecturer or instructor. The aim is to produce a graduate who has learned how to learn and has the capability of independent pursuit of knowledge.'\textsuperscript{15}

Sheldon Rovin also says that the responsibility for learning rests with the student but he terms it as individualized instruction. Individualized instruction allows students to pursue the curriculum as individuals not as a class. Inherent in any consideration of such
instruction is the recognition that all students are not able to learn at the same pace or to learn facts and techniques, to the same extent. The concept of class is eliminated and students learn at a self determined pace. In terms of pace, flexibility provides an opportunity for acceleration or deceleration depending on the ability, interest and choice of the student.\textsuperscript{136}

Generally, students have endured about sixteen years of an educational system that has largely stressed what to learn, not how to learn. To introduce individualized instruction to such students will create problems – a state referred as 'future shock'. These problems can be solved by not introducing the students to individualized instruction in totality. Some elements of traditional curriculum should be retained, thus a mixture of the new with the desirable parts of the old will ease the burden of the transition to independent learning.\textsuperscript{15}

King, et al., says that positive learning environment causes the student to enjoy learning and this entails the removal of negative reinforcers and an increase in frequency of positive references.\textsuperscript{82}
1.4 Goals of New Education

If the goals are those of a new education, one needs standards based on the actual activities of competent, confident learners when they are genuinely engaged in learning. One must be centrally concerned with the hearts and minds of learners - in contrast to those merely concerned with the fundament. Any talk about high standards from teachers or school administrators is nonsense unless they are talking about standard of learning (as distinct from standards of grading). For most people, the "three R's" represent what is fundamental to a learner. However if one asks a learner 'what is the organism needs without which he cannot thrive?' it is impossible to come up with the answer, "the three R's".

In In Defence of Youth, Early Kelly lists five such possible answers:

a. The need for other people.

b. The need for good communication with other people.

c. The need for a loving relationship with other people.

d. The need for a workable concept of self.

e. The need for freedom.

Goodwin Watson's Summary of what is known about learning included the following points.

a. Behaviour which is regarded from the learner's point of view is more likely to recur.

b. Sheer repetition without reward is a poor way to learn.

c. Threat and punishment have variable effects upon learning, but they can and do, commonly produce avoidance behaviour - in which the reward is the diminuition of punishment possibilities. Punishment,
it can be seen, is not the opposite of reward. Indeed, much of the activity the school used as punishment is perceived by students as reward, and so rather than to eliminate the behaviour being punished, the school in fact reinforces it.

d. How 'ready' we are to learn something new is contingent upon the confluence of diverse and changing of factors and are:
adequate existing experience to permit the new to be learned (we can learn only in relation to what we already know);
adequate significance and relevance for the learner to engage in learning activity (we learn only what is appropriate to our purposes);
freedom from discouragement, the expectation of failure or threats to physical, emotional or intellectual well-being.

e. Whatever is to be learned will remain unlearnable if we believe that we cannot learn it or if we perceive it as irrelevant or if the learning situation is perceived as threatening.

f. Novelty is generally rewarding.

g. We learn best that which we participate in selecting and planning ourselves.

h. Genuine participation (as compared with feigned participation intended to avoid punishment) intensifies motivation, flexibility and rate of learning.

i. An autocratic atmosphere (produced by a dominating teacher who controls direction via intricate punishments) produces in learners apathetic conformity, various - and frequently devious - kinds of defiance, scapegoating (venting hostility generated by the repressive atmosphere on colleagues) or escape
(psychologically or physically). An autocratic atmosphere also produces increasing dependence upon the authority, with consequent obsequiousness, anxiety, shyness and acquiescence.

j. 'Closed' authoritarian environments (such as are characteristic of most conventional schools and classrooms) condemn most learners to continuing criticism, sarcasm, discouragement and failure so that self confidence, aspiration (for anything but escape) and a healthy self-concept are destroyed. Whitehead called this kind of a process 'soul murder'. Learners condemn to such relentless failure learn only that they cannot learn and their anger and distress in the face of this is frequently vented against the system and the society that has inflicted an inhuman punishment on them.

k. The best time to learn anything is when whatever is to be learned is immediately useful to us.

l. An 'open', non-authoritarian atmosphere can, then, be seen as conducive to learner initiative and creativity, encouraging the learning of attitudes of self-confidence, originality, self-reliance, enterprise and independence. All of which is equivalent to learning how to learn.

The importance of the school in a community should be used as an element in support of the concept of a community centre.

The arguments in favour of this concept are:

a. It takes a total view of the community facilities and therefore, leads to a more efficient deployment of capital.
b. It gives physical embodiment to the principles that parents should be more directly involved in the educational enterprise and that education should be available and continuing for all members of the community.

c. It aims to break down traditional barriers between the life of schools and the life of the community by 'mixing' environments.

d. It stands for the principle that the ultimate control of and responsibility for education should be in the hands of the community.

e. Given community involvement in education within such a centre, curricula with a more pointed relevance to community life should develop.

f. Such a community centre is based on a truly open philosophy of education, acknowledging that learning goes on in places other than schools and under the tutelage of others than teachers. It should aim to deny education to no-one who seeks it and it should seek to promote learning in all sectors of the community.117
1.5 **Communication**

Good communication, free communication within or between men is always therapeutic and facilitates the process of learning.

The major barrier to material interpersonal communication is our very natural tendency to judge, to evaluate, to approve or disapprove the statement of the other person or the other group. In other words, the primary action is to evaluate it from your point of view, your own frame of reference.

Although, tendency to make evaluation is common, it is very much heightened in those situations where feelings and emotions are deeply involved. So the stronger the feelings, the more likely it is that there will be no material element in the communication. There will be just two ideas, two feelings, two judgements, missing each other in psychological space. The tendency to react to any emotionally meaningful statement by forming an evaluation of it from our own point of view is the major barrier to interpersonal communication.

Real communication occurs and this evaluative tendency is avoided when we listen with understanding. What does this mean? It means to see the expressed idea and attitude from the other person's point of view; to sense how it feels to him, to achieve his frame of reference in regard to the thing he is talking about.

This approach is the most effective agent for altering the basic personality structure of an individual
and improving his relationship and his communication with others.

An emphatic understanding - understanding with a person, not about him - is such an effective approach that it can bring about major changes in personality.

When one has been able to see the other's point of view, his own comments will have to be drastically revised. He will also find the emotion going out of the discussion, the difference being reduced and those deficiencies which remain being of a rational and understanding sort.

The difficulties which keep that way of approach being utilized as an effective avenue to good communication and good relationships are:

a. it takes courage, a quality which is not too widespread.

b. when emotions are strongest, that it is most difficult to achieve the frame of reference of the other person or group. Yet this is the time, the attitude is most needed, if communication is to be established. A neutral, understanding, catalyst type of leader can overcome this obstacle in a small way.

c. Our civilization does not yet have enough faith in the social sciences to utilize their findings. 133

To end the changes in the concept of education, it is wise to state what Robert Theobald said about education, "Incredible changes are going to take place within 35 years and that no human group has ever before faced the problem of coping with changes of such magnitude. Noting
that cultures have failed because they were incapable of changing their old concepts and ways of thinking, we have to help the young people in our culture, learn a new set of values, which will allow them to live in a totally different world. The issue lies here: how to change the thinking of a culture with enormous speed?

The school system is the only social institution that exists to fulfil this function.

The new education has as its purpose the development of a new kind of person, one who – as a result of internalizing a different series of concepts – is an actively inquiring, flexible, creative, innovative, tolerant, liberal personality who can face uncertainty and ambiguity without disorientation, who can formulate viable new meanings to meet changes in the environment which threaten individual and mutual survival. 126

The new education should be student centred, question centred and language centred.
2. THE ROLE OF THE TEACHER

In recent years, a considerable amount of research has been done into the teaching and learning process. Changes in the concept of education have accentuated the need to analyse the teaching-learning process. There is a growing awareness that process of educating is determined both socially and culturally. This means that the teacher-pupil behaviour will be affected by the social environment of the classroom, of the school and of the communities outside the school from which they come.

A great body of research information shows the effect of cultural and subcultural factors upon the capacity of pupils' abilities and achievements. Also, teachers and pupils enter into a teaching-learning situation from different portions in the social structure and with conflicting value-orientations and 'codes' of communication.\(^{10}\)

Social environment is not comprised of merely material and physical conditions but also involves the ways of thinking, feeling and evaluating common to cultural or sub-cultural groups. Thus, social environment in the broader sense may influence the learning situation. The interaction that takes place in the classroom between teacher and pupil can be viewed as a social system and analysis of the system will help in understanding the teacher-learning process.
Sociologists have used the role concept to analyse the social system so that the role of the teacher in the teaching-learning process can be studied.

To study the role of the teacher, firstly the concepts used in role analyses should be known, secondly, the factors outside the school which operate upon the role of the teacher like social status, the general expectations for his role, the public image of teaching and the training of the teacher, thirdly, the role of the teacher within the social context of the school and the classroom.\textsuperscript{168}
2.1 Concept of Role

All men play certain functions or parts in life at different times and in differing circumstances and these parts have certain uniformities in human behaviour which are specific to particular social situations and relationships. Also, each individual plays many different roles, for example, father, doctor, mayor of city and he plays each role conforming to the conceptions that others have as to how an individual performing this role will behave. Thus, sociologists are concerned with the extent to which roles are determined by social structure.

Role is an abstract concept relating to the ideas that people have of expected or desired behaviour. According to Robert Linton, status is a 'collection of rights and duties' and role is the 'dynamic aspect of a status' - putting the rights and duties associated with a role into effect. Talcott Parsons sees role as 'the processual aspect of the participation of an actor in the social system', and status as referring to 'the positional aspect of that participation; his place in the relationship system considered as a structure.'

There are two major types of role conceptions: those which relate to how a person (or group) believes the incumbents of a role should behave and those which relate to how a person (or group) thinks incumbents of a role will behave. The former may be called role norms, the latter role expectations. How any individual actually performs his role is termed the role behaviour of the individual.
A person's role set is the complement of role relationships which he has by virtue of occupying a particular status or position.\textsuperscript{104}

The expectations of the different members of the role-set may differ and in some respects be incompatible and this may lead to role conflict. The teacher's role is liable to role conflict as the teacher's role-set consists of pupils, parents, colleagues, headmasters, inspectors and others.

'The role behaviour of any individual will be influenced by what he perceives to be the standards and outlook of a group or groups outside his role-set which he considers important or which he aspires to join and such groups are called reference groups. The reference group towards which an individual orientates his behaviour will be of great importance in determining his role conceptions and performance. Individual role performance will also be determined by the particular skills, qualities, personality of the role incumbent, age and sex.'\textsuperscript{168}
2.2 The Teacher's Status in the Community

An individual's occupation is a major determinant of social status. Thus, the conceptions held by a community on teaching as an occupational role will determine the teacher's status. Other contributory factors to the status of teachers are: the salary structure, the qualifications necessary, the general working conditions, the importance accorded to education as judged by the amount of money the state is prepared to spend on it, the influence that teachers can wield as an organized body. Also, the status is historically determined. The community may accord more status to the teachers than the teachers themselves think to be the case. 148

The term teacher covers a very wide diversity of types and levels of teaching and thus the teacher's status will differ. The status of a teacher may consist of three major subsidiary parts: the status afforded to teachers as a general occupational group, the status of the teacher's group relative to other groups in the educational system and his status in the individual school. Because of the increasing number of large schools, creation of a more hierarchical system of offices and positions with differential salary allowances have occurred. This system has provided opportunities for diversity of status within the individual school. But the status system within the educational system has remained static because the status within the educational system depends upon the age of the pupils taught, their scholastic level and the type of school
they are taught in as well as such factors as the social class of the pupils, the qualifications of the teacher and the subjects taught by the teacher. Thus, teachers in secondary schools tend to have more status than those in primary schools and those teaching primarily older pupils in all types of schools will have higher status than those teaching the younger pupils. But for the general public, all teachers are performing the same job and accorded a similar status. Not all sociologists, who have studied the status of teachers, do consider teaching as a profession. A professional association has the power to restrict any member of the profession from practising it. The teaching associations do not have this power and also do not have the power to control entry to the profession. Professional status is usually accorded on the basis of possession of specific skills and knowledge but the teacher's role consists of a multitude of skills and this gives rise to 'status anxiety' among teachers. The social prestige accorded to teachers will affect the interaction of teacher-pupil relationship and authority which the teachers are able to exert on the pupils and these have important bearings on the role of the teacher.
2.3 General Conceptions of the Teacher's Role

There are two attitudes which the society has towards the role of the teacher. Firstly, the community expects the role of the teacher to cover a much wider area of social interaction than other roles. Secondly, the community tends to feel that teaching is somewhat different from other occupations and has a distinct social status. These two facts seem to arise from the functions of the teacher which the community considers a teacher should perform. The functions are transmission of knowledge and values, social attitudes and skills to the pupil which the society upholds dearly.\textsuperscript{11}

Thus, "The general picture of the teacher is that of someone who is more than almost any other occupational role incumbent - a representative of conventional middle-class morality and conformity."\textsuperscript{168} The larger part of the teachers' task consists in inducing conformity in his pupils. This general picture is generally referred to as the 'public image' or 'stereotype'.

Recruitment of teachers depends on the public image of teaching. A feeling of low status by a teacher may have effect on his role conceptions and performance, weaken his motivation and ability, lessen his influence and authority. It may lead him to seek prestige elsewhere. The status of the school and its pupils has an important bearing on the retention of teachers in the staff. Teachers leave schools of 'low status' to seek prestige in 'better' schools. Furthermore...
teachers play an important role in determining the occupational and social status of the pupils. Therefore, in contemporary industrial society the status of teachers has risen in recent years. This has resulted in parents becoming more concerned in their children and exerting pressure upon teachers.

"The teacher to a slight extent is isolated socially from the community because of the job of the teacher. He spends most of his life among children, he is cut off at work from intercourse with the adult population—except other teachers. He is also cut off from many of the adult population by virtue of his 'superior' education and cultural standards. And he is increasingly under modern conditions, cut off from the community in which he teaches, either because he lives away from it or because he does not stay in it for any considerable time or both."
2.4 Teacher-Training and the Teacher's Role

The type of training that teachers receive has an effect on the way the teachers conceive teaching as a career. In Australia and the United Kingdom, teachers enter teaching via a three year University course followed or not followed by a year of teacher training. These teachers might consider themselves as subject specialists and their status as linked from the universities. Kob found that many of these teachers will seek prestige by activity outside the school rather than within it. Those who have obtained their training from Colleges of education in pedagogy and child development will tend to consider themselves as teachers first and subject specialists second.

The period of teacher training should inculcate in the students the conception of what a teacher should be and do. It involves an examination not merely of the formal course content of the training programme and how this influences students' role conception but also of such factors as the values and attitudes acquired during more general social interaction with staff and fellow students, the influence of teaching practice and of interaction with practising teachers in the schools. It involves a study of the conceptions students have of the teachers' role when they embark upon their training, of the various factors which have influenced it, and of how such conception may change over the training period. 31
2.5 General Analyses of the Teacher's Role

Few sociological analyses of the teacher's role have been undertaken. Willard Waller points out the great difficulties and potential conflicts which exist in the teacher's role. He sees these as stemming, fundamentally, from the position of authority that the teacher must first of all obtain and then maintain before the process of educating can take place. He speaks of dominance and subordination, a very unstable relationship and in quivering equilibrium.\textsuperscript{158}

Waller sees that is is essential for the teacher to maintain the dominance-submission relationship with his pupils. He sees the school as an institution under question from the students, from the parents, from the School Board and others.

Webb gives an account of the difficulties of maintaining authority in schools in 'bad' areas and of the ways in which sociological pressures are at work to make teachers in them fall into the role of pedagogical 'drill-sergeants'.\textsuperscript{164}

Jean Floud analysing the problem of teaching in the affluent society examined the teacher-missionary role conception. She found that this conception is inadequate in the condition of contemporary society and suggests that teacher 'social workers' for the slums and teacher 'crusaders' in the suburbs are needed.\textsuperscript{51}
Wilson stresses the difficulties inherent in the teacher's role. The teacher's role has multifarious and adverse obligations and the teacher finds it difficult to feel that he is fully discharging his obligations. Also, he sees the teacher as "a social weaning agent helping the child to acquire new attitudes of minds, new values, new knowledge and new maturations." 175

The teacher acts as a bridge between the child's and the adult world. "In modern society with the emergence of a powerful and pervasive youth or adolescent sub-culture with all its implications and a growing 'gap' between generations, the teacher's role becomes ever more ambivalent, the task of mediating between two sub-cultures increasingly one of strain. And it may be said, the more successfully a teacher belongs to either one of the two worlds he inhabits, the more must he cut himself off from the other." 168

From the analysis, it is worthwhile to look at the problems of the teacher's role with a broad sociological perspective.

Waller's views on the role of the teacher seems inappropriate in the modern contemporary society. Neil Postman and Charles Weingartner both rightly argue that the way the schools are currently conducted does very little to enhance our chances of mutual survival. 126 The passive learning that has been going on up to the present day does not help the pupil to exercise his mind. It is imperative that the pupils take active part in the process of learning and reach
conclusions and judgements on their own. The teacher's role should merely be one of guidance.

Jean Floud's view seems worthwhile consideration as in a poor socio-economic region, a teacher with sociological knowledge and inclination could possibly surmount the inherent problems which plague such areas, and instil in the pupils the knowledge and values that are so necessary in the modern society.
2.6 The Role of the Teacher Within the Social System of the School

The role of the teacher within the social context of the school is a complex one. There are many factors involved in the social context of the school and it is proper to look at the difficulties inherent in the teacher's role.

The teacher imparts information and passes the values and norms to his pupils. In this, he mediates between the adult world and the child's world and this role is a difficult one. A generational gap exists between the teacher and the pupil, and pupils are reluctant to accept this relationship. The rapidity of technological and social change added a cultural gap. This has resulted in the poor communication between the pupils and the teachers. Margaret Mead says, 'Age and experience become not orienting factors but disorienting ones and children become increasingly unpredictable. In such circumstances, preparing the pupil for the future may seem a very onerous task and calls to educate for change fall on deaf ears.'

Recent work on educational psychology and the theory of teaching has laid more emphasis on a more 'individualized and motivational approach to learning as opposed to the more routinized and drill-like methods of teaching the 'Three R's". But the society applies pressure on the teacher on a personalized approach to teaching and forces him to prepare the pupils towards particular occupations.
As the teacher is the transmitter of values and norms, he may be uncertain of the society's values and norms and this places him in a dilemma as what norms and values he should impart to his pupils. At the same time, he may be uncertain of his own values and norms and also the values and norms he is inculcating to his pupils may change when the child reaches adulthood. Thus, the school and teacher should recognize that in a rapidly changing society, there is always a real possibility that what the child learns today may be dysfunctional when the child grows to a mature age.

If the student comes from a background where the prevailing beliefs and norms are different from the accepted norms of the school and teacher, then there would not be any 'acceptance of either the instrumental or expressive culture of the society and school.'

The school and the teacher transmit the expressive culture only partially through formal education. The interactions that goes on within the social organization of the school influences the pupils in assimilating the values and norms of the school. But in the past, the school acted merely as a 'reinforcer the accepted norms of the home and society'. This no longer applies with the contemporary youth sub-culture and this poses problems to the teacher.
2.7 The Organizational Context of Teaching

The modern society has become an intricately woven organizational structure, and so has the school. The school is an organization because it has specific ends as a socializing agency. As Dreeken\(^{36}\) points out, 'Schools and the classroom within them have a characteristic pattern of organizational properties different from those of other agencies in which socialization takes place. ... what children learn derives as much from the nature of their experiences in the school setting as from what they are taught.'

Also, teachers are affected by the 'characteristic pattern of organizational properties' of the schools in which they teach both in how they conceive their role and how they perform.
2.8 Bureaucratization of the Teacher's Role

In modern society, the educational system is increasingly becoming a complex one and thus the teacher's role tends towards increasing bureaucratization. The schools have become large with functional division of labour. So, a hierarchy of positions are created limiting the activities of those holding offices in the school organization. This forces the responsibility for co-ordination and rationalizing of educational activities from the school to the administrative centre. Also, external agencies like curriculum reform committees, educational psychologists and psychiatrists are concerned in the work of the school. These result in the bureaucratization of the teacher's role and removing a certain degree of the teacher's professional autonomy. Wilson\textsuperscript{175} says, 'the hierarchy of positions within the school is stimulated on the one hand by increase in school size and on the other hand by the system of allowances for responsibility. The effect has been to produce a greatly increased mobility among teachers and the adverse comment which this receives in many quarters is in itself a recognition of the affective and motivational character of the teacher's task and of the difficulty of fulfilling it adequately over very brief periods.'

The schools and the individual teachers have a certain degree of autonomy and thus the school system varies from other bureaucracies. The teacher performs his role alone in a classroom where there are no means of observing or evaluating as the teacher must be given

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broad discretionary powers and judgements. So, the teacher is normally protected from conflicts which are so common between professional staff and administration such as hospitals, universities and research institutions.

The increasing demand for 'specialists' of all kinds in the schools increases the bureaucratization of the teacher's role. This could reduce the status and autonomy of the 'rank and file' teachers. Also, these teachers' duties and authorities would be greatly reduced. Studies in America have shown that teachers' moral is positively associated with degree of bureaucracy.
2.9 Educational Aims and the Teacher's Role

As stated earlier, although a school is an organization, it differs fundamentally from other types of organizations since its aims are not specific and clearly defined. A school has multiplicity of aims and these aims relate to the values held by teachers and by society at large. The aims of the school - the moral, the intellectual, the social, the aesthetic - have degrees of emphasis according to the values held by teachers and society.

Teachers probably do not have clearly defined aims because of various causes such as an awareness of the magnitude and complexity of the task, the distance between educational ideas and realities. Role incumbents would tend to substitute their own goals. This produces a gulf between the official aims and the real aims of the schools. If the aims are not clear, the teachers are not aware of what they should be and conflicts could occur between the aims of the teachers and those of the schools.
2.10 **Leadership Roles in the Schools**

The role of the leaders in any organization is to influence the efficient working and attainment of organizations' goals. But research works on the role of the headmaster-leader of a school - have been scanty.

Sociological analysis of leadership roles has been based on the types of authority which upholds the leader's position and Weber\textsuperscript{165} enunciated the following classification - the legal, the traditional and the charismatic. Legal (or bureaucratic) authority is that which derives from formally drawn up rules and regulations which the leader follows and is himself subject to. Traditional authority is based on historical precedent and custom - the leader is obeyed because he symbolizes the sacredness of the social order. Charismatic authority in its original sense is based on magical or divine powers possessed by the leader but is extended to imply some highly individual power of personality.

In the past, the headmaster's role has been characterised by the charismatic and traditional elements but owing to the increasing tendency towards bureaucratization of the school, the headmaster's role is becoming legal. But, Etzioni\textsuperscript{48} says that the headmaster's role is essentially charismatic. Some headmasters see their leadership functions as being fulfilled by a kind of charismatic osmosis - whereby all these qualities which the Head wishes to characterize the school are passed on from him by a process of quasi magical diffusion.
Burnham, using the 'instrumental-expressive' dimension, sees the instrument aspect of leadership in the school as being performed by the deputy head.\textsuperscript{21}

Gross carried out a study termed Executive Professional Leadership (E.P.L.) in 1965. The assumption of the study was that the principal's practice of formal leadership provided him with the opportunity to motivate his staff, to offer them valuable advice, to make meetings an important and stimulating experience. Thus the specific question posed was: does the degree to which the principal attempts to give such leadership to his staff have a favourable effect upon teacher's morale, their performance in the classroom and the learning of the pupils? The findings of the study showed conclusively that it did.\textsuperscript{61}

Halpin investigated the leadership of American Air Force Officers. He found two major factors. The first of these relates to the leader's behaviour in trying to establish 'well-defined patterns of organization, channels of communication and methods of procedure.' The second refers to 'behaviour indicative of mutual trust, respect and warmth in the relationship between the leader and the members of his staff.'\textsuperscript{64}

From the foregoing, it could be said that attempting to ascertain the teacher's role is a particularly difficult one, as the role has no limitations and specificity. A teacher is usually uncertain of his role in the school because his views on teacher's role behaviour may be in variance either with those in the schools or those of the society at large. The difficulty
of the teacher is further aggravated by the increasing tendency of the schools becoming larger and the inevitable occurrence of bureaucracy. Thus, the inability of the teacher in fulfilling the affective, motivational aspect of his role and lessen commitment and the degree of satisfaction felt.¹⁶⁹

The few studies that have been carried out on teacher's role have managed to throw some insights in the teacher's role. Many more studies are needed if the teacher's role is to be fully understood.
3. NEW TECHNIQUES USED IN TEACHER EDUCATION

3.1 The Three Aspects of Teacher Education

Both in-service and pre-service training can be broadly classified into three major areas of instruction.

a. Curriculum Content:-- refers primarily to the subject matter or course content that the teacher is expected to transmit to the pupil. During the training phase, most content materials are presented through language and/or abstract symbols. Subsequently, the teacher uses language and/or symbols, and evaluates performance with objective tests and thus the teachers consider content courses the most useful part of their training.

b. Professional knowledge:-- pertains to the pedagogical concepts and behavioural science principles teachers need in order to understand and deal with problems related to the pupil and the educational process. These concepts normally are taught in courses such as educational psychology, child development and educational evaluation. The conceptual leap from the predominantly abstract-academic orientation of these courses to the grim performance realities of the classroom must be made by the teacher. Many teachers are unable to bridge this gap between theory and performance, and subsequently complain that these courses are of little practical value.

c. Classroom skills:-- in teacher education deals with the specific teaching skills and behaviour patterns the teacher needs to function in the classroom. In these courses, the trainee is confronted with an unbridgeable
gap between the content presented and the skills actually needed to teach effectively. Instructors in methods courses employ lecture and discussion techniques for the most part and it simply isn't possible to learn complex teaching skills by talking about them. What teachers get out of such courses is an academic knowledge about teaching.

B.O. Smith (1969) observes in teacher education that student teaching is not training but a type of reality experience in which the individual learns by trial and error and by the inadequate direction that the supervising staff is able to give him. Student teaching came into being before the concept of training was developed and should be phased out as quickly as possible.¹⁴¹

Joyce (1969) notes that student teaching traditionally consists of (1) observations of a supervising teacher who usually uses as many bad techniques as good ones. (2) practice teaching in which the learner has virtually no idea of what he is supposed to be practising. (3) intermittent feedback from the supervising teacher and/or the college supervisor consisting mostly of undefined generalities which the learner cannot translate into specific classroom behaviour.⁷⁷
3.2 Interaction Analysis as a Feedback System by Ned Flanders

To understand the types and sources of feedback and effects of feedback in terms of teacher behaviour, a category system such as Interaction Analysis As a Feedback System was enunciated by Ned Flanders.³

The social forces at work in the classroom are so complex that it looks on the surface as if any attempt to analyze them would be extremely difficult. The teacher's interaction with children, which is a portion of the total social process, seems almost as difficult to identify.

The Flanders system is concerned with verbal behaviour only, primarily because it can be observed with higher reliability than can non-verbal behaviour. The assumption is made that the verbal behaviour of an individual is an adequate sample of his total behaviour.

In this system, all teacher statements are classified first as either indirect or direct. This classification gives central attention to the amount of freedom, minimizing the freedom of the student to respond or he can be indirect, maximizing the freedom of the student to respond.

In order to make total behaviour or total interaction in the classroom meaningful, the Flanders system also provides for the categorizing of student talk. A third major section, silence or confusion, is included in order to account for the time spent in behaviour other than that which can be classified as either teacher or student talk.
All statements that occur in the classroom are categorized in one of three major sections:
(a) teacher talk
(b) student talk
(c) silence or confusion (i.e. anything else that is not teacher or student talk).

The teacher's verbal behaviour is subdivided into:
Indirect influence and consists of:
- accepting feeling
- praising or encouraging
- accepting ideas
- asking questions

Direct influence and divided into:
- lecturing
- giving directions
- criticizing or justifying authority

The student talk is divided into:
- responding to teacher
- initiating talk
### Description of Categories for the 13-Category Modification of the Flanders System of Interaction Analysis

<table>
<thead>
<tr>
<th>Category Number</th>
<th>Description of Verbal Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Accepts Feelings: Accepts and clarifies the feeling tone of students in a friendly manner. Student feelings may be of a positive or negative nature. Predicting and recalling students' feelings are also included.</td>
</tr>
<tr>
<td>2.</td>
<td>Praises or Encourages: Praises or encourages student action, behaviour, recitation, comments, ideas, etc. Jokes that release tension, not at the expense of another individual, nodding head or saying &quot;uh-huh&quot; or &quot;go on&quot; are included.</td>
</tr>
<tr>
<td>3.</td>
<td>Accepts or Uses Ideas of Students: Clarifying, building on, developing, and accepting the action, behaviour, and ideas of the student.</td>
</tr>
<tr>
<td>4.</td>
<td>Asks Questions: Asking a question about the content (subject matter) or procedure with the intent that the student should answer.</td>
</tr>
<tr>
<td>5.</td>
<td>Answers Student Questions (Student-Initiated Teacher Talk): Giving direct answers to student questions regarding content or procedures.</td>
</tr>
<tr>
<td>6.</td>
<td>Lectures (Teacher-Initiated Teacher Talk): Giving facts, information, or opinions about content or procedure. Teacher expressing his own ideas. Asking rhetorical questions (not intended to be answered).</td>
</tr>
<tr>
<td>7.</td>
<td>Gives Directions: Directions, commands, or orders to which the student is expected to comply.</td>
</tr>
<tr>
<td>8.</td>
<td>Corrective Feedback: Telling a student that his answer is wrong when the correctness of his answer can be established by other than opinions (i.e. empirical validation, definition, or custom).</td>
</tr>
<tr>
<td>9.</td>
<td>Criticize Students(s) or Justifies Authority: Statements intended to change student behaviour from a nonacceptable to an acceptable pattern; bawling out someone; stating why the teacher is doing what he is doing so as to gain or maintain control; rejecting or criticizing a student's opinion or judgment.</td>
</tr>
<tr>
<td>10.</td>
<td>Teacher-Initiated Student Talk: Talk by students in response to requests or narrow teacher questions. The teacher initiates the contact or solicits students' statements.</td>
</tr>
<tr>
<td>11.</td>
<td>Student Questions: Student questions concerning content or procedure that are directed to the teacher.</td>
</tr>
<tr>
<td>12.</td>
<td>Student-Initiated Student Talk: Talk by students in response to broad teacher questions that require judgment or opinion. Voluntary declarative statements offered by the student but not called for by the teacher.</td>
</tr>
</tbody>
</table>
13. Silence or Confusion: Pauses, short periods of silence, and periods of confusion in which communication cannot be understood by an observer.

\[
\text{Indirect-direct ratio} = \frac{\text{categories } 1,2,3,4,5}{\text{categories } 6,7,8,9}
\]

\[
\text{Student-teacher ratio} = \frac{\text{categories } 10,11,12}{\text{categories } 1,2,3,4,5,6,7,8,9}
\]

\[
\text{Flexibility factor} = \text{total number of occupied cells}
\]
Discussion

For a teacher to improve his teaching, three factors should probably be present -
(a) the teacher should want to improve
(b) the teacher should have a model of the type of teaching behaviour that he wants to develop
(c) the teacher should get feedback regarding his progress toward the development of those teaching behaviours which he has conceptualized as his goal.

Research on the training of teachers that has involved the use of interaction analysis has indicated that the second and third conditions necessary for change mentioned above are produced by interaction analysis.

Also, research in teacher education between the verbal behaviour of teachers trained in interaction analysis (training involving feedback to teachers) and those not so trained show clearly the different results. Those trained in interaction analysis
(a) used more praise
(b) accepted and clarified student ideas more
(c) used more indirect teacher talk as opposed to direct teacher talk
(d) used more extended praise
(e) had more extended use of student ideas
(f) used more positive affective talk
(g) accepted student ideas more after teacher initiated student talk
(h) used more positive reinforcement after teacher-initiated student talk
(i) used less corrective feedback
(j) criticized students less
(k) asked more questions
(l) used less lecture
(m) gave fewer directions

In addition, there was significantly less teacher-initiated talk and significantly more student-initiated talk in the student teacher group receiving feedback.

Experiences should be provided to both prospective and in-service teachers to become more aware of and flexible in using a variety of appropriate teaching behaviours related to positive student attitudes towards school, their teachers and student achievement.

What a teacher does in the classroom is affected by his conception of children and learning. He must be willing to examine his own behaviour; he must voluntarily subject his classroom verbal behaviour to the scrutiny of some sort of system that will give him an accurate and objective record of his verbal performance. Systematic observation holds the promise of providing him with the information he needs to improve his role as a facilitator of learning in the classroom. Universities must explore ways of working with local schools to develop techniques for analysing and evaluating teaching. Teachers, supervisors and prospective teachers should become familiar with the potential value of observational systems for planning and analysing classroom instruction.16
3.3 Micro Teaching

Micro teaching is contrived, but nevertheless real teaching. It is teaching scaled down in terms of time, class size, task and skill. Typically it involves the application of clearly defined basic teaching skills in a series of carefully planned encounters of five to fifteen minutes with a small group of 3 to 10 pupils. Each episode is generally video-taped and replayed. Opportunities are thus provided for immediate diagnostic evaluation of the teacher's performance by colleagues, supervisors and non-participating pupils, and for measuring progress in specific teaching techniques. Following the critique, the micro unit is retaught. The micro teaching concept is simple, flexible and in view of its achievements, powerful.

The first micro teaching programme began in 1963 as part of a preservice training programme at Stanford University under the leadership of Professors Allen, Bush and MacDonald. Professor Allen sought a more potent measure than the traditional approach of lectures supplemented by student practice and observation in schools and micro teaching met a number of important criteria.

First, a real teaching situation was required so that from the beginning, students could practice and refine teaching skills and experiment with their own ideas and those suggested in the course. Second, the most suitable teaching situation would have 'low risk' for the student teacher and pupils. Students would not be expected to surmount initially and pupils would not be subjected
to sometimes very poor teaching. Third, the practice context should embody some well-established principles of learning; for example, numerous distributed practice sessions would seem more valuable than fewer, more extended sessions; immediate supervisory feedback would be far more valuable than delayed feedback; immediate opportunity to rectify errors and weakness would be preferable to extended periods of living with the weakness; low anxiety from a low threat situation should be more conducive to learning than a highly threatening situation. Fourth, the practice situation should provide the trainee with the opportunity to experience a wide variety of pupil age levels and abilities and to develop competence in a range of basic teaching skills. Finally, the practice scheme should be economic in terms of time and resources. Micro teaching was seen to provide more effective, concentrated use of students' time in practising a variety of skills and in freeing students to spend more time in preparatory work; and the best use of supervisory talents could be made.

3.3.1 Significant Features of Micro Teaching

There are five main features which have emerged from the Stanford experience.

A. Specific Skills in Teaching must be Developed.
   a. Reinforcement techniques.
   b. Varying the stimulus situation to keep pupils' attention at a high level.
   c. Three presentation skills -
      Pre-instructional procedures (set).
      Lecturing techniques and the use of audio-visual aids.
      Closure.
d. Illustrating and use of examples.
e. Student initiated questions.

B. The Establishment of Training Protocols before the Practice of Particular Skills.

A strong agent in influencing change in teacher behaviour is the presentation of short video-taped or filmed 'protocols' or models of experienced teachers demonstrating a particular skill. Supervisions\(^8\) play a key role in micro teaching, particularly in pre-service training programmes and it is their responsibility to help trainees relate such skills to both the theory underlying the skills and to the practical condition of the classroom. Miller and Dolland (1941)\(^{106}\) found that one learns a specific behaviour by observing a model's responses to stimuli either because the model is reinforced or the learner is directly reinforced as he matches the model's responses. Bandura and McDonald (1963)\(^6\) found that models were significantly more effective in changing behaviour than was the use of reinforcement alone.

Borg et al., (1970)\(^{18}\) described Modelling as a two-step process where the learner first observes a model (e.g. expert teacher) demonstrating a skill or skills and then tries to shape his own behaviours after those of the model. Bandura and Walters (1963) has shown that complex social behaviour may be acquired almost entirely through imitation and that the provision of face-to-face models accelerates the learning process.
Wodtke and Brown (1967) found that if the observer verbalizes a model's behaviour, he will perform significantly more imitative responses than the observer who passively observes the model. Two types of models -
a. Perceptual Models - filmed or videotaped teaching segments.
b. Symbolic Models - written transcripts of a teaching episode or written descriptions of a skill's application

C. Video-Tape Recording

It is important to note that while video-tape recordings are an extremely useful adjunct to the micro teaching, they are not the essence of the concept. When used to replay the student's micro teaching performance, it provides an objective and vivid record for supervisor and student of what took place - a common frame of reference for evaluative discussion. Moreover, because of its capacity for instant replay, video-tape can provide the student with immediate and accurate feedback of his performance. Specific comments may be made as the teaching is recreated and if necessary small segments may be replayed to emphasize or clarify points. It has been found that trainees are less inclined to take constructive criticism personally when comments are directed at the T.V. monitor. Thus the televised replay tends to depersonalize criticism and make students less defensive. Video-taped micro sessions also provide opportunity for self-analyses by the student. He may privately diagnose his own strengths and weaknesses.

D. The Teach-Critique-Reteach Sequence

Since micro teaching episodes are of short duration and involve few pupils, they can be taught again to a different group, incorporating suggestions for improvement.
E. The Development of Specific Evaluation Instruments

A series of specific rating scales was constructed at Stanford for each skill. These have proved useful in the systematic assessment of skill development and have provided a valuable basis for discussion of replays.

3.3.2 Setting and Equipment\textsuperscript{83}

A normal classroom setting, with a teacher's desk, blackboard and student desks provides the necessary space and equipment for a micro teaching station. Special rooms or equipment may be needed for certain subject areas. If the clinic is held in a school, it should be possible to provide appropriate teaching settings for all subject matter areas. If video-tape recordings are used, there will be additional equipment and an operator in the room. However, many video-tape recorders are compact, easily manoeuvrable and operable by non-technical staff.

The portability of the equipment allows recordings to be made in natural as well as experimental environments and the equipment's size and ability to record under standard lighting conditions help to obtain unobtrusive yet valid samplings.

3.3.3 Participants\textsuperscript{83}

Trainees are individuals given the opportunity to become more proficient at teaching, usually with reference to a certain skill or group of skills through a programme of focusses presentation, practice and feedback. Feedback may come from pupils and supervisors in written and/or verbal form and possibly from playback of a
video-tape recording of the performance. The trainee is then given a chance to revise his performance strategy and to teach a second lesson usually with a different group of students. The task of micro teaching pupils, usually selected to represent a variety of socio-economic backgrounds, subject matter interests and competencies, and age levels, is twofold: to provide realistic classroom interaction for trainees, and to help provide them with accurate information about their teaching performances.

Supervisors play a key role in micro teaching, particularly in preservice training programmes. Experienced in the skills emphasised in the training, it is their responsibility to help trainees relate such skills to both the theory underlying the skills and to the practical conditions of the classroom. The role of the supervisor is one of continuous consultation. It should be continuous, so that the supervisor can help the trainee transfer the skills learned in the micro teaching setting to the actual classroom. With his understanding of the trainee's teaching characteristics, the supervisor is the appropriate person to help the trainee to adapt his micro teaching learning to the classroom. Supervision should be consultative, because the type of assessment a trainee receives affects the amount of freedom he feels he has to innovate in his micro teaching performances, i.e. the supervisor's role is to provide information about trainee's performances which will help them to acquire the appropriate teaching skills.

3.3.4 Feedback

It is necessary to develop new models of providing feedback because of the inadequacy of the subjective,
limited feedback possible from self or supervisory observations. Video tape recordings were seen as potentially viable adjuncts to supervision because of their desirable feedback properties i.e. they reproduce the teaching performance immediately and in a complete objective and reliable manner. Thus the teacher and his supervisor can view the teacher's performances as they actually happen thereby avoiding the pitfalls of traditional supervisory sessions.

The trainees benefit more from same kind of feedback than from self analysis, that university supervisors were able to produce greater changes on selected behaviours than were school supervisors and that video plus verbal feedback is more effective than verbal feedback alone. In micro teaching, because of the reconstructive attributes of video-tape used in the playback sessions, the trainee may not require extensive supervisor feedback to help him compare his performance with the possible more appropriate behaviour demonstrated in a model tape.

3.3.5 Results of Micro Teaching

Students trained in the micro teaching clinic made discernible improvement in the skills practised and were judged to display greater teaching competence than their colleagues.

There is evidence that micro teaching can also change student attitudes and substantially improve student's skills in evaluating aspects of teaching. It can effectively improve significant aspects of teacher-pupil relationships.

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Micro teaching experience promoted 'student growth' in the following areas: 'Use of background information, provision of concrete materials, performance of experiments by groups of children, utilizing children's observations, allowing children to develop conclusions, helping children to verify conclusions and the overall response of children to the student teacher.'

Levis et al. 1973, found that in the acquisition of questioning skills, students undertaking micro teaching performed at a significantly higher level than students who had normal school experience in the use of probing questions and in the use of higher-order questions. (A 'probing' question requires a pupil to go beyond his initial response to a teacher's comment or question. This usually entails some sort of clarification or elaboration upon his previous response.)

In Wards' (1970) survey of micro teaching programmes, the four most frequently observed student attitudes towards education were:

a. greater understanding of the teaching process as a complex challenging profession.
b. greater interest and enthusiasm toward education.
c. increased self-confidence.
d. greater concern for self improvement and self evaluation.

Students were better able to achieve desirable voice control and became more clearly aware of the 'value of facial expression, gesture and movement'. They also detected 'detrimental personal idiosyncracies' and sought to eliminate them.
Primary school children responded naturally in the micro teaching situation. Most groups were apparently little affected by the presence of equipment and cameramen.

Equipment\(^{149}\) cost would be a major obstacle. The solution would be the use of a number of small portable camera recording units (each with its own play-back monitor) operated completely be students.

'Micro teaching stands today as one of the few experimental techniques which by its very structure encourages a combination of theory and practice, research and training, innovation and implementation. The phenomenal growth and diversity of micro teaching should not obscure the fact that the technique is still in its infancy. The ultimate potential of this most promising tool for both research and training depends entirely upon our imagination and our ingenuity in developing and testing new ways of applying micro teaching principles and techniques to the problems of education.'\(^1\)
3.4 The Minicourse

The staff\textsuperscript{17} of the Far West Laboratory for Educational Research and Development, Berkeley, California is developing some in-service courses—called 'minicourses' to differentiate them from other instructional models that employ micro teaching approach. The minicourse\textsuperscript{19} is a self-contained, self-instructional package of teacher training materials designed to help the teacher master specific teaching skills and strategists. Minicourses are an extension of the research on micro teaching and of the technical skills of teaching that was initiated at Stanford University in 1963. The minicourse model differs from the Stanford model in (i) it provides a self-instructional package that can be used in any school where a video-tape recording system is available, (ii) it provides feedback through self-evaluation and/or peer interaction while micro teaching employs supervisors to provide feedback, (iii) the minicourse relies heavily upon illustrations by model teachers rather than supervisory feedback to provide the trainee with an operational definition of the behaviour patterns or skills to be learned. Research evidence suggests that models are more effective than supervisory feedback, and, of course their use makes it possible for the minicourse to be self-contained.

3.4.1 The Minicourse Instructional Model

The trainee\textsuperscript{17} first views an instructional film in which one to three specific teaching skills are described and illustrated with examples from various classrooms. This instructional film is followed by a model film in which the trainee sees a model teacher fitting these skills into a regular classroom lesson. As part of viewing
the model film, the trainee is usually called upon to identify each skill as the model teacher uses it. After viewing the instructional and model films, the trainee receives further information on the specific skills by studying a teacher handbook. He then prepares a microteach lesson designed to give him practice in using the skills. The lesson is recorded in videotape. Immediately, after the lesson, the trainee replays the recording and evaluates his use of the teaching skills employing evaluation forms provided in the teacher handbook. Then based on his evaluation, he replans the lesson and reteaches it to another small group of pupils from his regular classroom, again recording the lesson on videotape and evaluating it using additional evaluation forms provided in the handbook. Thus, the minicourse instructional models contain three main elements: (a) the instructional and model films; (b) the microteach and reteach lessons and (c) the video-tape replay and self-evaluation.

3.4.2 Minicourse 1 Skills

Instructional Sequence I

Skills Covered:

a. Ask question, pause 3 to 5 seconds, then call on pupil.

b. Deal with incorrect answers in an accepting, non-punitive manner.

c. Call on both volunteers and non-volunteers in order to keep all pupils alert and distribute participation.

Instructional Sequence II

Skills Covered:

d. Redirection - directing the same question to several pupils.

e. Framing questions that call for longer pupil responses.

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Ask for sets or groups of information when framing information level questions. Avoid yes-no replies.

f. Framing questions that require the pupil to use higher cognitive processes.

**Instructional Sequence III**

Skills Covered:

- g. Prompting to improve a weak pupil response.
- h. Seeking further clarification of the pupils' response.
- i. Refocusing the pupils' response.

**Instructional Sequence IV**

Skills Covered:

- j. Teacher should not repeat his questions.
- k. Teacher should not answer his own questions.
- l. Teacher should not repeat pupil answers.

3.4.3 **Results**

Three skills - refocusing, frequency of punitive teacher responses to incorrect pupil answers and pausing had not changed between the precourse and postcourse evaluation.

Re-direction changed markedly between pre- and post-evaluation and then remained stable over the two follow-up periods. Re-direction is the technique of framing a question having several possible answers and then directing it to several pupils rather than to a single pupil.

The Minicourse I attempts to increase the teacher's use of three probing techniques. Those are prompting, in which the teacher gives the pupil clues or asks him leading questions; further clarification, in which the teacher attempts to get the pupil to clarify, elaborate or explain
his initial response; and refocusing, in which the teacher attempts to get the pupil to relate his initial response to other topics that the class has studied and as stated earlier refocusing is virtually non-existent in either the precourse or post-course tapes. This indicates that the minicourse model is not useful in shaping teacher behaviour that can be practised only infrequently in the microteach and reteach lessons.

Repeating the question is generally considered a poor practice since it wastes discussion time and encourages pupil inattention. Repeating pupil answers is considered desirable by some teacher educators since it provides a degree of reinforcement to the pupil. W. Borg considers it undesirable because it increases teacher talk and also conditions pupils to listen to the teacher rather than to one another since they can expect the pupil's answer to be repeated by the teacher. The disadvantages of the teacher answering his or her own questions are obvious and if carried to an extreme, this behaviour results in the teacher giving a monologue rather than conducting a discussion. All these negative practices were drastically reduced after teachers had completed the course.

Another objective of the course is to train teachers to ask questions that call for longer pupil responses and avoid questions that can be answered by a single word. The average word count for pupil responses nearly doubled on the post course tapes. The minicourse increased the teacher's use of higher cognitive questions and also reduced the percentage of time during class discussion
when the teacher is talking. Reducing teacher talk resulted in the pupils becoming more interested and more willing to participate; direct interactions between pupils were more in evidence; and teachers no longer dominated and restricted the discussion.

3.4.4 Advantages of the Minicourse Model

i. Minicourses are designed to provide a complete package that can be used in any school, regardless of local resources.

ii. Since the teacher works with a short lesson and few students, he can try out new methods and ideas in a less difficult situation than that found in the regular classroom.

iii. 70% of the course, the teacher is practising the skills and watching his own performance.

iv. The teacher gets immediate feedback from the video-tape replays of his teaching. Thus, he can promptly evaluate his progress, eliminate bad habits and more firmly establish the new methods he is learning.

v. Minicourses focus on specific skills rather than generalities.
3.5 Games in the Classroom

Nova High School in Ft. Lauderdale,\textsuperscript{25} runs a new process of education known as Olympic Games. But the activities are confined in the comforts of the classroom.

Recognizing that high school athletes generally are accorded recognition and prestige by their peers while scholars are less 'acceptable', Robert W. Allen (Director of Nova's Academic Games Project) declares that the Nova Olympics are aimed at restructuring this 'value perspective'. In time, through competitive use of a panoply of games, Mr. Allen hopes the school achievement of adolescents will be improved by altering the structure of values and rewards evidenced in many schools.

A growing number of schools, universities as well as secondary and elementary schools, are finding that various problem-solving games can be helpful in teaching everything from mathematics and business administration to international relations.

Some Baltimore and San Diego high schools have found that games can help motivate slow learners. And grade schools in northern Westchester County, New York, working under a U.S. Office of Education Grant have designed games to teach sixth graders the economic problems of an emerging nation and the operation of a retail toy store.

On the university level, the same spirit of innovation is infecting a growing number of graduate schools of business, where some educators contend games may remedy
a deficiency in those curriculum overlooking that
decision-making occurs in a context of conflict.

The game exercises are being used for a bewildering
array of purposes by firms, hospitals, labour unions and
even the State Department. It is in the schools, however,
where the games are more varied and where their use may
prove most rewarding.

Why are games considered effective learning aids?
For one thing, 'they spur motivation', claims Kalman J.
Cohen, professor of economics and industrial administration
at the Carnegie Institute of Technology. 'Students get
very absorbed in the competitive aspects of the game.
They try harder at games than in some courses.'
'More important,' he adds, 'the exercises give students
an opportunity to practise decision-making techniques
or approaches studied in the classroom. They force
students to live with the consequences of their decisions,
an experience hard to get in the classroom.'

Typical of business games is Carnegie Technology's
developed to realistically mirror the problems of running
a company. The purpose of the game, which involves about
eighteen graduate student 'executives' representing three
competing firms in a fictional detergent industry, is
almost breathtakingly ambitious. Dr. Cohen says it is
aimed at providing guided experience in managerial
decision making under conditions of competition and
uncertainty. At the same time, he says, the games seek
to advance student skills of analysis, advocacy and
negotiation in contacts with outside groups.
The impact of the decisions on a mythical market and, consequently on the other 'companies' in the market, is calculated by an umpire, usually a computer programmed with certain cause and effect formulas.

What do students learn from such exercises? Conceding their value has yet to be proved, Dr. Guetzkow, professor of political science at Northwestern, nevertheless insists, 'they are an effective teaching tool. We put individuals into decision making posts so they can experience what it's like to operate in an international system,' he says, 'In a simulated situation, students get a sense of the reality of decision making. They learn that it's not as simple as it seems in textbooks.'

Despite high marks by students, not all educators are sanguine about games. Indeed, some are downright critical. Charles O. Lerche, dean of the school of international services at American University observes they have 'certain advantages of conveying to the student an approximation of reality.' But he cautions that the games have 'certain built-in limitations.' The essence of the game is that you artificially simplify the universe to single out a few variables. The trouble is that there are few situations in real life where there are only a few variables at work. Life situations are far more complex than these games can make them.

At John Hopkins University, James S. Coleman and Sarame S. Brocock value of games arises in their ability to bring the future into the present allowing the child to play roles in a large differential society of which he otherwise gets hardly a glimpse. Also, they claim,
games are peculiarly 'self-disciplining' and finally, 'self-judging', meaning 'a player knows that he has won or lost by his own actions'.

Slow learners, in fact, are among the chief beneficiaries of games, say researchers. One game specifically aimed at students considered to be potential dropouts is BMG, developed two years ago by the Western Behavioural Sciences Institute for use in four San Diego schools. Noting that such students are often fond of cars a WBSI spokesman explains that the young people, for the purpose of the game, play auto manufacturers required to both increase profits and carve out a larger share of the market for their respective 'companies'.

Nova High School in Ft. Lauderdale uses games 'to meet the educational needs of the student classified as non-motivated, under-achiever, or less capable', says Robert Allen. At the same time, he notes that Nova's games are aimed at the gifted or advanced student; or the student who has formed negative attitudes about a given subject.

Not surprisingly, some Nova educators worry that such competition may lead to an excessive emphasis on winning rather than learning.

Cleo. H. Cherryholmes, a political scientist at Michigan State University agrees that stimulation does create more student motivation and interest, but he found that they produce no consistent or significant difference in learning, retention, critical thinking or attitude change.
There is no question that games, when properly used, can have value. When used in conjunction with other materials, they can provide useful points of departure for discussion. At best, then, games can supplement other educational programmes, making real and vivid material that often seems abstract in a textbook. If nothing else, they can convey to the player a feeling for the complexity and multiplicity of factors that must be considered in decision making. And conceivably they may increase the confidence of young people to deal with real world problems that seem impossibly remote from their own lives.

But the nature-of the games makes them vulnerable to abuse, particularly in the hands of inexperienced or lazy teachers. Equally worrisome is the heavy emphasis often placed on winning, which may mislead the player as to the real objectives of learning.

The burgeoning market for games reflects further movements away from two longtime staples of the classroom: unrealistic and idealized textbook views of American life, and the old teacher-pupil relationship in which the former hands down pronouncements to be regurgitated by the latter. Increasingly the focus is on realism, and increasingly students are expected to learn by themselves and at least without the intervention of 'gradegrind teachers drilling home facts by slamming rulers on desk tops.'
4. EDUCATION OF THE DENTIST

Dentistry has been defined by Federation Dental Internationale as 'The science and art of preventing, diagnosing and treating diseases and malformations of any injuries to the teeth, jaws and mouth and of replacing lost teeth and associated tissues.'

The two major chronic dental diseases - Dental Caries and periodontal disease - are on the increase and the training of the dental personnel to meet this increase in need and demand for dental care is of paramount importance.

In a rapidly changing world, the traditional system of educating health personnel is no longer adequate, however, excellent they may have been in the past. Innovations are needed everywhere and to reap the full benefit of advances in science and technology. Dental education cannot restrict itself to the affluent few if the manpower and sociologic needs of the future are to be met.

Dental education in its broader perspective is considered as a field of professional education of higher education. The progress and maturity of dental education are thus intimately linked with the principles of higher education. Its quality must, therefore, rest both pedagogically and philosophically upon the broadest possible educational base of higher education. Dental education must assume and share its responsibility in promoting the dental students' optimal intellectual, social and technical development.
Dental education should give an individual a sense of professionalism. Professionalization is essentially an effort to encourage the adoption of the ideals universally accepted in today's centre; the ethical standard, personal integrity, an appreciation of dignity, an acute sense of responsibility, a dedication to service, an appreciation of vocational accomplishments and a scholarly inclination. One of the most important aspects of an individual's development of such a concept is derived from his view of the reaction of others to him, particularly those reactions that come from significant situations. Each dentist grows, develops and eventually matures within the context of many different publics.145

J.L. Henry, Dean, Howard University, College of Dentistry, speaks of the future dental graduates as five fingered dentists with each finger having significance — socially conscious, community oriented, politically informed, civically active and professionally competent.67

Therefore, the importance in the education of the future dentist would be appreciated by knowing the evolution of dental education to the present time.
5. EVOLUTION OF DENTAL EDUCATION

The evolution of dental education has been guided by changing concepts, each adding and building upon the preceding one a new emphasis and dimension. These concepts are readily neglected in corresponding developmental stages as mechanical, biologic, social, pedagogic and humanistic. 139,183

It seems fair to say that by the very nature of its concern, the rate of change in dentistry has been and will be slower than is occurring in society around us. 6000 years ago, the Egyptians had recipes to strengthen teeth and cures for the aching tooth. Mummies from 500 B.C. have been found with artificial teeth and with cavities stuffed with gold foil.

Aristotle described the construction of dental forceps and noted that 'Soft teeth damage the teeth because small particles adhere between teeth where they very easily cause putrefaction.' Celsus was moving teeth with finger pressure, so orthodontics was under way and prosthetics was in bloom. Golen relieved pain by "perforating the sick tooth by means of small drill and the Aztecs in Mexico were placing ornamental jade inlays in teeth hundreds of years before the Inquisition. When Luther was having his problem with the church, the first dental textbook was published independent of any medical text.

Leeumnhock turned his microscope to teeth and he noted the dentinal tubules which were "hardly the consistency of a hair of a beard". He also noted that
tartar contained micro-organisms or "animalcules."  

Prior to the middle of the 19th century there was little science or research in dentistry. The bioscience explosion in Western Europe in the latter half of 19th century had some influence on dental treatment. Dentists became aware of the significance or oral infection and in fact feared that teeth might be a source of focal infection sometimes led to their needless sacrifice.  

From the middle of the 19th century through the first quarter of the present century, dental research has largely dealt with dental materials, dental equipment and dental technology. Since dental practice has been oriented toward treatment of existing disease, it is not surprising that the dentist should have had a great interest in the materials and devices he uses in rendering treatment. Dentists have always rapidly adopted new methods and new materials partly because they have been involved in these discoveries.  

At the turn of this century, Miller put forward the concept of bacteria demineralising enamel as a cause of caries and G.V. Black introduced rational cavity designs and a non-expanding amalgam.  

More recently, the discovery of the role of fluorides in the prevention of caries has changed the character of dentistry as radically as Fleming's discovery of penicillin changed medicine. The antibiotics have also sharpened the distinction between medicine and dentistry.
A new phase of research by dentists themselves began at about the beginning of the second quarter of this century. There was a significant increase in support for dental research in the 1930's and more dentists sought the additional training required to carry out worthwhile studies and led to oral health. Ten to fifteen years ago, as dental research continued, it was observed that in spite of massive increase in knowledge, the incidence of dental caries continued to increase. It became evident to many dentists responsible for community care that our dental problem cannot be solved by bioscience alone. Dental caries and periodontal disease are socio-behavioural problems. The recognition that we must educate people and influence the personal behaviour of our patients brought about the behavioural science phase of research in dentistry. We have enough biologic information to control or almost eliminate our two major dental diseases - now we must learn how to apply this knowledge in practice.47

Between 1903-1913, first training school for dental hygienists came into being. In 1921, the training school for dental nurses was opened in Wellington, New Zealand. A major development in the 1940's was a pioneering start in the field of voluntary prepaid comprehensive dental care. National Insurance Scheme including comprehensive dental service was established in England in the year 1948. In 1966 in the United States of America, Medicare (Title XIX of the Social Security Act) included dentistry along with many other health services designed not merely for the recipients of general relief, but also for the entire lower middle class of the country.41
The beginning of dental schools or the "early period of dental education" consisted of relatively short dental courses two or three years in duration, offered sometimes in close connection with medical schools and often by proprietary schools. The growth of dental knowledge with the deepening of the foundation of modern dentistry in the biological and medical sciences has led to the "contemporary period of formal dental education", with courses of four or five years in length. These courses have taken different forms in various countries according to the particular national systems of higher education and the varying degrees of relationship of the dental schools to the medical schools. 183, 47.
6. AN ANALYSIS OF THE PRESENT SITUATION

6.1 Manpower

Any dental educational programme should analyse the present situation before planning and implementation of the programme.

It is recognized that at present there is a wide gap between need and demand for dental care. While the impact of the expansion of manpower programmes will reduce this separation in some areas, parity is unlikely to be achieved.¹⁴⁰,¹²⁷,¹⁷¹,¹⁸³,³⁷,⁷⁰,¹⁶²,¹⁵⁷,¹⁵,¹⁰⁹,⁹⁶

To bridge the gap between need and demand, it is necessary to increase the dental manpower but it seems clear that the study of dental manpower must be concerned with more than total numbers of personnel. Although adequate numbers are important, they are only one of series of factors which affect availability of dental care facilities. How are they organized and how efficiently used are they? How accessible and available are they? What are their demographic characteristics and how are they changing in relation to population characteristics and dental needs?¹²⁷,⁴⁷,¹⁰⁹,³⁷

Hillenbrand⁶⁹ suggests that there is no single formula which can be applied universally to assess current or project future needs. He lists four basic factors which must be considered.

A. The present population of a country and the predicted rate of growth.

It is important to have a detailed knowledge of the population of a given country, its levels, needs and
demands in relation to dental care and its sociological and demographic characteristics in relation to age, sex, urban/rural distribution, income and education.

Increasing urbanisation is resulting in an increased demand for dental services.

The level of general education within the community is increasing, creating a greater demand for dental care.

B. The current resources of the profession and its capacity for future growth.

This involves having vital statistics and potential resources of the dental manpower. This could be done by building up a profile of the profession in terms of an inventory of practitioners and their distribution by age, sex, geographic location, educational qualification, income and type of dental service.

There is a tendency for dentists to locate in large cities to the neglect of rural areas. There is a clear association between social class structure of the population and the population of dentists - thus the higher the proportion of persons in socio-economic groups (employers, managers and professionals) the higher the proportion of dentists. 127, 38, 96, 174

The establishment of School Dental Services and community and other permanent clinics will require more manpower. This will result indirectly in an increased demand on private practice.
Newton\textsuperscript{114} summarises the future dental manpower in Australia as follows:--

The Australian Government has introduced a crash programme for the School Dental Services utilising School Dental Therapists, with the object of providing dental care for all children of primary school age by 1980 and all children up to 15 years of age by 1986. Whilst such a scheme will remove children from private practice it should be realised that firstly not all parents will utilise the School Service, secondly there will be some locations where it will not be feasible for the School Service to operate and the additional work load will fall upon the dentists practising in that area and thirdly, by 1976 it will require an additional 279 dentists to those at present (1972) employed in School Dental Services and by 1981 this will reach a total of 792 or an increase of 610 over the year 1972 figure.

In addition to the school programme, a scheme to provide dental care for the aborigines has been introduced, a domiciliary dental care scheme has been proposed and the introduction of community health centres and clinics in hospitals is growing in favour. All of these must increase demand for dental services in the short term.

It is also not unreasonable to assume that in the long term the school programme will produce a more dentally oriented population thus creating further demand.
C. An estimate of dentist/population ratio best suited to meet national needs and aspirations and also perhaps an estimated auxiliary-dentist ratio to enlarge the capacity of the professional work force.

Dental Manpower\textsuperscript{171} statistics of some countries are:

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<th>Countries with favourable dentist/population ratio</th>
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<tr>
<td>Monaco</td>
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<td>Sweden</td>
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<td>Norway</td>
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<td>Denmark</td>
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<td>W. Germany</td>
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<td>Brazil</td>
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### Countries with unfavourable dentist/population ratios

<table>
<thead>
<tr>
<th>Country</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>Nigeria</td>
<td>1:1,100,000</td>
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<tr>
<td>Burma</td>
<td>1:806,452</td>
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<tr>
<td>Central African Republic</td>
<td>1:751,845</td>
</tr>
<tr>
<td>Tanzania</td>
<td>1:476,900</td>
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<tr>
<td>Uganda</td>
<td>1:387,000</td>
</tr>
<tr>
<td>Laos</td>
<td>1:333,333</td>
</tr>
<tr>
<td>Botswana</td>
<td>1:203,666</td>
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<tr>
<td>India</td>
<td>1:180,000</td>
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<tr>
<td>Kenya</td>
<td>1:155,532</td>
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<tr>
<td>Zambia</td>
<td>1:150,000</td>
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<tr>
<td>Morocco</td>
<td>1:140,000</td>
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<tr>
<td>Indonesia</td>
<td>1:119,760</td>
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</tbody>
</table>

In Australia, it is considered that the ratio of 1:2439 or better should be achieved by 1986 and to reach this target, it will be necessary to increase the output of graduates from all Australian Dental Schools by a total of 1376 or 172 per annum. This means a doubling of the present number graduating each year.\textsuperscript{115}

It is estimated that 3547 School Dental Therapists will be needed throughout Australia by 1981 and 4470 by 1986.

In Japan,\textsuperscript{79} estimated number of patients per day will be 2,272,000 in 1975 and 3,873,000 in 1985. The number of dentists necessary for treatment is estimated to be 87,383 in 1975 and 148,926 in 1985.
It has been estimated that it would take 250,000 dentists, 2½ times the present number in the United States of America, working ten years in order to catch up with the backlog of dental caries alone.\textsuperscript{172}

Smith has shown how the dentist/population ratio has declined from 1:1730 in 1930 to 1:2170 in 1958. He suggests 6000 additional dentists will be needed to provide every region with a supply of dentists large enough to meet demand level already being satisfied in the average state of United States.\textsuperscript{142}

In a study of health services in Europe, notice was taken in growing numbers of health workers and of the continuing need to increase these numbers. Two factors, it was claimed were responsible.

(a) the impact of science as the diagnosis, treatment and control of disease.
(b) the increased demand for health services. The study pointed to the need for a consideration of dentistry in this context: 'dentistry is perhaps a good example of a branch of health work which is unable to meet the demands for the service. Nearly all countries in Europe face such a situation! To this European problem can be added a similar problem for the United States of America - indeed it would seem fair to describe the shortage of dental manpower as a world-wide problem'.\textsuperscript{184}

D. The technological, social, economic and political factors as the following:-
(a) Target manpower goals.
(b) Availability of dental education facilities and resources.
(c) Recruitment characteristics.
(d) Dental Health Education and its role in equating need and demand.
(e) Dental equipment and technology.
(f) Use of auxiliary personnel.
(g) Deployment of dentists.
(h) Availability of dentists.
(i) Methods of payments.
(j) Provision of services.
6.2 Systems of Delivery of Dental Care

The present mode of delivery of dental care is far from satisfactory. A complete orientation in the system of delivery of dental care has to be adopted in order to provide optimum dental health care to the community.

The following delivery system is recognized in Australia.

A. Graduate Dentists.
   (a) General or specialist private practice (Fee-for-service) either solo or group.
   (b) Institutional e.g. Armed Services, School Dental Services, dental schools, hospitals (centralised, de-centralised).
   (c) Community Health Centres staffed by salaried dentists or private practice utilising fee-for-service.
   (d) Industrial Organization and Friendly Societies.
   (e) Specifically funded systems e.g. aboriginal, repatriation, Legacy, pensioners.
   (f) Dental Services in General Hospitals.

B. Treatment delivery systems utilising auxiliary personnel.
   (a) School Dental Therapists.
   (b) Dental Practice in Private Practice.
   (c) Dental Hygienists.
   (d) Dental Chairside Assistants.
   (e) Dental Technicians.
Operative Technicians (treat patients by examination and construction of partial and full dentures) are operating in Tasmania.
   (f) Miscellaneous e.g. radiographers, dieticians, dental health educators, speech therapists.
Delivery of Dental Care to the Community in Australia:

a. Private Practice - It is estimated that not more than 40% of the community are receiving regular care through this system.

Currently this system is primarily concerned with treatment but there is evidence that the prevention and dental health education components are increasing.

b. Community Health Centres.

These services reach a minimal proportion of the population. However, easier access is available to other health services.


Approximately 10% of the community are being treated by these services.\textsuperscript{140}

By nature of the current dental armamentarium, dental care is not amenable to mass delivery, fluoridation of community water supplies being the outstanding exception, along with some educational methods which use mass media.\textsuperscript{119}

Hall\textsuperscript{63} states that the dental practices fall into five major categories.

a. Profession - oriented practices.

Here the welfare of the profession is the dominant feature. The practice is frequently of a specialized sort. These practitioners are likely to find some time for teaching duties.
b. Enterprise-oriented practice.
The emphasis is on the welfare of the enterprise, with a large amount of time and energy devoted to the planning and running of an efficient and effective enterprise. There is little time spent on the affairs of the profession. These offices are marked by substantial use of auxiliary personnel.

c. Clientele-oriented practices.
Here, the welfare of the client is the prime orientation and this clientele is largely high paying, desirous of securing highly skilled services. Personnel relationships with practices are paramount.

d. Routine-oriented practices are a kind of residual category and they comprise a large part of the total and where the dentist has been unable to impose a definite form on his practice. These are very busy with a substantial proportion of the patients of the drops-in or emergency character. It is not feasible to establish a recall system. The dentists are constrained to do what the patient demands rather than advise the patient in what he needs to have done.

e. Fringe practices. These are two types: those dentists who are starting or concluding a practice and those who have failed to make the grade.

Hall believes that the enterprise oriented dentists are the ones most likely to break with the past and adopt rational procedures of organization over traditional patterns.
Schoen\textsuperscript{138} states that private practitioners tend to look down upon anyone who works for a salary. Part of the problem is the set of values dental students get while in school where they tend to become procedure oriented rather than patient oriented and concludes by saying "group practice can more closely approach the ethical and moral ideals of dentistry than the typical fee-for-service solo practice."

Mercer, Muhler and Bixler\textsuperscript{102} did a mail survey in 1960 of 1700 members of the Indiana State Dental Association in order to determine their views and current opinions concerning the status of preventive dentistry and its role in the dental office. Public apathy in dental health education, lack of time available to teach Dental Health Education, not attempting to put patient education on a fee basis were the reasons given for not attempting to motivate the patient towards a preventive philosophy. Vast majority felt that preventive dentistry should be taught in the dental schools but 57% answered that they felt that their own education was lacking in this respect.

As a result, the present system of delivery of dental care is principally aimed at reparative treatment and not the control practitioners' activities in repairing or correcting oral disease and malfunction should involve the effect of such dental care on the whole person. It is time that the dentist be considered to be a specialist in the field of medicine rather than a highly skilled technician who does only with repairing the ravages of dental disease. As a medical specialist,
the dentist must understand the total patient and the part that he plays in the patients' total life. The public's image of the dentist should be changed from that of an oral technician to that of a specialist in the health care field whose chief responsibility is the diagnosis and treatment or prevention of the diseases and malfunctions of the mouth and its related structures.

Many of the problems which the dental practitioner encounters, have their roots in dental education.

a. The dental student frequently assumes from his contact with dental practitioners that he will run into these problems in his practice and he therefore often enters his practice expecting a series of problems and of course finding them.

b. When he works in the dental clinic, the student often treats some patients who are at lower levels of the socio-economic scale and other patients who do not fully appreciate oral rehabilitative procedures. This can give rise to a defeatist attitude in the student's mind, because he begins to believe that few patients really appreciate high quality dentistry.

c. Because of circumstances beyond his control the dental student is rarely able to observe the results of his work over a period of years because his clinical experiences are necessarily abbreviated. At times, therefore, he becomes enthusiastic concerning his skills and later on when he is in practice suggests extensive treatments which may ultimately fail. Such early failures can discourage him from making further progress in his practice of dentistry.
d. A dental student is seldom told whom he is going to treat or why he is going to treat that particular patient. He may not be trained in the concept that the teeth and the mouth of his dental clinic patient are integral parts of the total human being and thus he may not recognize that his treatment of the diseases of such parts plays a vital role in the life of his patient.

Unfortunately, the relatively impersonal clinical situation in which dental students are trained has helped to form the background for the traditional manner in which dentistry is practiced today. The dentist often offers his professional service to the patient in a 'cafeteria style', allowing the patient to select the materials and the forms of treatment he pleases, even though the patient has no training and little understanding on which to base his choice. By offering such choices to his patient, the dental practitioner does not enhance his image as a professional man.

From the foregoing, it can be concluded that comprehensive dental care is not being provided to the whole community due to lack of dental manpower, lack of emphasis in prevention, and the impersonal clinical situation in which the dental students are trained.
6.3 Pattern of Dental Health and Dental Disease

Health is not merely the absence of disease but a state of physical, social and mental well being. Oral health is an essential component of general health. Dental health is a more positive concept than the absence of disease as a result of dental treatment. It is the result of primary prevention and like general health ultimately is the complete balance and integration of the physical, mental and social components of state of "wellness".\textsuperscript{65,70,96,157,177,2}

The basic objective of the dental profession in all countries of the world is to make dental health care available to all the citizens who need and want it so that the total health of the individual and the nation are best served.\textsuperscript{127}

To accomplish the above objective, one should look in terms of need and demand of dental care by the community.

Conservative estimates based on examination findings on 6,672 persons, a probability sample representative of the entire United States civilian, non-institutional population 18-79 years of age, indicate the intensity with which dental disease strikes in the American population. At least, one in four adults had no natural teeth remaining in either one or both jaws. The 111 million adults represented by the sample had an average of 20.4 decayed, missing and filled teeth per person. Moreover, about three of every four persons with natural teeth remaining showed some evidence of gingivitis or destructive periodontal disease.
The accumulated effects of dental disease rose abruptly with age while only about 1 in every 100 persons 18-24 years was edentulous, by age 65-74 years nearly 1 in 2 had lost all of his teeth. The mean number of decayed, missing and filled teeth showed a twofold increase from the youngest to the oldest age groups, rising from a low of about 14 teeth to a high of about 29. The prevalence and severity of periodontal disease in persons with natural teeth and therefore still susceptible to the disease also increased sharply with age. At ages 75-79 years no fewer than 9 of every 10 persons showed evidence of periodontal disease and more than half had evidence of destructive disease.

More women than men had lost all their permanent teeth. The mean number of decayed, missing and filled teeth also was generally higher for women than for men of comparable age. Periodontal disease by contrast was less severe and less prevalent in women. Within most age groups, differences by sex were not large.

Substantial differences in dental status were found between White and Negro adults. White adults were twice as likely as Negro to have lost all their natural teeth either in one or both jaws. The average numbers of decayed, missing and filled teeth in Negroes was only about two-thirds of the number found in White persons, 14.5 and 21.5 teeth respectively. On the other hand, destructive periodontal disease was half again as prevalent among Negro as among White adults.  

In Australia, New South Wales Dental Services Committee report says "Most of the data available related
to the age group 0-21 years which constitutes a sizeable proportion of the total population, particularly those in need of restorative and preventive care. The numbers in the Surveys are sufficient to provide a representative sample for the reliable calculation of treatment needs. Analysis of the data indicates that there is a serious dental health problem and a high prevalence of dental disease together with inadequate treatment of those conditions. Only 30-40% of the restorative filling requirements for the permanent dentition are being met and less than 20% of the requirements of the deciduous dentition.  

Community Dental Health Survey in the Sydney Metropolitan Area in 1972 carried out by Department of Preventive Dentistry on a sample of 2,194 persons with an age distribution 4-75+ years shows -

a. Dental Caries

Dental caries prevalence (DMFT) by age was lower than anticipated from school surveys, the difference being in D.T. component. By the age of 20 years, there were 15 teeth affected by caries and by 40 years about 20 teeth.

b. Tooth Loss

Loss of teeth because of dental caries, periodontal disease and other reasons seem to be the basic outcome of dental care in Australia in the past.

c. Edentulousness

Some 15% of the total group were edentulous and 23% of those over 20 years were in this condition.

At all the schools examined in South Australia, it was found that the mean number of teeth which has been filled was far less than the number requiring treatment.  

.../88
Roder surveyed 2,026 Adelaide born children aged between 6 and 16 years. The average number of decayed teeth rose from 1.24 in the 6 year olds to 8.03 in the 14 year olds. The percentage of children with positive DMF scores rose from 56.8 in the 6 year old to 99.7 in the 16 year old child.\textsuperscript{131}

Less than one third of women attending Queen Victoria Maternity Hospital in Adelaide, South Australia receive regular dental care.\textsuperscript{50}

Duckworth et. al., have shown that dental caries is almost universal in the population in England and Wales, less than 2% of persons with teeth being free of the disease and by age of 50 years, well over half the population is edentulous.\textsuperscript{37}

The pattern of dental health and disease is not only related to dental caries for while this is low in Papua, New Guinea, in many areas periodontal disease is consistently high and while differences have been observed in prevalence in different areas, these differences do not alter significantly the treatment needs of the total community. Likewise, demand for care is low but if the experience of other countries is repeated in Papua, New Guinea, then change factors will produce a steady increase in caries prevalence and a greater demand for dental services.\textsuperscript{97}

The above surveys do throw some light to the need and demand of dental care but the present and future need and demand of dental care can be obtained by a national survey. A comprehensive national dental survey
complying with international standards should be undertaken in various countries. The available data is meagre and in many countries including some parts of the western world, national surveys have not been taken at all. National Dental Survey would greatly help in projecting the future manpower needs and give adequate information on dental health and disease in the respective countries. Also, it enables continuing evaluation of the state of oral health.

'The simplistic answer to the oral disease-oral health problem has too often been given as an increase in the number of dental graduates of the kind that are presently trained and educated and for too long, the emphasis has been on techniques of treatment and slavish commitment to the concept of "private practice" by the individual or single dentist as the almost sole and certainly the most desirable care delivery system.'

The real concern must be for the delivery system for dental health care and prevention because it is the system that provides the service where it is needed irrespective of their social, educational, economic or geographical situation.
7. RECRUITMENT AND SELECTION OF DENTAL STUDENTS

In recruiting we should appeal to feelings of motivation whether or not dormant and in selection we would like to check whether those feelings match our concept of requirements.

Recruitment is about manpower and manpower is an acutely scarce and vital resource: any knowledge of an important element of the total resource situation is therefore important and it seems clear that social science methodology has much to contribute in effecting a full understanding of recruitment of sufficient dental manpower.

The recruitment of students in emerging countries is of even greater importance as the first graduates will be the founders of the dental profession. On their calibre will depend the whole future of dentistry in administrative ability as well as dedication and devotion to the ideal of creating a national dental profession operating an effective dental care service which will be worthy of their country.¹⁸³

Factors which bear on the recruitment of a sufficient number of well qualified students are -

a. the professional and social status of dental practitioners in the country.
b. the economic factors related to dental practice.
c. the establishment of a continuing recruitment programme to interest well qualified young men and women in dentistry as a career.
d. the screening of prospective students by educational measurement techniques such as the aptitude test.
e. the availability of scholarship and loan funds for qualified students.$^{127}$

Experience in many countries has demonstrated that dentistry is a suitable career for women. When recruitment programmes are designed, all countries should give consideration to ways in which well-qualified women applicants may be attracted.$^{183}$

Also, demographic position of both the age structure and the sex-ratio is important for recruitment of suitable applicants. If the population in the recruitment age group is falling, then recruitment is inevitably not going to find it easy to produce enough recruits. Where the age of the recruitment is more flexible, the opportunities for solving recruitment problem may be greater. As the work patterns in industrialized and more particularly automated societies change, the opportunity for training those who have to change careers in the middle of their working life may well increase. The other demographic feature is the sex ratio in the profession. When a dental profession has a high proportion of female members, the recruitment and retention will be different from countries with a mainly male profession. For potential women entrants, the double career pattern before and after child rearing may be of considerable importance.

In some countries, recruitment may be facilitated or hampered by the net-flow of migration in and out.
Recruitment to the dental profession is likely to be affected detrimentally where attitudes to oral health is poor and not valued. In a profession such as dentistry, recruitment will be affected by the educational requirements for admission to its training system. If these requirements for admission are of such a level that few children are produced by the educational system with the requisite achievements, then recruitment will be limited. Thus, the nature of the dental schools' requirements and the structure and effectiveness of the educational system will be of importance. What is clear, however, in all countries, is that the qualifications required of the entrant must not be raised so high that recruitment will suffer from a lack of supply of suitably qualified entrants, nor set so low as to face unnecessary competition with other less highly skilled occupational groups. The conflict between standards and recruitment is a real one as also at a later stage is the conflict between providing sufficient service but perhaps of a second best standard and providing a first class but not widely available service. Thus, both quantity and quality of recruitment must be considered in manpower studies.

Training is tending to lengthen as the training becomes formalized, so the recruit is increasingly placed in a position of being unable to support himself and therefore dependent on state or familial support or on personal savings. The cost to the trainee is heavy and in many countries, a considerable bar to recruitment and subsequent training. Unless, the trainee is supported in some way during training and can look for higher lifetime incomes to compensate for his loss...
of earnings, he is unlikely in economic term at least, to contemplate training.

The location of training schools may also have some relevance for the recruitment and final deployment of dentists. There is evidence that in Britain, the existence of training school in a region stimulates recruitment to the training system.

So, the image, educational system, the qualification required and the demographic facts will all to differing degrees influence recruitment patterns in different countries.

With these factors in mind, programmes of recruitment are needed in some countries to attract a sufficient number of students to meet the manpower needs of dental education and to ensure, in every country that there is a flow of persons of high quality into the profession. The technological orientation of modern life means that there is an increasing competition for those with exceptional capabilities. The dental profession everywhere must be prepared to meet this development and to compete with the attractions of the other health professions and with the rewards of the physical and social sciences in its quest for students of the highest calibre.183

The dental profession and the dental schools must take the initiative in organizing programmes of recruitment which should include continuing efforts to advance the status of dentistry as a respected, recognized
and rewarding profession and to demonstrate the opportunity for a lifetime career of service to the public. A best possible image of the dentist must be created and presented to the potential applicants. Young people should be made aware of the careers other than practice which are available to dentists such as teaching, dental public health and other special fields. The assistance of vocational guidance and counselling personnel of secondary schools and colleges should be sought, when such persons are aware of the attractiveness of careers in dentistry, they will inform young people about the possible opportunities at the time when they are making the selection of their lifework. 183

Studies in the United States of America reveal that the practising dentist is perhaps the most effective person in recruitment efforts. For this reason, he must be completely informed about the needs and desires of dental schools for applicants and should participate in programmes of recruitment. To facilitate this, he must be continually supplied with suitable and attractive recruitment material designated by the organized profession in collaboration with publicity experts. 183,125

Many recruitment programmes are under way in the United States and involve the creation of many publications, leaflets, announcements and films which are designed to acquaint more parents and more sons and daughters that dentistry is a profession which deserves serious consideration from one who is about to select a career that will provide the graduate with an opportunity to be in business for himself and have an income that is
much higher than that which can be promised by most other careers. One cannot blame or criticize students for using the criteria of self employment and financial income in their consideration of future careers; but surely a health profession, such as dentistry does not want to have its own future and the welfare of the public placed in the hands of immature persons who have thought only of those two criteria when they chose dentistry. Both dentistry and medicine must choose carefully the men whom they want to represent them in every community; the men who will sit in their Houses of Delegates in their own professional associations and who will decide the policies and the philosophies of their professions. Dentistry and medicine both need 'statesmen' for the future planning and for the future programming of their professions. This responsibility cannot be left to 'immature young people' who think only of quick financial returns and an irresponsible life of leisure. 

But the dental student has been characterized by many investigators as conservative conforming, unconsciously aggressive, persistent methodical and somewhat rigid and inflexible and with motives of upward mobility and financial betterment. 

Thus, Moore notes that any campaign to enlist more applicants in the study of dentistry cannot ignore symbolic or even direct appeals to the possible applicants' desire for social status and occupation prestige for financial improvement and security for the chance to make creative use of manual talent and for the opportunity to give genuinely needed service to mankind. 

.../96
In selecting a potential dental student, the following qualities are essential.
a. an acceptable level of scholarship and a capacity for further intellectual development.
b. a practical bias in his interests and hobbies.
c. qualities of leadership, integrity and maturity of outlook to enable him to accept his future responsibilities as a professional man.
d. a satisfactory motive for wishing to enter the dental profession with some evidence of his likelihood of completing successfully the long and arduous education.
e. a level of physical and mental health.\textsuperscript{183,116}

The initial step in the selection of dental applicants may be the initial receipt of dental treatment by a young person. This young person likes the dental office, likes the kind of service that the dentist performs and likes the dentist as a person.\textsuperscript{116,183,153,125,171}

In addition to the formal educational requirements, the Council on Dental Education of the American Dental Association demands each applicant to complete successfully the Dental Aptitude Test. This exercise is a battery of tests designed to measure the applicant's ability to -
a. read scientific information with comprehension.
b. demonstrate manual dexterity.
c. reason with numbers, manipulate numerical relationships and deal intelligently with qualitative materials.
d. use and understand the meaning of words.
e. visualize the construction of two and three dimensional patterns.

.../97
f. demonstrate knowledge of elementary biology and chemistry.

This mode of selection, only emphasises the applicant's predental scholastic average and his grades in required courses as the requirements for a dental student. Series of studies have shown that the criteria used by the Committees on admission only predict the dental students' scholastic and clinical performance effectively. The Test does not measure the attributes and aptitudes of the applicant. During the past years, the dental profession has experienced a total reappraisal and redirection of its values. Dental practice has progressed to the consideration of the entire patient but the Test continues to measure the same criteria. The American Association of Dental Schools states officially, "to speak of dentistry as a single career is misleading."\textsuperscript{153, 89,67.}

Upshaw\textsuperscript{152} notes, "These Tests are all indirect or predictive criteria of the success that might be expected in the technical aspects of dental education and the skills and ability needed for a good practitioner. The problem has appeared today to develop indirect instruments that can predict, not merely the grades in courses as formerly, by the level of competence and concern for the non-technical aspects of the practice of dentistry. The attributes to be predicted now are those of the practitioner not the student."
Nedelsky\textsuperscript{112} reviewed the problem discussed at a workshop convened to study the dental curriculum of 1980. He found that today's requirements for entrance to schools of dentistry effectively prevent students from obtaining liberal education. The entering class must include, therefore, a number of students who put little value on a liberal education.

Most guidance counsellors of pre-professional students are biologists, chemists, physicists or at times college physicians. Rarely, are members of the behavioural and social sciences designated as professional counsellors. Few high school students think of the dentist as working with people, but rather as working with things. It would seem natural, once having made the decision to seek admission to a school of dentistry, that the student would attempt to excell in those particular subjects and satisfy those particular requirements considered most important by committees on admission.\textsuperscript{153,67}

In a study of 31 answers from consultants of the Commission on Dental Education of the F.D.I. to a questionnaire sent to them in 1970, supported the conclusion that a professional dentist needs,\textsuperscript{144,89} a. Intellect.

Intellect should be measurable quite well, either on the basis of results of school education or by specific tests. The capacity for wider intellectual development should possibly be further evaluated, especially in the field of understanding and original creative thinking.
The selection should aim at determining whether the
candidate is capable of becoming a dentist who is able
to appreciate, understand and base his treatment on
scientific evidence. The selection is not meant to be
a search for prospective scholars.


This is measurable either by exercises or by a Test.
A single test of dexterity, the production of a certain
piece of work is not valuable as an estimate of the
qualities of the candidate. Manual dexterity is above
all things a quality formed by training and derived from
psychomotor characteristics. This psychomotor quality
is a gift, an aptitude, which governs the co-ordination
of rhythm and movement. At present the perception motor
ability test seems to be promising.

c. Qualities of character.

It is difficult to obtain a definite opinion about
the qualities of character required.

In information for purposes of recruitment, qualities
of a good dentist should be supplied. Propaganda at the
schools should be based on better public relations and
especially the objective of caring for our fellow-man
should be passed. During dental education, the
awakened interest should be cultivated by the faculties.
From analyses in literature, it appears that more than
50% of the candidates have already made their choice of
dentistry as a profession before the age of 18 years.
So it is clear, that guidance about the dental profession
should start very early and not only in the senior classes.

.../100
Motivation of applicants is not adequately responded to in the course of education or probably in the profession itself. This is due to not having a clear picture of the final product of our education - a good dentist.

Many young people are able to change themselves and to learn habits, attitudes and behavioural patterns which are expected from them in professional surroundings. This means that the selection procedures should lead to a conclusion about the potential qualities of the applicant.

It was found by using California F Scale, more authoritarian students seemed to have poorer attitudes towards public health than non-authoritarian students. Thus, California F Scale may be profitably used for identifying socially conscious applicants to school of dentistry.89

An introductory course in general psychology should be added to the list of pre-dental courses required for admission to dental school. The need for such a course is documented by references to authorities by argument concerning the rapid changes in the profession and by the argument based on the need for such knowledge by a dentist in his everyday activities. A major task of such a course would be the extinguishing of the erroneous ideas. This course should be taken before the student enters dental school.74

It is apparent that the recruitment of personnel to the dental profession has to be properly planned
and effected if the right calibre of persons are to be in the profession. Peterson\textsuperscript{125} says, "The ability of the dental profession to meet the demands of the future - whatever they may be - depends upon a recruitment programme that will provide dentistry with highest quality of professional men." He goes on to say, "the choice and the selection of students to enter dental school has always been important and vital - but it has never been so important as it is today and tomorrow. Pushing a 'panic' button on the needs of the dental profession could well be pushing the 'destruction' button for the profession as well as destroying the high quality of dental service that we know the public must have and duly deserves."
8. OBJECTIVES OF DENTAL EDUCATION

Formal dental education everywhere should have certain objectives towards which the educational experiences of dental students should be directed. In general, the objectives should identify the knowledge, skill and attitudes that a dentist should have in order to engage effectively in practice. The objectives must be realistic in terms of the needs of the country and the main objective is undoubtedly to educate personnel to a suitable level of competence to meet these needs.\textsuperscript{183,127}

Thus, the real concern must be for the delivery system for dental health care and prevention because it is the system that provides the service where it is needed irrespective of their social, educational, economic or geographical situation.\textsuperscript{97,57,160,87,45,44,159} In this regard Chaves writes "the professions are born out of the needs and aspirations of society; a complete definition of the objectives of dental teaching must take into account both the interests of the profession and those of the society." (W.H.O. report 1968).

The Education Committee of General Dental Council in United Kingdom in its inquiry in Dental Education, proposed the following questions\textsuperscript{129}

a. What in your view, are the present objectives of dental education?

b. Are these objectives being achieved?

c. If not, are they, in the present circumstances capable of being achieved and how could this be done?

d. If the objectives are not capable of being achieved in present circumstances, what are the inhibiting factors and how could they be overcome?
e. Do you consider the present objectives of dental education to be the right objectives?

f. If not, what are the right objectives?

g. What change in dental education would need to be made to achieve the new objectives?

h. Could these changes be made within the present availability of resources?

i. To what extent are problems of dental recruitment likely to affect the present situation?

With these questions in the background, the stated objectives of any course of dental education must now be broader than they used to be; it is no longer sufficient to produce dentists who are proficient in the treatment skills and little else. 22 Walsh(1966) sees the ultimate objective of this new type of education as a profession which will produce leadership in planning, developing and participating in dental health programmes.

The objectives of dental education are the following:-

a. Undergraduate education should provide graduating dentists with a sound knowledge of health and disease and an understanding of social needs.

b. Team dentistry with a dentist accepting more responsibility in the social and medical aspects of patient care is required. Diagnosis, treatment planning and advanced clinical procedures will be major areas of activity in the education of the dentists.

c. Some basic biological sciences and the behavioural sciences need expansion and re-emphasis as part of dental care education.
d. Vocational training should provide a satisfactory degree of clinical skills but ideally competence in all areas is a matter of co-ordination.

e. To emphasize the social aspects of patient needs, development of teaching material in community and preventive dentistry requires additional consideration by dental schools.

f. The undergraduate educational programme should have flexibility and not cast students in a stereotyped pattern.

g. A knowledge which will allow the dentist to appraise research findings critically and apply them to his own practice.

h. A proper sense of professional ethics and conduct.

i. The acceptance of the dentists' responsibility to the community in which he lives and for providing leadership within it.\textsuperscript{183,127,59,111,140}

The aim should be to increase knowledge of\textsuperscript{146}

a. New teaching and examining methods in Medical or Dental Schools.

b. Current educational research being undertaken in the Medical or Dental Schools.

c. The methodology of educational research.

d. Curriculum developments in Medical or Dental Schools.

Burket\textsuperscript{20} writes, "Respect for and adherence to tradition have prevented the development of imaginative dental education programmes designed to meet the changing social needs. Dental education must develop and evaluate objectives in the light and meaning of the current social revolution. The fulfillment of these objectives will require major rethinking and modification of dental education programmes."
If the pattern of practice of dentistry is going to change materially, obviously the objectives of dental education should change accordingly as the objectives or goals of dental education are and must be related to the purposes of dentistry itself. An educational plan must be related to a treatment plan.¹⁶⁰
9. DENTAL CURRICULUM

The increasing need and demand for dental care and the anticipated shortage of dental manpower in the future, the dental curriculum has to change substantially so as to meet the community's needs.

Furthermore, the dental curriculum for different countries may have to be designed according to the available manpower, standard of school education, dental needs, demographic characteristics, political climate and available resources. Thus, in emerging countries, where there are immense problems in the reconstruction of these countries' essential needs, priority of dental services has to be considered against this background and dental curriculum has to conform to this environment.

In developed countries, problems are different and sophistication in the training of dental personnel may be needed.

Goldhaber in describing the dental educator's dilemma says, "Most dentists are over-educated for what they do and under-educated for what they ought to be doing," and goes on to say, "One finds utilized today a broad spectrum of clinical procedures, each requiring substantial skill but different degrees of education and knowledge.....Most so called general practitioners of today are actually specialists in restorative dentistry, since they tend to refer most, if not all, of their oral surgery, periodontics, paedodontics, endodontics and orthodontics. Until we find new and better ways to prevent oral disease, the immense backlog of restorative

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dentistry needs will continue to consume an inordinate proportion of professional time."  

Professor Frankel P. of Flinder's University, South Australia, says, "The two concepts which have dominated our thoughts at Flinders about the undergraduate curriculum so far are that it should be relevant to patient care and that it should take full account of the involvement of medicine in the community."  

Thus, in formulating a curriculum, all aspects of it have to be looked at. W.H.O. Report on Undergraduate Dental Curricula in Europe (1968) comments, "changes in curricula should not be made just for expedience but only after careful study."

Curriculum is merely an instrument by which objectives are attained. Curriculum construction - the selection and organization of the content and methods - is not merely a question of arranging courses and timetables. In constructing a curriculum, the teacher must take into consideration the objectives to be achieved, the philosophy of education, the philosophy of the institution and the social milieu in which the education is to occur. He should keep in mind the organizing principles on which the instruction will be built, the sequence in which instruction is to be offered, the role of instruction and the extent to which individual differences can be accommodated.  

Also, in establishing a curriculum, it should be noted that the curriculum be neither encyclopaedic nor
overspecialized. It should be sufficiently flexible to permit the introduction of new subjects and techniques and the reduction or deletion of sections that have become relatively unimportant.¹⁸²

So, the first step in developing a new programme is for the dean to delineate a programme philosophy and to state the broad educational goals which indicate the direction of the educational programme for the institution. It is essential that faculty and administration agree in their basic philosophies if the educational programme incorporating teaching innovations is to succeed.⁸²

The second step in curriculum development is for a representative group of dental faculty members - curriculum committee to formulate a document which states the general educational goals and the guidelines that will be used to govern the detailed development of the curriculum. Among topics that should be considered are methods of correlating biomedical sciences with clinical dentistry, community dentistry, behavioural sciences, dental auxiliary utilization into the clinical programme; methods of incorporating professional values; degree of flexibility and individualization of instruction, teaching methodologies to be encouraged; student requirements; proposed length of the dental programme and the basic structure or format of the curriculum.

It is important that the curriculum committee be representative of the faculty and the guideline document be approved by the entire faculty. The curriculum
committee serves the faculty by gathering and integrating information based on sound educational principles by suggesting instructional and evaluative strategies and by marshalling resources to help the faculty fulfill its responsibilities.

A 'Report'\textsuperscript{59} of the Working Group on Objectives of Curricula' was presented at the June 1971 meeting of the Federation Dentaire Internationale. The report was based on statements received from 39 dental schools in response to the following two questions:

What are the objectives of your undergraduate dental curriculum?
Describe any innovative changes that are being planned or instituted in order to better accomplish these objectives.

This study provided a list of 31 potential 'objectives' and 26 possible 'innovative changes'.

The findings of this preliminary study were used in a larger sample size and a multiple choice questionnaire was constructed and sent to larger group of schools.

The questionnaire consisted of two major sections. The first part dealt with curricular objectives and each respondent was asked to check whether each of the 31 curricular objectives was a "high", "moderate", or "low priority" for his school. The second part dealt with innovative changes and the respondent was requested to check his school's status as to 'currently exists'.
'under consideration' or 'neither' for each of the 26 innovative changes. One hundred and nine schools were sent questionnaires and replies were obtained from thirty seven.

Table 1 consists of list of 94 schools.

In order to establish a rank order for the 31 'objectives' the following scoring system was utilized.

- High Priority 2
- Moderate 1
- Low Priority 0

The maximum number of points that any 'objective' could possibly obtain would be equal to twice the number of schools responding to that question. The identical scoring system was used for responses to 'innovative changes' as follows:

- Currently Exists 2
- Under Consideration 1
- Neither 0

A rank order was established for the 'objectives' and the 'innovations' respectively starting with the highest per cent score. Where two or more questions received the identical per cent score, priority ranking as the final test was established on the basis of relative position on the list obtained from the preliminary study. Finally, since the two final lists were long and the range in per cent scores was large, the items on the list were arbitrarily grouped as follows:
<table>
<thead>
<tr>
<th>Group</th>
<th>% Scores Ranging From</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>90-99</td>
</tr>
<tr>
<td>Group II</td>
<td>80-89</td>
</tr>
<tr>
<td>Group III</td>
<td>70-79</td>
</tr>
<tr>
<td>Group IV</td>
<td>60-69</td>
</tr>
<tr>
<td>Group V</td>
<td>50-59</td>
</tr>
<tr>
<td>Group VI</td>
<td>40-49</td>
</tr>
<tr>
<td>Group VII</td>
<td>30-39</td>
</tr>
</tbody>
</table>
# TABLE II A

**DATA AND PERCENT SCORE FOR CURRICULAR OBJECTIVES**

<table>
<thead>
<tr>
<th>Number Responding</th>
<th>High Priority</th>
<th>Moderate Priority</th>
<th>Low Priority</th>
<th>Score in per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. to produce competent practitioners</td>
<td>94</td>
<td>88</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>2. to develop awareness of community problems and needs, and sense of professional and social responsibilities</td>
<td>94</td>
<td>68</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td>3. to develop a sound scientific basis for practice</td>
<td>94</td>
<td>84</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>4. to inculcate desire for continuing education</td>
<td>94</td>
<td>70</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>5. to be able to diagnose and treat diseases of oral cavity and related structures</td>
<td>94</td>
<td>84</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>6. to obtain experience in using all types of auxiliaries</td>
<td>93</td>
<td>47</td>
<td>26</td>
<td>20</td>
</tr>
<tr>
<td>7. to place emphasis on preventive dentistry</td>
<td>93</td>
<td>76</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>8. to provide the basic technical skills</td>
<td>94</td>
<td>78</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>9. to increase student awareness of and participation in research</td>
<td>94</td>
<td>20</td>
<td>52</td>
<td>22</td>
</tr>
<tr>
<td>10. to be able to provide comprehensive care</td>
<td>94</td>
<td>69</td>
<td>23</td>
<td>2</td>
</tr>
</tbody>
</table>

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# TABLE II B

**DATA AND PERCENT SCORE FOR CURRICULAR OBJECTIVES**

<table>
<thead>
<tr>
<th>Number Responding</th>
<th>High Priority</th>
<th>Moderate Priority</th>
<th>Low Priority</th>
<th>Score in per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. to develop necessary skills and understanding of dental bioengineering and technology</td>
<td>92</td>
<td>32</td>
<td>43</td>
<td>17</td>
</tr>
<tr>
<td>12. to foster attitude of critical inquiry</td>
<td>93</td>
<td>49</td>
<td>37</td>
<td>7</td>
</tr>
<tr>
<td>13. to point out career possibilities in dental research, dental education and dental public health</td>
<td>94</td>
<td>27</td>
<td>40</td>
<td>27</td>
</tr>
<tr>
<td>14. to develop a competent administrator able to manage an effective and efficient practice</td>
<td>94</td>
<td>27</td>
<td>37</td>
<td>30</td>
</tr>
<tr>
<td>15. to develop an effective teacher who educates and directs people towards excellent oral health</td>
<td>94</td>
<td>40</td>
<td>35</td>
<td>19</td>
</tr>
<tr>
<td>16. to develop leadership qualities in profession and community</td>
<td>94</td>
<td>29</td>
<td>40</td>
<td>25</td>
</tr>
<tr>
<td>17. to prepare students to be able to express themselves effectively orally and in writing on professional subjects, directed either to the public or profession</td>
<td>94</td>
<td>20</td>
<td>44</td>
<td>30</td>
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<tr>
<td>18. to teach student his limitation</td>
<td>91</td>
<td>34</td>
<td>39</td>
<td>18</td>
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<tr>
<td>19. to prepare students for specialty training or postdoctoral programs</td>
<td>92</td>
<td>10</td>
<td>49</td>
<td>33</td>
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<tr>
<td>20. to prepare each student for practice of the future</td>
<td>94</td>
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<td>34</td>
<td>5</td>
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<tr>
<td>Number Responding</td>
<td>High Priority</td>
<td>Moderate Priority</td>
<td>Low Priority</td>
<td>Score in per cent</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------------</td>
<td>-------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>21. to transmit knowledge in the field of general medicine indispensable for successful prevention and treatment of disease</td>
<td>93</td>
<td>54</td>
<td>35</td>
<td>4</td>
</tr>
<tr>
<td>22. to provide for flexibility in curriculum to incorporate new approaches</td>
<td>94</td>
<td>61</td>
<td>21</td>
<td>12</td>
</tr>
<tr>
<td>23. to provide for elective opportunity</td>
<td>91</td>
<td>41</td>
<td>29</td>
<td>21</td>
</tr>
<tr>
<td>24. to provide flexibility in curriculum permitting acceleration</td>
<td>92</td>
<td>35</td>
<td>29</td>
<td>28</td>
</tr>
<tr>
<td>25. to prepare student to work with all members of the health professions</td>
<td>94</td>
<td>42</td>
<td>37</td>
<td>15</td>
</tr>
<tr>
<td>26. to be able to provide dental care within a hospital or other environment outside office</td>
<td>94</td>
<td>33</td>
<td>45</td>
<td>16</td>
</tr>
<tr>
<td>27. to place emphasis on periodontal care</td>
<td>91</td>
<td>63</td>
<td>28</td>
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</tr>
<tr>
<td>28. to be able to analyze clinical performance of peers</td>
<td>93</td>
<td>16</td>
<td>39</td>
<td>38</td>
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<tr>
<td>29. to prepare students to be able to work effectively in committee, class or group organizations</td>
<td>93</td>
<td>18</td>
<td>45</td>
<td>30</td>
</tr>
<tr>
<td>30. to be able to utilize and assist his patients in employing the available systems for the delivery and financing of dental care</td>
<td>93</td>
<td>16</td>
<td>38</td>
<td>39</td>
</tr>
<tr>
<td>31. to provide unusual students the opportunity to pursue graduate programs concurrently</td>
<td>93</td>
<td>20</td>
<td>25</td>
<td>48</td>
</tr>
</tbody>
</table>
Discussion

Examination of Group I Priority curricular objectives, reveals that only the following four received a score in the range of 90 through 99%.

a. to produce competent practitioners.
b. to be able to diagnose and treat diseases of oral cavity and related structures.
c. to develop a sound scientific basis for practice.
d. to provide the basic technical skills.

It is surprising that more curricular objectives such as to place emphasis on preventive dentistry, to be able to provide comprehensive care, to inculcate desire for continuing education, to place emphasis on periodontal care and to develop awareness of community problems and needs and sense of professional and social responsibilities did not fall into the Group I Priority category.
<table>
<thead>
<tr>
<th></th>
<th>Number Responding</th>
<th>Currently Exists</th>
<th>Under Consideration</th>
<th>Neither</th>
<th>Score in per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. increased elective time to permit student to develop his area of interest</td>
<td>93</td>
<td>47</td>
<td>35</td>
<td>11</td>
<td>69</td>
</tr>
<tr>
<td>2. early introduction of students to clinical dentistry</td>
<td>93</td>
<td>60</td>
<td>25</td>
<td>8</td>
<td>78</td>
</tr>
<tr>
<td>3. expansion of student experience with auxiliaries</td>
<td>92</td>
<td>50</td>
<td>32</td>
<td>10</td>
<td>72</td>
</tr>
<tr>
<td>4. establishment of undergraduate hospital clerkships</td>
<td>92</td>
<td>38</td>
<td>28</td>
<td>26</td>
<td>57</td>
</tr>
<tr>
<td>5. each course must set specific, realistic goals without any specific time requirement</td>
<td>91</td>
<td>30</td>
<td>37</td>
<td>24</td>
<td>53</td>
</tr>
<tr>
<td>6. student training to take place in neighborhood health centers and in hospital and other community health service institutions and agencies as well as in the school or in private practice offices</td>
<td>93</td>
<td>53</td>
<td>32</td>
<td>8</td>
<td>74</td>
</tr>
<tr>
<td>7. greater use of audiovisual material and self-instructional media</td>
<td>92</td>
<td>54</td>
<td>33</td>
<td>5</td>
<td>77</td>
</tr>
<tr>
<td>8. programs to promote concept of comprehensive care</td>
<td>81</td>
<td>52</td>
<td>24</td>
<td>5</td>
<td>79</td>
</tr>
<tr>
<td>9. senior elective program with opportunities for delivering oral health care outside the dental school environment and in foreign countries</td>
<td>91</td>
<td>32</td>
<td>31</td>
<td>28</td>
<td>52</td>
</tr>
<tr>
<td>10. a community oriented course in Public Health Dentistry and Behavioral Science where students participate outside the school</td>
<td>92</td>
<td>51</td>
<td>25</td>
<td>16</td>
<td>70</td>
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### TABLE III B
DATA AND PERCENT SCORE FOR INNOVATIVE CHANGES

<table>
<thead>
<tr>
<th>Number Responding</th>
<th>Currently Exists</th>
<th>Under Consideration</th>
<th>Neither</th>
<th>Score in per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. emphasis on preventive dentistry</td>
<td>93</td>
<td>78</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>12. individualization of curriculum by pre-testing in first year to determine entering competencies in various disciplines</td>
<td>92</td>
<td>16</td>
<td>27</td>
<td>49</td>
</tr>
<tr>
<td>13. admit student to advanced standing if he already has specific courses or talents ordinarily required for the dental degree</td>
<td>92</td>
<td>33</td>
<td>22</td>
<td>37</td>
</tr>
<tr>
<td>14. opportunity for students to take the D.M.D. or Ph.D. program concurrently</td>
<td>90</td>
<td>22</td>
<td>14</td>
<td>54</td>
</tr>
<tr>
<td>15. teaching of student in simulated office environment</td>
<td>92</td>
<td>30</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>16. use of dental laboratory technician students to work along with undergraduate dental students</td>
<td>93</td>
<td>31</td>
<td>30</td>
<td>32</td>
</tr>
<tr>
<td>17. bring undergraduate students into frequent contact with graduate, postgraduate and continuing education students</td>
<td>90</td>
<td>37</td>
<td>20</td>
<td>33</td>
</tr>
<tr>
<td>18. involvement of students in dental research</td>
<td>92</td>
<td>58</td>
<td>21</td>
<td>13</td>
</tr>
<tr>
<td>19. participation of students in epidemiological surveys</td>
<td>93</td>
<td>47</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>20. develop an oro-facial rehabilitation center for the handicapped</td>
<td>92</td>
<td>33</td>
<td>25</td>
<td>34</td>
</tr>
</tbody>
</table>

### TABLE III C
DATA AND PERCENT SCORE FOR INNOVATIVE CHANGES

<table>
<thead>
<tr>
<th>Number Responding</th>
<th>Currently Exists</th>
<th>Under Consideration</th>
<th>Neither</th>
<th>Score in per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>21. establish bioclinical conferences similar to grand rounds</td>
<td>85</td>
<td>35</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>22. allocation of instructional time on basis of subject matter content instead of attempting to fit the conventional schedule</td>
<td>89</td>
<td>36</td>
<td>39</td>
<td>14</td>
</tr>
<tr>
<td>23. curriculum arranged in series of integrated instructional units, eliminating fragmented departmental courses</td>
<td>93</td>
<td>30</td>
<td>50</td>
<td>13</td>
</tr>
<tr>
<td>24. development of a completely interdisciplinary curriculum in Human Biology</td>
<td>91</td>
<td>12</td>
<td>44</td>
<td>35</td>
</tr>
<tr>
<td>25. development of 'Conjoint Sciences', bringing together basic science and clinical dentistry faculty in problem-oriented committee teaching</td>
<td>93</td>
<td>27</td>
<td>44</td>
<td>22</td>
</tr>
<tr>
<td>26. teaching of the basic sciences throughout the length of the curriculum</td>
<td>91</td>
<td>39</td>
<td>37</td>
<td>15</td>
</tr>
</tbody>
</table>
Preventive Dentistry stood alone as a Group I priority for innovative changes indicating that it will soon join the exclusive Group I category for curricular objectives.

It is of interest to look at the three curricular objectives that moved backward in rank ten or more places, namely:

to point out career possibilities in dental research, dental education and dental public health (Group V priority).
to increase student awareness of and participation in group research (Group VI priority).
to develop a competent administrator able to manage an effective and efficient practice (Group VI priority).

The curricular objectives that have moved forward in rank ten or more places are:
to place emphasis on peridontal care (Group II priority).
to prepare each student for practice of the future (Group III priority).
to transmit knowledge in the field of general medicine indispensable for successful prevention and treatment of oral disease (Group III priority).
to provide for flexibility in curriculum to incorporate new approaches (Group III priority).
to prepare students to work with all members of the health profession (Group IV priority).
With regard to innovative changes, emphasis on preventive dentistry is far ahead of all others. It stands above as a Group I priority. It is of interest to note in innovative changes which have a Group III priority:

Programmes to promote concept of comprehensive care.
Early introduction of students to clinical dentistry.
Greater use of audio-visual material and self instructional media.
Student training to take place in neighbourhood health centres and in hospital and other community health service agencies as well as in the school or in private practice offices.
Involvement of students in dental research.
Expansion of student experience with auxiliaries. A community oriented course in Public Health Dentistry and Behavioural Science where students participate outside school.
### TABLE IV

**OBJECTIVES — GROUP I PRIORITY**

<table>
<thead>
<tr>
<th>Final Rank</th>
<th>Preliminary Rank</th>
<th>Objective</th>
<th>Per cent Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>to produce competent practitioners</td>
<td>97</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>to be able to diagnose and treat diseases of oral cavity and related structures</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>to develop a sound scientific basis for practice</td>
<td>94</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>to provide the basic technical skills</td>
<td>91</td>
</tr>
</tbody>
</table>

### TABLE V

**OBJECTIVES — GROUP II PRIORITY**

<table>
<thead>
<tr>
<th>Final Rank</th>
<th>Preliminary Rank</th>
<th>Objective</th>
<th>Per cent Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>7</td>
<td>to place emphasis on preventive dentistry</td>
<td>89</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td>to be able to provide comprehensive care</td>
<td>86</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>to inculcate desire for continuing education</td>
<td>85</td>
</tr>
<tr>
<td>8</td>
<td>27</td>
<td>to place emphasis on periodontal care</td>
<td>85</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>to develop awareness of community problems and needs and sense of professional and social responsibilities</td>
<td>84</td>
</tr>
</tbody>
</table>

* = forward move in rank of ten or more places compared to preliminary study

### TABLE VI

**OBJECTIVES — GROUP III PRIORITY**

<table>
<thead>
<tr>
<th>Final Rank</th>
<th>Preliminary Rank</th>
<th>Objective</th>
<th>Per cent Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>20</td>
<td>to prepare each student for practice of the future</td>
<td>77</td>
</tr>
<tr>
<td>11</td>
<td>21</td>
<td>to transmit knowledge in the field of general medicine indispensable for successful prevention and treatment of oral disease</td>
<td>77</td>
</tr>
<tr>
<td>12</td>
<td>22</td>
<td>to provide for flexibility in curriculum to incorporate new approaches</td>
<td>76</td>
</tr>
<tr>
<td>13</td>
<td>12</td>
<td>to foster attitude of critical inquiry</td>
<td>73</td>
</tr>
</tbody>
</table>

* = forward move in rank of ten or more places compared to preliminary study
### TABLE VII  
OBJECTIVES — GROUP IV PRIORITY

<table>
<thead>
<tr>
<th>Final Rank</th>
<th>Preliminary Rank</th>
<th>Objective</th>
<th>Per cent Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>6</td>
<td>to obtain experience in using all types of auxiliaries</td>
<td>65</td>
</tr>
<tr>
<td>*15</td>
<td>25</td>
<td>to prepare student to work with all members of the health professions</td>
<td>64</td>
</tr>
<tr>
<td>16</td>
<td>15</td>
<td>to develop an effective teacher who educates and directs people towards excellent oral health</td>
<td>61</td>
</tr>
<tr>
<td>17</td>
<td>23</td>
<td>to provide for elective opportunity</td>
<td>61</td>
</tr>
<tr>
<td>18</td>
<td>26</td>
<td>to be able to provide dental care within a hospital or other environment outside office</td>
<td>60</td>
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</tbody>
</table>

* = forward move in rank of ten or more places compared to preliminary study

### TABLE VIII  
OBJECTIVES — GROUP V PRIORITY

<table>
<thead>
<tr>
<th>Final Rank</th>
<th>Preliminary Rank</th>
<th>Objective</th>
<th>Per cent Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>18</td>
<td>to teach student his limitation</td>
<td>59</td>
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<tr>
<td>20</td>
<td>11</td>
<td>to develop necessary skills and understanding of dental bioengineering and technology</td>
<td>58</td>
</tr>
<tr>
<td>21</td>
<td>24</td>
<td>to provide flexibility in curriculum permitting acceleration</td>
<td>54</td>
</tr>
<tr>
<td>22</td>
<td>16</td>
<td>to develop leadership qualities in profession and community</td>
<td>52</td>
</tr>
<tr>
<td>**23</td>
<td>13</td>
<td>to point out career possibilities in dental research, dental education and dental public health</td>
<td>50</td>
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</table>

** = backward move in rank of ten or more places compared to preliminary study

### TABLE IX  
OBJECTIVES — GROUP VI PRIORITY

<table>
<thead>
<tr>
<th>Final Rank</th>
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<th>Objective</th>
<th>Per cent Score</th>
</tr>
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<tbody>
<tr>
<td>**24</td>
<td>9</td>
<td>to increase student awareness of and participation in research</td>
<td>49</td>
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<tr>
<td>25</td>
<td>17</td>
<td>to prepare students to be able to express themselves effectively orally and in writing on professional subjects, directed either to the public or profession</td>
<td>47</td>
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<tr>
<td>**26</td>
<td>14</td>
<td>to develop a competent administrator able to manage an effective and efficient practice</td>
<td>48</td>
</tr>
<tr>
<td>27</td>
<td>29</td>
<td>to prepare students to be able to work effectively in committee, class or group organizations</td>
<td>44</td>
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</tbody>
</table>

* = backward move in rank of ten or more places as compared to preliminary study
### TABLE X
OBJECTIVES — GROUP VII PRIORITY

<table>
<thead>
<tr>
<th>Final Rank</th>
<th>Preliminary Rank</th>
<th>Objective</th>
<th>Per cent Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>19</td>
<td>to prepare students for specialty training or post-doctoral programs</td>
<td>38</td>
</tr>
<tr>
<td>29</td>
<td>28</td>
<td>to be able to analyze clinical performance of peers</td>
<td>38</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td>to be able to utilize and assist his patients in employing the available</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>systems for the delivery and financing of dental care</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>31</td>
<td>to provide unusual students the opportunity to pursue graduate programs</td>
<td>35</td>
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<tr>
<td></td>
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<td>concurrently</td>
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### TABLE XI
INNOVATIVE CHANGES — GROUP I PRIORITY

<table>
<thead>
<tr>
<th>Final Rank</th>
<th>Preliminary Rank</th>
<th>Innovation</th>
<th>Per cent Score</th>
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</thead>
<tbody>
<tr>
<td>*1</td>
<td>11</td>
<td>emphasis on preventive dentistry</td>
<td>92</td>
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</table>

* forward move in rank of ten or more places compared to preliminary study

### TABLE XII
INNOVATIVE CHANGES — GROUP III PRIORITY

<table>
<thead>
<tr>
<th>Final Rank</th>
<th>Preliminary Rank</th>
<th>Innovation</th>
<th>Per cent Score</th>
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</thead>
<tbody>
<tr>
<td>2</td>
<td>8</td>
<td>programs to promote concept of comprehensive care early introduction of</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>students to clinical dentistry</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>greater use of audiovisual material and self-instructional media</td>
<td>78</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>student training to take place in neighborhood health centers and in</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td></td>
<td>hospital and other community health service institutions and agencies as</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>well as in the school or in private practice offices</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>involvement of students in dental research</td>
<td>74</td>
</tr>
<tr>
<td>*6</td>
<td>18</td>
<td>expansion of student experience with auxiliaries</td>
<td>74</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>a community oriented course in Public Health Dentistry and Behavioral</td>
<td>72</td>
</tr>
<tr>
<td>8</td>
<td>10</td>
<td>Science where students participate outside the school</td>
<td>70</td>
</tr>
</tbody>
</table>

* forward move in rank of ten or more places compared to preliminary study
### TABLE XIII
INNOVATIVE CHANGES — GROUP IV PRIORITY

<table>
<thead>
<tr>
<th>Final Rank</th>
<th>Preliminary Rank</th>
<th>Innovation</th>
<th>Per cent Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>1</td>
<td>increased elective time to permit student to develop his area of interest</td>
<td>69</td>
</tr>
<tr>
<td>*10</td>
<td>26</td>
<td>teaching of the basic sciences throughout the length of the curriculum</td>
<td>63</td>
</tr>
<tr>
<td>*11</td>
<td>22</td>
<td>allocation of instructional time on basis of subject matter content instead of attempting to fit the conventional schedule</td>
<td>62</td>
</tr>
<tr>
<td>12</td>
<td>19</td>
<td>participation of students in epidemiological surveys</td>
<td>61</td>
</tr>
</tbody>
</table>

* Forward move in rank of ten or more places compared to preliminary study

### TABLE XIV
INNOVATIVE CHANGES — GROUP V PRIORITY

<table>
<thead>
<tr>
<th>Final Rank</th>
<th>Preliminary Rank</th>
<th>Innovation</th>
<th>Per cent Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>*13</td>
<td>23</td>
<td>curriculum arranged in series of integrated instructional units, eliminating fragmented departmental courses</td>
<td>59</td>
</tr>
<tr>
<td>**14</td>
<td>4</td>
<td>establishment of undergraduate hospital clerkships</td>
<td>57</td>
</tr>
<tr>
<td>15</td>
<td>21</td>
<td>establish bioclinical conferences similar to grand rounds</td>
<td>55</td>
</tr>
<tr>
<td>**16</td>
<td>5</td>
<td>each course must set specific, realistic goals without any specific time requirement</td>
<td>53</td>
</tr>
<tr>
<td>17</td>
<td>25</td>
<td>development of 'Conjoint Sciences', bringing together basic science and clinical dentistry faculty in problem-oriented committee teaching</td>
<td>53</td>
</tr>
<tr>
<td>18</td>
<td>9</td>
<td>senior elective program with opportunities for delivering oral health care outside the dental school environment and in foreign countries</td>
<td>52</td>
</tr>
<tr>
<td>19</td>
<td>17</td>
<td>bring undergraduate students into frequent contact with graduate, postgraduate and continuing education students</td>
<td>52</td>
</tr>
<tr>
<td>20</td>
<td>16</td>
<td>use of dental laboratory technician students to work along with undergraduate dental students</td>
<td>50</td>
</tr>
<tr>
<td>21</td>
<td>20</td>
<td>develop an oro-facial rehabilitation center for the handicapped</td>
<td>50</td>
</tr>
</tbody>
</table>

* Forward move in rank of ten or more places compared to preliminary study

backward move in rank of ten or more places compared to preliminary study
### TABLE XV

#### INNOVATIVE CHANGES — GROUP VI PRIORITY

<table>
<thead>
<tr>
<th>Final Rank</th>
<th>Preliminary Rank</th>
<th>Innovation</th>
<th>Per cent Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>15</td>
<td>teaching of student in simulated office environment</td>
<td></td>
</tr>
<tr>
<td>**23</td>
<td>13</td>
<td>admit student to advanced standing if he already has specific courses or talents ordinarily required for the dental degree</td>
<td></td>
</tr>
</tbody>
</table>

** backward move in rank of ten or more places compared to preliminary study

### TABLE XVI

#### INNOVATIVE CHANGES — GROUP VII PRIORITY

<table>
<thead>
<tr>
<th>Final Rank</th>
<th>Preliminary Rank</th>
<th>Innovation</th>
<th>Per cent Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>**24</td>
<td>12</td>
<td>individualization of curriculum by pretesting in first year to determine entering competencies in various disciplines</td>
<td>32</td>
</tr>
<tr>
<td>**25</td>
<td>14</td>
<td>opportunity for students to take the D.M.D.-Ph.D. program concurrently development of a completely interdisciplinary curri-culum in Human Biology</td>
<td>32</td>
</tr>
</tbody>
</table>

** backward move in rank of ten or more places compared to preliminary study
Despite these divergent goals, there seem to be a number of primary curricular objectives common to most schools throughout the world.

These objectives and innovations which are less popular today will become the essence in dental education in the next two decades.

Independence of departments always leads to overlaps in teaching and often brings in controversies which the student is unfit to recognize. The student who has come to study dentistry may in some schools have to wait for 2 years before he properly encounters his chosen subject. Restoration is almost always introduced before prevention. In new curricula, early introduction of student to the patient is essential.

The dental training does not equip those students who intend to go into general practice after graduation. The discrepancy between the teaching in dental schools and the situation which exists in general practice is present in varying degrees everywhere. The student is not given much idea about his future situation and function in society, as an individual and as a member of a profession. To possess the above qualities, the student should be taught subjects like sociology, psychology, public health and welfare, ethics, epidemiology, statistics. To deal adequately with the practice situation in a more practical way, subjects like practice administration, economics, ergonomics, jurisprudence should be taught.
If the student is not trained in the above subjects and not introduced early in the clinical training he often graduates with a negative attitude to dentistry even though he applied for course with positive interest.

Those students who aim to become a school dentist, need not go through a full theoretical, laboratory, phantom and clinical course in prosthetics and vice-versa.

English says, 'Basic science such as biochemistry and an appreciation of research are essential to the understanding of mechanism of disease. The foundation of preventive dentistry is to understand the basic science which explains the cause of the disease and to be familiar with the research work which proves that the disease can be prevented.' He goes on to say, 'In situations where ancillary personnel are available and dentist works as a team, then the dentist role will necessitate his having more comprehensive training as well as greater depth of understanding of both disease and prevention of disease. In this situation, the dentist will have a major role in diagnosis, treatment of difficult cases, supervision of ancillary personnel, instruction of those he supervises and a need to communicate with other health professionals.'

The teaching of clinical dentistry is still largely achieved through departmentalization and students gain clinical experience often by the execution of items of treatment rather than through the provision of overall care for patients. It is clearly much in the interest of dental education that within dental schools comprehensive care for patients be provided through
the work of teams in which from the outset of his clinical training, the dental student has a role appropriate to his training requirements and his experience.

It is therefore desirable that clinical dentistry should be learned within teams made up of people training for different roles, designed to prevent and eliminate dental disease on both a personal and a community scale. Those undergoing training in the clinical practice of dentistry, the dental students, should be trainee team leaders learning to recognize and manage the problems of all members of the team some of whom might well be junior as well as ancillaries.37

The practitioner should be trained in such a way that he will be intellectually open-minded and will be able to learn and to understand. The methods should be re-examined so that fundamental, technical, clinical and practical knowledge will be integrated to form a logical, dynamic whole. The future practitioner must understand that all the elements of dental science are interdependent and that the whole system must adapt itself to every disease change. Thus teaching cannot be static but must be modified because science and techniques as well as the health laws affecting the population all evolve.166,44,155

The dental curriculum while requiring a large element of dogma probably best presented by full-time teachers must also be supplemented by instruction and training by practitioners familiar with the circumstances of general or specialized practice and preferably demonstrating their skills in circumstances less impersonal than those found on the floors of dental hospitals and more in line with those available to the community at large. Progress in
the field of ergonomics, rationalization, work simplification, working patterns, sit down dentistry is making dentistry less arduous and less hazardous for the dentist and more acceptable for the patient. 156

The dentists of the future must be able to concentrate his sophisticated skills in selected parts of dental practice instead of the routine procedure of restorations of teeth. His training should be oriented so that he could work as a team. The faculty of the Harvard School of Dental Medicine 60 has considered the changes necessary in the Dental Curriculum during the past few years and have concluded the following:

A. The existing curriculum would not adequately prepare our students to be effective professionals in the year 2000.

B. Although our dental students spent their first two years in the same basic science courses with the medical students in an attempt to integrate their professional education with that of their medical student colleagues as part of the total health care picture, the results were not as satisfactory as anticipated for the following reasons.

(a) The mass of basic science material presented to the students seemed to concentrate on details, while fundamental concepts often remained unfocused.

(b) The lack of relevance of this basic science material to oral biology and pathophysiology was occasionally discouraging to the dental student.

(c) The amount of time devoted to the basic sciences (50% of the curriculum) automatically limited the amount of time available for significant experimentation with other aspects of the dental curriculum in the remainder of the four year program.
D. The clinical years concentrated primarily on the development of technical skills in restorative dentistry with too little time spent on the other vital aspects of practice such as preventive dentistry, diagnosis and treatment planning.

E. The clinical years failed to continue the preparation of the student for interaction with his medical colleagues in a hospital medical center, or neighborhood health center.

F. During the clinical years the dental student received too little experience in the diagnosis and management of ill patients, causing him to forget much of what he learned during the first two years, and leading to estrangement from the concept of total health care.

G. During the clinical years the student, for the most part, remained isolated in the dental school clinic. He had relatively little contact with the broad spectrum of social, economic, and health problems which he could have observed and learned to manage at the various Harvard-affiliated hospitals and community clinics.

H. The curriculum made no provision in the schedule for the students' knowledge at the time of admission to the school, or for significant development of the different interests and talents of each of them, thereby forcing every student to move along in "lock-step". The complete lack of "free" time and "elective" time discouraged the scholarly pursuit of knowledge or "in-depth" study in a particular area of interest.

I. No way existed for our students to shorten their post-graduate studies if they elected to continue at Harvard and enroll in a postdoctoral program.
J. The pattern of dental education throughout the nation was not as exciting or challenging as it could be to many bright college students who might otherwise consider dentistry as a career.

K. Because new graduates of dental schools set the pattern and standards for dental practice twenty-five years later, it was considered essential that changes in our curriculum be initiated as soon as feasible if Harvard was to continue to contribute to the progress of dental education and the delivery of oral health care.

L. Harvard's entering class size of sixteen was too small to provide enough graduates to make a significant impact on the dental profession, be it in clinical practice, academic careers, or research.

M. Unless Harvard initiated innovative educational programs, there was serious question whether the undergraduate program at the dental school would be or should be continued.

The above conclusions arrived at by Harvard School of Dental Medicine are equally applicable to all the dental schools envisaging changes in the dental curriculum.

As a result, a new curriculum was proposed at Harvard which had the following components:

a. An eleven month Dental School Basic Science Care.
b. A five month Medical and Surgery Clerkship.
c. An eleven month Clinical Dentistry.
d. An Oral Biology and Pathophysiology Correlating Course to run concurrently with both the Basic Science and the Clinical Cares.
e. A six month Hospital Dental Externship.
f. A fourth year made up of completely elective time.
The Harvard Dental Faculty initiated a clinical care for 11 months. The aim of the 'core' is to teach the fundamentals in the clinical disciplines and to provide the student with sufficient experience in the care of the patients so that he can work effectively in a hospital or community clinic during his dental externship period. Half the time of the clinical care will be spent on restorative dentistry and the remaining time will be devoted to oral medicine, oral histopathology, oral diagnosis, roentgenology, periodontics, endodontics, orthodontics, pedodontics, oral surgery, and ecological dentistry. This enables the reduction in the amount of time devoted to restorative dentistry.

Harvard's plan for integrating oral health care with total health care, teaching of clinical dentistry outside the school's dental clinic utilizing the dental facilities of hospitals and clinics. Every effort will be made to integrate the student with the hospital environment by having him attend medical and surgical rounds, clinical pathological conferences and consultation sessions with various medical and social services. The student should have mastered the fundamentals of clinical dentistry and become familiar with hospital procedures, including the role of the dentist as a member of the health team.

In the fourth year, the elective year, the student will have the opportunity to capitalize upon his experiences and scholarly initiative and develop the special interests that will enable him to make optimal progress towards the attainment of his professional goals in dentistry.
Two features seem to be prominent in the new course at the Harvard School of Dental Medicine. First, the student is receiving experience in clinical dentistry in departments outside the Faculty which exposes him to fresh approaches and opinions and to the hospital environment. This keeps him in contact with his medical colleagues. Second, the elective year, the student can capitalize on his experience and initiative to make optimal progress toward attainment of his professional goal.

**Flexible Curriculum**

Flexible curriculum is an educational programme that permits variation in the rate at which students complete a basic prescribed course of study and provides the individual with freedom of choice in advanced aspects of training. There is a basic programme of study that all students are required to complete.¹⁵,¹³⁶

The advantage of the flexible curriculum is that individual differences among students are acknowledged. It is based on an awareness that students and dental social sciences - and all those aspects of dental education would be correlated during each year of the programme.¹⁵,¹³⁶,¹⁸³,¹¹⁶

In addition to the 'core' programme in flexible curriculum, changes in traditional teaching methods used in dental education have to take place because (a) Altered character of the knowledge to be communicated to the student.

Fantastic rate of increase of scientific knowledge will influence our future educational programme. The health literature doubles every five years and two
million technical articles are published each year. Textbooks are out of date within five years. It is impossible to teach the student everything about his profession during his dental training period. Flexible curriculum will enable the student to continue and supplement his education throughout his professional lifetime.

(b) Altered character of the student to whom the knowledge is to be communicated. Primary and secondary school system has vastly improved and thus a better student is produced than the student of only a few short years ago. His educational background is broader and deeper than that experienced by his predecessors. He is idealistic, outspoken, critical, and comes demanding the better dental education he rightfully deserves.

(c) Altered environment in which the communication will occur. In the past, educating a dentist involves meeting the requirements established by the profession for the profession. Now, educating a dentist is to prepare him to meet the health requirements of the people.

Elective courses are provided in flexible curriculum and this provides for variation in the advanced portion of the training programmes. The student is permitted a choice of electives once he has identified areas of interest. Special programmes are planned for students who desire in depth training in particular disciplines. In addition, special programmes could be developed for students like
an extended experience in the care and treatment of handicapped children. 15, 136, 183, 116

In elective courses, senior students might be used as teachers. Hunt and Massler believe that senior students could lecture juniors and conduct courses if possible. They cite research which has shown that students as teachers can get through to average students and perhaps with less trauma than when a demanding, even punitive professor forces the pace. There is a more personal understanding which is welcomed and questions are asked with less embarrassment. 73

Pascall 123 supports this concept and says 'Useful exercise in an elective year and a challenging role for a budding teacher.'

Basically a curriculum could be devised which would be built around a 'core' course and science, teaching extended upwards into clinical area and clinical teaching extended downwards into the science area. 162

The notion of a 'core' course is interwoven into a statement of aims. The general aims are:

a. course to be liberalised by providing option in the entry requirements by giving the whole course a sociological context and by providing for a range -pace of learning and a range of interests in fifth year.

b. students to have contact with people from the start, to be quickly translated to clinical responsibility.

c. more use of internal assessing to relieve the pressure of end of year examination.
d. weekly timetable hours for students to be reduced.

The particular aims are:

a. to complete the core course of clinical teaching by the end of the fourth year. Qualitative experience to be gained in fifth year.

b. faster students to include an optional subject in their fifth year studies. Slower students to complete the core programme in fifth year.

c. all fifth year students to gain some experience in a 'general practice unit.'

d. sociological studies to be introduced in each year of the course.

The compression of subjects required in a core course is attended by a corresponding end-of-year congestion of examinations. To overcome this, some examinations could be moved to mid-year thereby reducing the number to be sat at any one time. Internal assessment counted not less than 30% and not more than 50% of the total mark in a professional examination. By this, the weight of the examinations may be reduced. The Final Professional Examination is to be taken in one subject of General Dentistry and to be in the form of clinical-orals, no written papers necessary. 162,116

**Individualized Instruction**

The curriculum which incorporates individualized instruction has several fundamental characteristics or attributes.

a. There is more learning and less teaching. Students learn to become independent learners.

b. Process is stressed and content is de-emphasized.
   Mastery of the body of knowledge is not a goal; rather
the manipulation of knowledge through its evaluation and application is the goal.

c. All students do not learn the same facts or techniques but all of them learn the elements of independent judgement.

d. Graduation is based on a demonstrated ability to learn and the attainment of sufficient competence to launch a career and to continue learning thereafter irrespective of the time spent in class or clinic.

The key to the successful implementation of an individualized curriculum can be found in two words: independence and flexibility. The student becomes an independent learner because the programme is flexible enough for him to do so.

In patient care, the instruction goal is to teach the student to make independent judgements as a matter of habit in any of the framework of a clinical setting. Realization of this goal is facilitated, by two conditions.

a. the instructor's recognition that his primary function is to instill judgements. The instructor evaluates judgements made by students and not make judgements for them.

b. a flexible individualized clinical practice with many types of patients in a variety of settings.

In these settings the student
(a) begins to care for patients early in the curriculum when he is prepared, irrespective of the readiness of other students and not a fixed point in the curriculum.
(b) progresses and eventually functions independently on the basis of sufficient judgements and technical
ability and not on the basis of the number of procedures that he has performed.

(c) is exposed to more than a token variety of patients from all socio-economic and ethnic groups.

(d) renders care in addition to dental school clinics, in hospitals, state and federal institutions, ghetto clinics and if possible in the offices of practitioners.

A 'Career-Ladder' for Educating Dental Personnel

Many of the emerging countries have no formal dental courses and must rely upon the services of foreign dentists and limited number of their own nationals. Governments cannot expect to provide a comprehensive dental service under these conditions. Lack of dental manpower can be solved to some degree by providing a course of dental training at a sub-professional level as an interim measure. Courses should be designed with a view to meeting only the most urgent needs and provision should be made for the upgrading of the personnel so trained when eventually a dental school at University level is established. Dental courses in these circumstances should be of two or three years' duration and need not be complex in structure nor as deep in subject range and content as the full University course. 183

Harris suggests a programme for training and utilizing manpower that is applicable at once for developing nations in which the economic base and the professional manpower are limited. It applies equally to national oral health programmes where total care for total populations is the objective. It will be particularly appropriate for national programmes in which care for the children is the main focus. Harris' programme is the
adoption of a 'field-ladder' for careers in dental practice with planned flexibility in the vertical and lateral advancement of personnel. It could man a maximum programme of prevention and treatment for the two basic oral diseases. Such a career-field, coupled with on-the-job training interspersed with periodic academic programmes could provide the means by which the continued advancement of an individual might be based on thoroughly demonstrated aptitudes and attitudes.

In order to establish a career-ladder, one soon finds the necessity to define clearly the terminal behaviour expected of personnel achieving each level of skill for the ladder. The dental profession already has a number of members on its health team, each with clearly definable requirements of performance. Starting at the least level of training, one now finds the Preventive Dentistry Aide, the Dental Assistant and the Preventive Dentistry Technician. Then in an ascending order of training, he finds the dental therapist, the Dental Hygienist, the Dental Health Educator, the Dentist and finally the various Board-Certified Specialists.¹⁰⁹,⁶⁵

In dentistry, many educators and teachers believe that schools will soon adopt a three year curriculum and accomplish their purpose by eliminating summer vacations and operating eleven months per year. Such action may be a method of meeting manpower problems in their own countries.⁹⁶

Carnegie Commission on Higher Education²⁴ recommends the revision of the curriculum so that all members of the class will complete the programme in three years.
Mann believes that in United States, virtually every
dental and medical school will shortly be organized in a
manner that will permit the better students to graduate
in less than four years and many will operate on a basic
three year curriculum within 3 to 5 years.\textsuperscript{96}

Alfred, et al., believes that the pattern of education
and training should be designed to make the dentist
 capable of providing against a background of medical care,
a complete oral health service equivalent to that provided
by his colleagues in other specialists of medicine. Thus,
the risk of dentistry becoming a technological service
isolated from medicine with the possible consequent decline
in the standard of patient care could be avoided.
Possibility of incorporating dental education and training
into any further system of medical education should be
examined. However, it is essential for the dental
profession itself to continue to develop. Alfred, et al.,
believe that future dentists should receive the same
expanded basic education as the future medical practitioners
with the option of limited study in dentally oriented
subjects, graduating after five years with degrees in
medical sciences and medicine.\textsuperscript{2,37}

The new and proposed medical schools in Australia have
adopted significantly different curricula and the
Universities of Sydney, Brisbane, Adelaide, New South
Wales are undertaking major revision. It appears that
the following changes will occur.\textsuperscript{7,183,116}
(a) Reduction of the curriculum to five years.
(b) Integration of some areas of basic and clinical science.
(c) Earlier student-patient contact.
(d) More emphasis in behavioural science.
(e) Integration of undergraduate and graduate training.
(f) Increased patient care responsibility.
(g) Training for community practice.
(h) 'Core' plus elective programmes with flexibility.
(i) Decrease in time for some subjects.
(j) Emphasis in individual learning.
(k) Changes in teaching methods and examinations.

If one looks for strikingly new and original steps forward, it is the verticalisation of the course and the breakdown of interdepartmental barriers, the elective course in the emphasis on preventive dentistry and the interest in public health and community dentistry which stand out.

In conclusion it is relevant to recall the views of Cowan on dental curriculum. He says, 'Let there be universally acceptable minimum standards on which gradual and constant improvement can be built; but let us avoid universal standardization of courses for in that self-satisfied attitude lies the end of progress. Dentists throughout the world, whatever their training are bound by a common desire to prevent and treat disease of the oral cavity. The patient who starts treatment in one corner of the world can in this jet age have it smoothly contained or completed in almost any other corner and this simple fact summarises the theme of shared knowledge.

It appears abundantly clear that important changes are taking place in the dental curricula and it is pertinent here to discuss in some detail the Social and Behavioural Sciences, Community Dentistry, Teaching Methodology, Continuing Education and Organization as these are important components of dental education.
10. DENTAL AUXILIARIES

When the dental needs and dental manpower requirements are studied, it is very apparent that training of more dentists alone will not bridge the gap between the needs and manpower.

The development of a vast scale of the use of auxiliary personnel has led to a greater productivity and has meant that one dentist may now tender the needs of increased numbers of patients and their increased use in appropriate situations can lead to a reduction in the demand on recruiters for highly trained staff, can increase the output of service provided and also in the right circumstances lead to an improvement in the quality of service provided. These are the most logical and economical methods of providing for a nation's needs. 171

Thus, for an efficient and productive practice of dentistry, dental auxiliaries are an important adjunct to the manpower requirements.

The undergraduate dental student must be taught the functions and training of dental auxiliaries, the team concept and the organization and management of dental personnel as the future dentist will be working in a situation where he will be the leader and provider of guidance to the dental team. 140, 42, 129, 125, 39, 170, 110, 2, 109, 15, 119, 67, 32, 160, 127, 96, 5.

The dental hygienists and dental therapists can be aided by dental auxiliaries and this would greatly
contribute to the effectiveness and delivery of dental care.

The need for flexibility in the roles of the dental team must be clearly defined for the expanded utilization of dental auxiliaries. \textsuperscript{182,124}

The Australian Dental Association National Policies on principles relating to auxiliary personnel states:--
(a) Auxiliary personnel are complimentary to and not a substitute for the dentist.
(b) Auxiliary personnel should be officially recognized and their range of activities defined.
(c) Auxiliary personnel should receive appropriate status and condition.
(d) Direction and supervision of auxiliary personnel should be by dentists.
(e) The dentists shall be responsible for all the activities carried out by auxiliary personnel under his direction and/or supervision.
(f) Legal control of all dental auxiliary personnel should be vested with Dental Boards.\textsuperscript{5}

The roles of the dental auxiliaries vary according to the types of duties assigned and adequate training given to the auxiliary on such duties.
10.1 **Role** of the Auxiliary in Four-Handed Dentistry

Expanded duty dentistry is an outgrowth of four-handed dentistry and hence the auxiliary must understand techniques of four-handed dentistry before she can become an expanded duty auxiliary.

Four-handed dentistry is a dental care delivery system involving improved auxiliary utilization and it is multifaceted. It can be divided into four distinct parts and for maximum effectiveness all four parts should be fully implemented.

The four sections are as follows:

- Equipment
- Tray delivery system
- Positioning of patient, dentist and auxiliary positioning
- High velocity oral evacuation and instrument transfer techniques

The auxiliary who can intelligently assist the dentist in selecting equipment for the office will be of increased value to him. By using present sterilizable trays and instruments, the dental auxiliary is prepared to function in any restorative procedure. Each present tray contains the instruments necessary for each specific procedure. All trays may be colour coded for specific procedures. Accessory instruments and spare equipment can be placed in the mobile cabinet.
10.2 Role of the Auxiliary in Oral Medicine

Dental Medicine as an important component in the service profession, often plays a key role in the preliminary evaluation of symptoms indicative of early general disease. This is because many patients may visit the family dentist on a regular basis but may visit the family physician only when acutely ill. It is therefore important for the dental team to be able to detect these early patterns of disease. Also, local or general complications may arise as a result of medical and surgical procedures and the dental team must be familiar with the treatment guidelines to deal with each patient with medical illness.

The dental auxiliary plays a key role in detection of systemic disease and the precautions to be taken in dealing with patients with medical illnesses. The following are the functions of Auxiliary in Oral Medicine.

Auxiliary plays key role in detection of systemic disease by history-taking.

Dental chart maintained by auxiliary
(a) Ongoing record of patients' overall dental programmes and records.
(b) Abstract of patients' overall health status.
(c) Information source for both physician and dentist auxiliary team.

Medical history questionnaire maintained by auxiliary.
(a) Record of all signs and symptoms of patient.
(b) Record of diseases of special significance to dentist auxiliary team.

High Blood Pressure
Congenital or rhematic heart disease
Diabetes Mellitus

.../144
Drug Allergy
Epilepsy
Hepatitis
Abnormalities of bleeding or clotting
Unfavourable reaction to medication

(c) History of any of above conditions alerts dentist-auxiliary team to need of consultation with physician and modifications in dental treatment.
10.3 **Role of the Auxiliary in Preventive and Operative Dentistry**

The preventive auxiliary primarily works directly with the patient and her role is basic to the long term success of a preventive practice.

Dr. R. Barkley explains that six out of seven patients cannot learn skills of plaque removal and prevention of plaque, by themselves. In order to create a permanent change in the way that patients care for their teeth, a personal relationship of high trust with the patient is necessary. The development of this relationship takes time. It is economically impossible for the dentist to take sole responsibility for this task. When a dentist first introduces control into his practice, he may conduct the preventive dentistry programme himself. Eventually, he must select and train a preventive assistant if he wishes to make prevention available to all of his patients in a permanent effective way. Also, patient often feels more at ease with her as doctor-patient relationship often contains some degree of stress.

**Functions of Preventive Auxiliary or Control Assistant**

Conducts control programme of four to five weeks.
Teaches patient use of floss and flossing techniques.
Teaches patient proper use of toothbrush.
Evaluates patient's programme.
Programme may be shortened in special circumstances.
Programme modified if patient is a child: child less than 10 years of age - educates and instructs mother; child 10 to 13 years of age - works directly with patient.
Preventive Auxiliary counsels mother on food intake.
(A) Conducts food intake study.
   (a) Record of family's dietary habits and daily
       routine that may affect food intake.
   (b) Means of instructing mother in elements of
       balanced diet and types of foods that are free
       of sucrose.
(B) Prescribed diet for family.
   (a) Based on family's habits, routines, income.
   (b) Stresses basic Four Foods.
Preventive Auxiliary applies fluoride.
Establishment of a positive, friendly relationship and use
of valid teaching techniques are essential to success in a
preventive programme.
Knowledge of dental anatomy is essential.
Recontouring and Restoration.
Isolation of operating field.
Caries control.
Principles of Cavity design.
Matrix application.
Restorative procedures. 132, 29
Role of the Auxiliary in Fixed and Removable Prosthetics

The chairside auxiliary, the roving auxiliary and the auxiliaries who function in the laboratory comprise the auxiliary group in the restorative dental practice. The laboratory auxiliaries include the dental technicians.

Chairside and roving auxiliary participate in all office procedures and always works under direction of dentist.

A. (a) Sedation and Anaesthesia  
(b) Tooth preparation  
(c) Fabrication of provisional restoration  
(d) Impression visit  
(e) Coping transfer visit  
(f) Gold assemblage visit  
(g) Cementation procedures

B. Dental laboratory technician may perform critical phase of articulator models as well as routine laboratory procedures.

C. Auxiliary provides emotional and psychological support to patient.
10.5 Role of the Auxiliary in Endodontics

The Endodontic Auxiliary can learn every phase of endodontics except for diagnosis which must remain the responsibility of the dentist. A knowledge of root canal anatomy is essential in all phases of endodontics. The auxiliary should be well informed about tooth length, number of roots and the canal system of the teeth with the permanent dentition.

General principles of work simplification and motion economy can be readily applied to endodontic practice. A system for endodontics should be developed within these guidelines by the dentist and the auxiliary working together. Also, the auxiliary must be trained in some modification of the standard methods developed for efficiency in dental practice which are necessary such as instrument passing and the taking of x-ray films with the rubber dam in place.

Functions of Endodontic Auxiliary

(a) Auxiliary gathers information on patients' medical and dental history including drug sensitivity.
(b) Auxiliary completes eight clinical tests.
   Visual examination of tooth and gingiva
   Percussion of tooth and adjacent teeth
   Palpation of gingiva
   Mobility of tooth
   X-ray studies
   Electric pulp test
   Thermal test
   Transillumination
(c) Auxiliary informs patient about nature and cost of endodontic therapy.
(d) Auxiliary responsible for many procedures.
Places and removes rubber dam
Takes all radiograms
Takes culture
Irrigates with chemical solutions
Fits points for canal obstruction
Places medications
Seals access cavity

(e) Auxiliary may be trained to apply bleach and to remove sutures.
10.6 Role of the Auxiliary in Periodontics

Analysis of surveys of periodontal health from all areas of the world makes it clear that periodontal disease occurs at some time in nearly 100 per cent of the population in some degree of severity. Periodontists and dentists are not sufficiently available to treat effectively this chronic dental disease. Therefore, dental assistants and dental hygienists are being called upon to provide many more services in the periodontal office.

Functions of Auxiliary in Periodontics

A. Auxiliary completely documents patients' card.
   a. Medical and dental health questionnaire
   b. Indicated laboratory tests
   c. Study models
   d. Radiographic survey
   e. Oral examination and periodontal charting

B. Auxiliary renders periodontal therapy.
   a. Plaque control
   b. Temporary stabilization of mobile anterior teeth (dental hygienist)
   c. Sealing and root planing
   d. Polishing natural and restored tooth surfaces
   e. Administration of infiltration anaesthesia (dental hygienist)
   f. Periodontal surgical procedures (dental hygienist)
      Soft tissue curettage
      Gingivoplasty
      Gingivectomy
   g. Manipulation of periodontal dressings
   h. Postoperative instruction of patient
   i. Treatment of hypersensitive root surfaces
j. Maintenance of patient recall system

C. Auxiliary assists periodontist during procedures.
   a. Provides proper tray set-up, radiograms and medical and dental health questionnaire for each patient
   b. Assist at chairside during surgical procedures
   c. Mixes and places periodontal dressing
   d. Instructs patients' postoperatively
   e. Sets up patients' post operative appointment schedule
10.7 Role of the Auxiliary in Oral Surgery

Dental team personnel who have had comprehensive training in performing oral prophylaxes and in dental assisting can readily adapt to the requirements of the oral surgeon. The identification of surgical instruments, tray preparation, surgical assisting and a knowledge of the drugs and techniques used in local and general anaesthesia are but a few of the added duties they must be prepared to assume. In essence, the auxiliary must fulfil the role of the hygienist, technician, nurse and at times anaesthetist in the oral surgeon's office.

Functions of Auxiliary in Oral Surgery
(a) Auxiliary assists in treatment of both ambulatory and hospitalized patients.
(b) Auxiliary takes medical history and checks patient's vital signs.
(c) Exodontia and minor oral surgery comprise bulk of office practice.

Instrument tray setups needed for exodontia, removal of impactions and soft tissue surgery. Auxiliary serves as surgical assistant. Auxiliary provides patient care in post surgical period. Auxiliary may perform some post-operative treatments such as suture removal and dressing change. Auxiliary may administer local or general anaesthetic and may premedicate patient; these procedures always under direct supervision of dentist. Auxiliary must be prepared to render immediate assistance in emergency medical situations.
10.8 Role of the Auxiliary in Pedodontics

(a) Auxiliary needs to gain understanding of physiological and psychological attributes of young children in order to function effectively in paediatric dentistry.

(b) Auxiliary explains plaque control including use of fluoride.

(c) Auxiliary explains injections technique to child and mother and assists in administration of anaesthetic.

(d) Auxiliary explains use of rubber dam and places it.

(e) Auxiliaries duties during operative procedures
   Places lining material on tooth as directed by dentist.
   Fits and secures matrix band.
   Mixes and places restoration.
   Curves and contours restoration.
   Finishes restoration.
   Selects, contours and finishes stainless steel crowns.
   Cements stainless steel crowns and removes excess cement after cementation.

(f) Auxiliary assists in paediatric pulpal procedures as directed by dentist.
   Pulp capping.
   Pulpotomy.
   Pulpectomy.

(g) Tongue thrust therapy.
   Auxiliary determines selection of patients and role in therapy after consultation with dentist and speech therapist.
   Auxiliary receives training under speech therapist before undertaking training of patients.
10.9 Role of the Auxiliary in Orthodontics

Both the hygienist and the assistant have an important place in the orthodontic office. The orthodontic laboratory technician is an essential member of the orthodontic dental team.

Functions of Auxiliary in Orthodontics
(a) Auxiliary performs oral prophylaxes.
(b) Auxiliary exposes, develops, mounts, and traces cephalometric radiographs.
(c) Auxiliaries' responsibilities in orthodontic impressions
   Selects and prepares impression trays
   Mixes impression material
   Fills impression tray
   Seats impression tray
   Provides psychological support to patient during impression procedures
(d) Auxiliary's responsibilities in model construction
   Mixes plaster and stone
   Pours impression
   Trims models: maxillary cast and mandibular cast
(e) Auxiliary's responsibilities in use of orthodontic instruments.
   Band fabrication, cementation and removal.
   Bending and placing archwires.
   Removing and tying-in archwires.
(f) In welding and soldering procedures auxiliary secures all necessary attachments outside patients' mouth before they are inserted.
(g) Auxiliary's responsibilities during banding appointment.
   Prepares patient
   Provides band material
   Pre-arranges instruments
   Delivers instruments
Places selected bands
Welds and solders attachments on selected fitted bands

(h) Auxiliary's responsibilities at separation appointment include pre-arranging instruments and setting up for separation.

(i) Auxiliary's responsibilities for try-in of preselected bands include pre-arranging materials and instruments and assisting chairside.

(j) In band cementation, auxiliary is responsible for prophylaxis, tray set-up and cement mixing.

(k) In arch ligation, auxiliary is responsible for tray set-up, assisting chairside and making adjustment appointment.

(l) Auxiliary instructs patient in use of supplemental appliances.

(m) Both auxiliary and hygienist assist orthodontist at completion appointment.

(n) Auxiliary's responsibilities in preparation of retention appliances.
   Constructs removal retainer
   Constructs positioner
   Instructs patient in wearing of appliance

The roles of auxiliaries that have been discussed so far are varied. The dental auxiliary who is being trained and utilized in Australia is known as School Dental Therapist. The role of the school dental therapist is a combination of the roles of auxiliaries in preventive and operative dentistry discussed earlier. Dental therapists' clinical duties are -

a. The initial examination of the patient including bite wing diagnostic radiographs if she considers this procedure necessary.
b. Subsequent Recall Examination.
c. Control dental caries by excavation of softened dentine and insertion of temporary fillings.
d. Oral prophylaxis and topical application of fluoride solution to the teeth.
e. Instruct patients in correct methods of maintaining oral hygiene and in dietary practices favourable to good oral health.
f. Expose and process intra oral radiographs.
g. Inject local anaesthetics using the inferior dental nerve block or supra-periosteal infiltration technique.
h. Prepare cavities in primary and permanent teeth and restore those teeth with composite resin or silver amalgam using retentive pins in posterior teeth when they are necessary.
i. Treat the exposed vital pulp in a primary tooth by coronal pulpotomy and five minute application of formocresol to the pulp tissue in the root canals.
j. Provide emergency treatment only for the exposed pulp in a permanent tooth by capping with Calcium hydroxide and sedative temporary filling.
k. Apply rubber dam for all composite resin restorations and pulpotomy operations; its use for amalgam restorations is also encouraged.
l. Polish all restorations.
m. Extract primary teeth.
n. Take alginate impressions and pour study cast of the teeth.
o. Shape and cement copper bands over sedative dressings.

The most important phase of dental therapists' work is in the field of dental health education.\textsuperscript{81,113}
Dental auxiliaries' roles in the fundamental division of labour appears to be the research topic of the next decade. Who will do what, with what motivation and rewards, with what power, along what training routes, with what consequences for job satisfaction and with what impact on the quality and extension of dental care? How can dentistry recruit and maintain its work force sufficient numbers of auxiliary personnel? A great deal of research will be needed in the dental auxiliary field to provide information in the effective and productive utilization of auxiliaries.

Deans in the Universities will find it easier in the future to secure money for faculty to teach auxiliaries than for new faculty in other positions.

Dunning says "In general, both in Australia and New Zealand, the samples of work that I saw were good and I tend to accept Fulton's favourable appraisal of the quality of the work performed by N.Z. dental nurses. Friedman visiting N.Z. in 1971 confirmed this report. He photographed the mouths of about 100 children and found not one missing permanent molar." Dunning concludes by saying "The N.Z. programme gives such real and challenging responsibilities to the nurse that her occupation has become prestigious. The service attracts above-average young women and good leaders. There is an excellent espirit de corps." The training and utilization of increasing numbers of dental auxiliaries in parallel with the production of dentists will be supported and encouraged by the community.
11. SOCIAL AND BEHAVIOURAL SCIENCES IN DENTISTRY

Over the years, the importance of social and behavioural sciences has become very evident for a better dentist/patient relationship. In order to understand and deal with patients and community with social problems, the dentist should be trained in the sociological, anthropological and psychological sciences. Social sciences contribute favourably to the general education of the dental student and emphasises the professional importance to the would-be dentist of a working knowledge of the social sciences.

It is pertinent to ascertain the aims of the dental student and his social behaviour as an undergraduate.

Dental students were found to be more economically oriented than medical students.

Students chose dentistry because of its autonomy and law.\textsuperscript{93}

O'Shea and Cohen\textsuperscript{118} reported that public health is the least preferred speciality of dentistry and the job of administration connected with public health problems is of little interest to dental students.

The students are mainly interested in general practice, teaching and speciality areas. Quarrenteli found that students were attracted to specialities because of large financial rewards and because specialities were more like medicine.
Jaco noted that humanitarians and scientist scholars rated considerably higher in their clinical programme for handicapped patients than did students classified as technicians and instrumentationalists. 75

Derene and Fallon found married students fared better in scholastic achievement than unmarried students.

Frederick and Mundy 55 say that upper and middle class students selected dentistry on the basis of a desire for service while lower class students selected dentistry on the basis of status and respect.

Hall 63 found that measures of humanitarianism and social value were positively associated with a public service orientation and that the service orientation was negatively associated with a measure of economic value.

Rosenberg noted that dental students tend to become less self-reliant, less independent and have less leadership potential and initiative. They become less ambitious, active, forceful, insightful, resourceful and versatile and more stereotyped in thinking. 135

Guild 62 found the following problems were identified by the students: lecturers are inadequate, lack of feedback, abrasive-student-faculty interactions, poor quality examinations, faculty inconsistency, lack of rewards and encouragement, lack of direction, work and time pressures and inadequate use of available text books.

Flesh found that the student tends to be relatively more aware of the patient's general health and intelligence level than of the interpersonal relationship between himself and the patient. He is relatively less aware
of the patient's emotional response. The student views the patient primarily in a dental situation frame-of-reference rather than a patient frame-of-reference.\textsuperscript{52}

The above findings indicate that the goals and interests of dental students are not attuned to the changing social responsibilities of the health professions.\textsuperscript{94}

The question of professionalization, perception, attitudes, motivation, personality, education, group dynamics, economics and modes of health behaviour are important for the training of a future dentist.\textsuperscript{130} The dental education should include the social science technique such as methods for gathering information on questionnaire, interviews, scales, inventories and systemic observations and methods for analysing social science information such as content analysis, factor analysis and multiple discriminant analysis.\textsuperscript{95}

W.H.O. Expert Committee on Dental Health (1962) stresses the importance of attitudinal values and professional and social conduct as some of the specific objectives in dental education.

The training of a future dentist on the above disciplines is vital and thus provision of central place in the medical and dental curriculum should be given for the teaching of behavioural sciences and to ensure that students perceive these studies as being central to their education.

The aims of social science course should be the following:
a. To help provide the student with an integrated understanding of behaviour that takes account of his patient's inherited characteristics, experience, psychophysiological state, social position and cultural background.

b. To introduce the student to methods of observing and communicating with his patient that will enable a good personal relationship to be established between them. The dentist must be trained to see his patient's point of view, to listen to what he has to say and to observe and interpret his non-verbal behaviour.

c. To give the student a better understanding of human diversity, so that he will be better able to distinguish between the 'normal' and 'abnormal' and to appreciate the problem of generalization in human biology.

d. To help the student to visualize the impact of his advice on his patient's personal commitments and the extent to which these commitments will interfere with treatment.

e. To increase the grasp which the student has of the organization and administration of dentistry at all levels and of the role that dentistry and the health sciences should play in society.

The educators of these sciences should be experts in these fields and thus the dental schools should have them in the permanent staff. This would enable the students to have a continuous evaluation of themselves and feedback. Departments of social dentistry should employ psychologists, sociologists, epidemiologists, political scientists, lawyers, biostatisticians and teachers of social and behavioural sciences.
Social science content ought to be taught right through the undergraduate course and that there is a need for a constant interplay between social science and clinical components.

As students move into the clinical years, teaching methods should change correspondingly. Use of conjoined case conferences, the development of independent research relating to changes in student's areas of special interest, the use of placements with general practitioners, with the out-patient's department of a teaching hospital or on location with families who have medical or dental problems of particular interest. 14

In the latter part of the dental course, the students should be able to integrate the relevant social science components into their dental disciplines.

Because of the increasing social commitments to improve the status of oral health for all people, it is necessary to recruit and train more socially conscious dental students. 89 But the committees on admission usually lack the psychological tools necessary to identify applicants who possess a high level of social consciousness.

Student's major personality characteristics, sense of values and behavioural attitudes have already been determined by his parents, prior schooling and peers. The extent to which the student will acquire characteristics of social sensitivity and type of change in personality depend to a certain extent on the social dentistry course. 186

Striffler 143 notes that social awareness cannot be gained by forced-feeding, the student must learn by experience that demands doing.
The students' existing motivation to become dentists could be used as a starting point to increase their enthusiasm for and understanding of Dentistry as a social science rather than as a largely technological one.

The design of curriculum and the development of teaching methods have failed to utilize imaginative approaches to change dental health practices. Without considerable information about the patient, his family background, social relationships, life experiences, perceptions, motives, beliefs, interests and values it is not possible to formulate meaningful, effective dental health education activities and programmes. Thus, the application of behavioural science to dental health educational efforts should be made.

English, in discussing the motivation of students towards community dentistry, says, 'We need to find out how to develop in students and subsequently in practitioners more self and social consciousness concerning the health needs of all people. We need to develop in them a willingness to participate in broad community activities. We need to have more specific ways of motivating students and it seems possible that the methods known to educational psychology could be applied to dental schools.'

Waldman writes, "The dentist is interested in gaining approbation from those whom he values - from the public and fellow practitioners. The development of perceived role is an essential part of occupational socialization that each student must undergo before he may be termed truly professional. Socialization regulates behaviour, transmits culture and develops personality and produces conformity in values and habits."
Levinson establishes a model for professional socialization that is relevant to a dental school.

a. The organization of an environment for socialization that utilizes such concrete situations as lectures, experiences in the laboratory, meetings of the staff and dormitory living, along with indirect symbolic influences such as the country's culture, its social structure, the educational goals of the school and professional ideology.

b. A study of a person who occupies the position of a student that examines the personality of the entering student, the meaning of dental school for him, the gains he hopes to achieve, his ideological orientation and his characteristic traits.

c. The mechanism of socializing process as it evolves to engage the student in the life of the system, how problems of ambiguity and uncertainty arise from a profession that prides itself on its rationality and competence and how problems arise when the student's technical knowledge fails to meet the demands of the faculty and

d. The outcome of socialization as it is measured by psychological changes that arise from contact with the direct and indirect techniques which are part of the system of educating students.

The social scientist can contribute to the dental student's education by providing a new insight with the sociology of the hospital, medical and dental economics, the impact of bureaucratic organization on professional practice and the relationships between dental institutions and other sections of society.
The dentist should also be concerned with matters such as poverty, family relationships, population control, social pathology and maintenance of effective health services and in these fields the social scientist is indispensable. 181

Knowledge in social science helps in the assessment of the process of the dental programme being used and finds out how well this process fits with the socio-cultural system of the group with which the programme is being implemented. 43

Thus, departments of social and community dentistry should be assigned the task of transforming the conservative, conforming, unconsciously aggressive, persistent and somewhat rigid or inflexible student motivated to move upward and gain financial betterment, into a socially sensitive practitioner - one who is capable of understanding and contributing to the needs of a changing social environment. 153
Critical curricular review all over the world has recently stressed the need for increasing emphasis on medicine or dentistry as a social science and the complete care of groups of people in the community.

At present, the emphasis is on individual treatment and rarely family environment is considered. The effects of illness of one member on the general family health is not seen, not discussed and not considered by the hospital doctor or dentist. Unfortunately, this is also forgotten by the dental practitioner who spends his whole life in the community.

The future dentist should be more involved in community dental health. The most striking trend will be seen in the emphasis placed on preventive dentistry.

World Health Organization (1965) Technical Report on the organisation of dental health services states, 'There is an increasing awareness among dental educators of the need for additional emphasis on the social aspects of dentistry....Educators are experimenting with curricula that will enable their graduates to be more responsive to the needs of society.'

The present curricula of many dental schools make it difficult to train dentists and related personnel to carry out their educational function. New, imaginative undergraduate training programmes for dentists are sorely needed throughout the world so that preventive aspects of dentistry can receive proper emphasis.
Dean of a dental school enumerated the following trends, "Even as today we get fewer and fewer people, even in our school clinics who want or who will permit full mouth extraction with the resultant full denture restoration, tomorrow patients will expect us to preserve their state of dental health from the cradle to the grave. It may seem a fantasy but compared to a very few years ago, the number of people who say, 'Take 'em all out, Doc, and give me a set of choppers,' is very few. Instead, it's can't you save them, doctor? with the pendulum swinging back to the extreme of extended endodontic treatment, periodontic treatment, preventive orthodontics and anything which might preserve the natural dentition as long as possible. This has occurred despite rapid advancement in denture prosthesis. Such is the dentistry of today and tomorrow - prevention and treatment."

Blackerby\textsuperscript{12} is in favour of establishing a separate Department of Community Dentistry in undergraduate curricula. He sees the function of this department as being

(i) Primary responsibility for curriculum development, in those areas of what he calls 'social import'.
(ii) Co-ordination of these subject areas throughout the total programme of dental education.

Burt\textsuperscript{22} suggests, 'To begin with to have a small department with responsibility for developing a continuous course of instruction throughout the full undergraduate course. This department should have the power to co-ordinate with other departments and it should have some teaching time of its own. In time, the teaching staff could grow and full departmental status may be achieved. Some of the subjects which could be taught..."
in department of community dentistry are behavioural sciences, administration of health care, dental manpower, dental auxiliaries, government planning and practice management. 53

James, P.M.C. tends to have the same views as that of Burt's. 76

The aim 68 of community medicine or dentistry should be
a. to teach the student to comprehend his social role in relationship to the individual family and community.
b. to teach the student to think epidemiologically and socially.
c. to understand the organisation of health services.

No sweeping changes are necessary to improve undergraduate instruction in dental public health. In basic dental subjects, the existing courses can be re-oriented, where necessary, to include public health considerations. For example, instruction in bacteriology should include the epidemiology and control of major communicable diseases and instruction in immunology could incorporate mention of public health methods and responsibilities. The head of other departments should be actively encouraged to introduce the public health and preventive concept of dental practice in the teaching of their respective subjects. 76,96

Undergraduate dental students require specific instruction in the following areas: 76
(a) Public Health is that part of the instruction where the care of the community is taught: the promotion of positive health and well being by control of disease and by improvement of the human environment.
Special functions of the national, state and local governments should be taught with mention of housing, sanitation, hygiene, water and medical services. The best teacher might be a medical officer and best method is to combine lecture-discussions with visits to suitable institutions such as waterworks, antenatal clinics, schools, etc.

(b) Social and Preventive Dentistry.
This course can be divided into two parts, the problem and its possible solutions. In the first part, the discussion should cover the nature and magnitude of oral disease in the population considered from viewpoints of health, socio-economic aspects and the provision of treatment.

The second part should contain all the well known aspects of preventive dentistry, nutrition, dietary control, fluoride, use of auxiliary personnel, oral hygiene.

c) Health Education.
Stress the importance not only of instituting the importance of dental health attitudes in the student but also the techniques for disseminating information and guidance on the subject.

It is no use trying to induce preventive dentistry in the public if the dentist does not have a preventive outlook himself.

d) Epidemiology and Statistics.
This subject should be developed and discussed in relation to current dental research with more specific instruction in the techniques of sampling the standardisation and reproducability of the examination,
the choice of diagnostic indices and the collection and treatment of the data.

Many of the scientific articles appearing in current literature have a statistical approach. Without an elementary knowledge of this subject, the reader is unable to evaluate the validity of the conclusions and often even their meaning. For this reason, instruction in elementary statistics should be included in an undergraduate course. Also statistics encourages clear thinking on scientific problems and a more critical appraisal of the literature. The student is made aware of his professional responsibility to the community in the control and prevention of dental disease.

Consideration may be given to the methods of assessing needs and demands of treatment and the conduct of dental health surveys. This is extended to the presentation of group data obtained so that evaluation and recommendations may be made. This phase of course serves to set the scene of dental health in the community and immediately put into perspective the whole matter of group responsibility to the community. Having established the size of the problem, a scientific basis for dealing with it is presented. Dental aspects of fluoridation should be emphasised as important in a modern society and other known methods of control and prevention are given. Discussion of responsibility in matters of dental health education and ways of disseminating information are important. The value of health campaigns and the means of evaluating them are of importance as is the understanding the social attitudes of the populace to dentistry. Active participation in school dental health
education is encouraged and practice provided whenever possible. Techniques for provision of dental health education in the surgery discussed as are methods for parent and patient motivation in dental health matters.  

Greer Walker says, 'If our dental schools could teach the clinical practice of dentistry as a collective dental health study rather than by clinical symptomatic techniques, I believe the emphasis would change....to one of prevention and maintenance where the accent is on the former rather than the latter.'  

The student must be made aware of the role and responsibility of dentistry within the community and its resulting image.  

Instruction in disease control should take place very early in the students' academic life. The student should be competent in preventive concepts and techniques and committed to a preventive philosophy of dentistry by the time he treats his first patient. The merits of prevention has to be highlighted and the importance of prevention as an integral part of the health and medical care system of the community will be more firmly established.  

Dental Health Education constitutes one of the important aspects of preventive dentistry. World Health Organisation Expert Committee on Planning and Evaluation of Health Education Services (1969) described health education as follows: 'The focus of health education is on people and on action. In general, its aims are to persuade people to adopt and sustain healthful life practices, to use
judiciously and wisely the health services available to them and to take their own decisions both individually and collectively, to improve their health status and environment."

It is essential that there is a pre-agreed policy on the details of the content of the dental health education being offered and definite programme of training in dental health education for all dental and other personnel involved.\textsuperscript{67}

It is desirable for public health dentists to receive their training in schools of public health or in other institutions where health education is a basic discipline in which all members of the health team follow a common course. The dentist must receive appropriate training during his undergraduate dental studies. The curriculum of dental schools should provide opportunities for participation in a variety of dental health education activities, in schools, hospitals, clinics and industrial settings.

In the training of dental hygienists, dental therapists, dental assistants and other types of dental auxiliaries, there is a need to include practical experience in developing and applying a variety of educational procedures and materials. Special emphasis should be placed on individual face-to-face methods and on procedures, applicable with small groups such as school children and women in pre-natal clinics. Throughout this training, educational concepts and behavioural principles related to ways of motivating people to take effective dental health actions should be stressed.
Young and Livemer state three aspects of preventive dentistry and community health which should be covered by a department of community dentistry. These aspects are general practice, professional participation and community responsibility. General practice should be taught within the concepts of prevention, efficiency and human concern; professional participation within the concepts of co-operation and adjustment to social and professional change. Community responsibility should be taught in such a way that the graduating students would be prepared for effective participation in general as well as dental health actions in the community.

"The time has passed when society will continue to accept the representative of a health profession as an entrepreneur, independent of obligation to concern himself with the quality of living and the necessity of to work closely as an equal partner with the other elements in a system for the public's welfare." It is apt to conclude with the description of preventive dentistry by Anthony Roeder.

"Preventive dentistry is not a speciality; it is a philosophy of dental practice. This philosophy is built on the logic and good sense of treating the causes of disease before treating the results of disease. Without this philosophy, dentistry might be compared to mopping up the floor without turning off the faucet. It becomes a continuous process of repair with all of its frustration of endless expense, discomfort, impaired dental function and ultimate failure. Preventive dentistry acknowledges that dental disease is avoidable, that oral health is attainable and that patients are entitled to have the information and instruction they need so as to realize freedom from dental disease and to have the permanent use of their natural teeth."
13. ADMINISTRATION, DELEGATION AND SUPERVISION

The future dentist will be working as a member of a team. He will be a part of a team in a community health centre or in a private group practice. He may be the leader of a dental team or of health centres.

Therefore, it is essential for him to possess training in the principles of organization and management. Qualities of leadership should be instilled in him so that he could have a harmonious, happy and productive group of dental personnel in the dental team.

The future dentist should be aware of the factors that go in the development of organization and effective management of the system. He should understand the managerial role in a complex and dynamic organizational society.

'Organization theory is an elective body of knowledge reflecting the diversity of the environment and the many internal forces involved. All types of complex systems - hospitals, schools, businesses reflect the need for knowledgeable and skillful managers. Organizational behaviour is directed towards objectives which are understood by members of the group. The organization uses knowledge and techniques in the accomplishment of its tasks. Organization implies structuring and integrating activities, that is, people working or co-operating together in interdependent relationships.'

'Management involves the co-ordination of human and material resources toward objective accomplishment.'
The elements can be identified as
(a) toward objectives
(b) through people
(c) via techniques
(d) in an organization

Management is a process of planning, organizing and controlling activities.'

Concept of the dental team with the dentist fulfilling the role as team leader will generate increasing importance to the principles of management.

As stated earlier, dentist may be the leader of a health team. The qualities of a leader includes the capacity to bring together and preside over a team or teams of competent people, to ensure for the organization the determination of clear and agreed upon goals, to have the ability to adapt in a responsible manner to changing conditions and requirements of the organization and generally to facilitate openness, free communication, trust and friendliness throughout the organization. 84

Expert knowledge of administration without leadership qualities results in bureaucracy, mechanistic thinking which remove initiative and creativity of individuals.

Kronborg describing leadership says, 'Effective leadership and teamwork in changing scene will no longer result in perplexity, stress and anxiety but rather be seen as an exciting challenge to personal and organizational initiative and creativity.' 84

Effective leaders have the following common things:
(a) A good memory which helps them to recall people's names and the few essential facts that are pertinent to a wide range of problems.
(b) A genuine interest in people and their development.
(c) They are good communicators in that they talk simply, clearly, persuasively and also that they can listen intently.
(d) They know when to decide.
(e) They are able to relax and switch off from the job.  

The dentist should possess knowledge in administration, delegation and supervision. It is important that an administrator possess the will to change the things that he can and the patience to accept those which he cannot. It is vital that he possess the wisdom to know the difference. He should know the specific role of members of the dental team like the training programme of the team members, standard of performance and productivity expected of them, local social and economic circumstances, facilities, equipment and material necessary to provide the dental service and legal, ethical, financial and organizational framework within which he must work, ability to set objectives in planning for the delivery of appropriate dental services, ability to specify tasks, delegate authority and supervise the whole dental team, ability to evaluate the performance of the dental team. The dentist should have some knowledge of economics of practice management to perform some of the above functions.

The undergraduate dental student should be in close association with trained auxiliaries and to assist the graduating dentist in administration, delegation and supervision. There should be a level of uniformity...
between the different training schemes for the same auxiliaries. 140

Delegation resulting in extending the functions of dental auxiliaries has a definite world wide interest. Delegation of certain dental care services to auxiliaries is a concept that could potentially have a significant impact on dental profession's ability to provide more care to a larger segment of the population.

Principles of delegation can be readily and effectively applied in a private practice setting. One of the common types is the delegation of certain duties to an expanded duty dental auxiliary.

So the dentists have to learn to consider the factors of time, task level, task complexity, auxiliary availability and patient tolerance in delegating the appropriate task to the appropriate auxiliary at the appropriate time. 35

People have five basic needs. They are as follows:
To Have
To Be
To Do
To Belong
To Grow

They strive to satisfy these needs and all activities are motivated by the desire to satisfy the needs. If managers (dentists) wish to motivate people, they have to structure situations so that people satisfy their needs by doing what the manager wishes them to do. 72
Thus, it is necessary for the dental student to have knowledge and experience in organization, management and administration if he wants to be an effective leader in a dental health team.
14. TEACHING TECHNIQUES

In an earlier section, changes in the concept of education were considered and also some of the techniques of teaching which in many studies proved successful. Dental Educator's role is particularly a difficult one as he has to teach in different learning situations - clinics, laboratory and in lecture theatres. Thus, it is imperative that the dental educators should receive the necessary advice in teaching methods and utilization of teaching aids from either a teaching institution or the education department in the University.

Often changes are made to course content in the hope that the students will find the course more interesting and relevant but generally this new content is transmitted through old channels. While all these innovations show an awareness of the problems of teaching and may well create a better atmosphere in the learning situation they will not necessarily result in improved student attainment. The research literature clearly shows that there is no one teaching method which will act as a panacea for all our teaching problems. The remedy is not to be found in any one method but in an approach that recognizes that there is a multitude of methods all with their own characteristic strengths and weaknesses. Bligh suggests, 'we normally have a variety of aims for a lesson and as different aims are best relieved by different methods, we should make use of a variety of teaching methods in each lesson.'

Thus, an understanding of the principles of modern teaching methodology will help the dental educator to achieve a rapid improvement in his performance. It will
enable him to identify his course objectives, to master the different teaching methods and techniques and constantly to evaluate his own performance as well as that of his students.¹⁷⁹

Teacher education and staff development and in-service teacher programmes have thus come to be considered an essential part of the total educational programme of a dental school with the primary assumption that the best measure of good teaching is the quality of learning by the student.¹³⁹

Another important variable in comparative studies of teaching procedures is the quality and attitude of the teacher.

The teachers should have the following benefits:
a. Orderly and effective teaching methods.
b. Teacher confidence in the presentation.
c. Use of full range of visual and other teaching aids.
d. A better understanding of the objectives of the teaching programme.
e. Knowledge of methods of evaluation.

Clinical teachers should have adequate clinical experience to maintain their competence and keep abreast of new developments.¹⁴⁰

Primary procedures like televised lectures or small group discussions should be supported by instrumental techniques such as programmed instruction, discussion groups, semi-notes and diagrams.
The teaching classification prepared by MacKenzie, Erant and Jones is:  
a. Group techniques and procedures e.g. group discussion, colloquium, case method, panel.
b. Student oriented procedures e.g. independent study, projects, programmed instruction.
c. Teacher initiated procedures e.g. laboratory, lecture, demonstration.
d. Supplementary techniques including graphics, exhibits, dramatization and audio-visual aids.
e. Special techniques including television simulation resource centres.

Selection of appropriate teaching methods and instruments should be guided by the educational objectives to be achieved, the individual or group to be taught and the situation in which teaching is taking place. Group discussion is becoming an important method of education provided the student is allowed to express himself and exchange ideas with his teacher. Other methods are team teaching, teaching by simulation, case-study, experiment and on-the-job training. Teachers must be taught how to advise their students on the most productive use of literature and libraries.

The criteria used to aid a lecturer in the selection of a specific technique are the following:  
(A) Management-centred factors.  
These factors are imposed on the lecturer by the real life parameters such as cost, facilities, staffing, etc.  
(a) Preparation factors.  
Time to develop or prepare.
Amount of material to be prepared.
Estimated cost to prepare or develop.
Facilities needed for preparation.
Quality of staff needed to prepare material.
Number of staff required to prepare material.

(b) Presentation factors.
Facilities needed for presentation.
Number of staff required for presentation.
Estimated cost to present.
Student entry requirements.
Ease of administration.
Number of students taught at one time.
Reliability of hardware.
Effect of length of course.

(B) Teacher-centred factors.
These items are important to the lecturer in regard to the presentation.
Ease of presentation.
Complexity of the hardware.
Flexibility of the techniques.
Manoeuvrability of the techniques.
Teacher's personal reactions to the techniques or procedure.
Teacher's experience with the technique or procedure.
Ease of evaluating students when using the technique or procedure.
Degree of teacher-student interaction possible.

(C) Student-centred factors.
Degree of student participation.
Degree to which it is student-paced.
Degree of realism.
Degree of reinforcement possible.
Degree of senses stimulated.
Degree of student feedback possible during the presentation.
Student's experience with the technique.

Most schools use a combination of lecture courses, seminars, tutorials, practical classes and demonstrations. In children's dentistry, use may be made of all the basic teaching methods. 9

There should be heavy dependence on audio-visual teaching material, self-instructional devices and faculty counselling. 82,116

Audio-visual aids are closed-circuit television, video-tape recordings, slide-tape sequences, programmed courses, strip films, cartridge loading films and computer assisted instruction. 96 Teachers should have some training in use of these aids. Teachers should, also, have guidance in the use of films.

The need for creative experimentation with new educational materials and methods is clear to all who review publications.

Alvin Morris says, "As the content of the curriculum changes, so will the teaching methods. Dental students in the year 2,000 will not be tolerant of ineffective teaching or teachers. Neither will they passively accept personal or intellectual abuse. I do not mean that students will be calling the shots but the dental school will be an un congenial environment for the type of dental instructor many of us have known who compensates for his own maladjustments by mistreating students and manufacturing blocks to the learning process." 110
15. CONTINUING EDUCATION

Essential requirement of a professional person is that he continues his personal education, that he attempts to keep up to date, continues to be a learner or researcher and developing new ideas and new techniques by assimilating new information.

Dental education should be regarded in two phases:
The undergraduate course which provides a basic education for professional practice.
Continuing education is graduate education.

Continuing education is a broad area of activity not leading to a higher qualification.

G.V. Black said that a professional man has no right to be other than a continuous student.

Allred, et al., say, 'The growing wealth of knowledge and breadth of experience within dentistry is resulting in a profession in which individuals are finding it increasingly difficult to feel competent in more than a limited part of the whole subject.'

Thus, it is imperative that graduating dentists keep pace with the so-called information explosion and with the inexorable demands of society's changing health wants if they are to avoid obsolescence at a very early age.

But in a survey conducted by Emery, Mogle, and Stephenson, it was found that a typical dentist spent an average of ten days a year attending symposia, post graduate courses and other continuing education activities.
The reason may be the way the undergraduate students have been taught to be taught. Students became dependent on mere teaching and were rendered incapable of organizing their careers around a continued effort to learn.\textsuperscript{136}

Teaching should have an indispensable 'plasticity' and thus be adaptable to the changing objectives of practice. It will be all the more functional because we will have succeeded in developing a dynamic association of fundamental knowledge with clinical practice according to the demands of society. It should not, therefore, become 'fossilized'. Its structure and its philosophy must allow it to adapt by means of a rational evolution. Teaching cannot be static but must be modified because science and techniques as well as health laws affecting the population, all evolve.\textsuperscript{166}

Through interchange of information, mutual support and through maximum utilization of the training potentials available to public health workers, the personal barriers can and will be removed in community health.\textsuperscript{103}

Various agencies can take part in the continuing education programmes. The Dental Board and the Dental Profession in conjunction with the University could run suitable courses.

Courses in continuing education may be in the form of:

- Formal training courses.
- Attendances at conferences, meetings and lectures.
- Correspondence courses.
- Personal study and research.\textsuperscript{146}
Efforts should be made to determine feasible alternatives to existing programmes acceptable to both the school and profession which will optimize the resources available. 137

Massler comments, 'Continuing education courses present information derived through evolution by persons who have made studies of the subject matter and have tailored the material to the needs of the practitioners. The best continuing education maintains a balance between the pragmatic and the academic, the immediately useful and the intellectual. Continuing education is still in an evolutionary stage. At present, it is taking the form not only of courses but also of seminar discussion. Regardless the direction continuing education may take place, many teachers will be needed. More and more, the dental school and the dental societies will find themselves in partnership to promote and maintain high standards of continuing education. The school will educate the teachers and the societies will provide the students. It is also, likely that the schools will be requested to certify continuing education courses that will beacceptable in lieu of an examination for competency to which practising dentists will be subjected periodically. If practical and academic dentistry move close together, both will benefit.' 99

Like Massler's suggestion, Dental Boards should make continuing education as a pre-requisite to the continuing right to practise dentistry. This should be equally applicable to the dental auxiliary personnel.
The undergraduate course then must not only provide a reasonable training in the general skills and knowledge expected of the future dentist but it must also equip the new graduate with the foundations on which to continue his education and gain additional competence.

Maxwell G. writes, 'A new course should produce an undifferentiated graduate able to continue his education throughout his professional life.'
SUMMARY

In this thesis, a review of literature was carried out on changes in the concept of education and their relation to the education of future dentists.

(1) Changes should take place in modern progressive society. But changes should not take place for the sake of change itself. Changes in the concept of education should take place in relation to the need and the type of society so that the society can lead a full life.

(2) Role of a teacher is particularly a difficult one as the teacher interacts with children as well as adults. Role conflicts may arise between the teacher and community or authorities because of different role norms and role expectations. The job of the teacher, socially isolates the teacher from the community as he spends most of his life among children. Teachers enter teaching either through a University course or through Colleges of Education and this has an effect on the way the teachers conceive teaching as a career.

Thus, it would be pertinent to view the problems of teacher's role with a broad sociological perspective.

(3) Great strides have taken place in teaching techniques. The knowledge is increasing rapidly and new teaching methodologies have to be utilized in imparting this knowledge.

Microteaching is relatively a new teaching aid and with modification would be a useful tool in education. The other processes of achieving education...
like Interaction Analysis as a Feedback System and Games in the Classroom, would be increasingly introduced in teaching methods as these involve interaction of the teacher and pupils and constant feedback.

(4) There is a wide gap between need and demand for dental care. The available manpower cannot cope with these dental needs and demands.

(5) The two most prevalent chronic diseases - dental caries and periodontal disease - are widespread and affects all sections of the community. Various studies show that the diseases are on the increase and many in the community do not receive dental care.

(6) Recruitment of the right calibre of students for dentistry is essential. Recruitment depends on many factors and also varies from country to country.

(7) The objectives of dental education should take into account the interests of the society and those of the profession.

(8) The present mode of dental education is grossly inadequate. The future dentist has to be trained with emphasis on preventive philosophy. This entails substantial change in the dental curriculum. The following changes will occur:

(i) Integration of some areas of basic and clinical studies.
(ii) Earlier student-patient contact.
(iii) More emphasis on behavioural science.
(iv) Integration of undergraduate and graduate training.
(v) Increased patient care responsibility.
(vi) Training for community practice.
(vii) 'Core' plus elective programmes with flexibility.
(viii) Decrease in time for some subjects.
(ix) Emphasis in individual learning.
(x) Changes in teaching methods and examinations.

(9) Dental auxiliaries are going to be an important and widely used personnel in future delivery of dental care. The auxiliaries would be both operative and non-operative. The operative dental auxiliaries would be increasingly utilized in delivering the clinical treatment so that the dentist can effectively provide his professional knowledge and training in diagnosis, supervision and treatment of specialized and complicated dental cases.

(10) Social and Behavioural Sciences would be an integral part of future dental curriculum. The chronic dental diseases are social and behavioural in nature and thus the Sciences should be central feature in the training of the dental student.

(11) In future, more emphasis would be placed on community and preventive dentistry. The dental student should be trained to view oral disease as part of a whole person. He should be inculcated in the preventive philosophy right from his first year in the dental course.

(12) The future dentist would be a leader of a dental team or of health centres. It is imperative that his undergraduate training consists of courses in organization, ethics, jurisprudence, economics
and management.

(13) Dental educator's role is particularly a difficult one as he has to teach in different learning situations. The dental educators must be familiar with the modern teaching techniques and teaching aids.

(14) The knowledge explosion in dentistry makes it necessary for a dentist to keep abreast with this new knowledge. The undergraduate curriculum should be flexible and permit the student to continue to seek knowledge throughout his life.
CONCLUSION

Dental ill-health abounds and the dentist should bring it under control. This is universally acknowledged.

The development and utilization of manpower is difficult, time-consuming and costly. Therefore, manpower programmes should be directed towards target objectives. The dentists in the past have been educated to think chiefly in terms of therapy, repair and restoration with little emphasis on prevention. This system has to be remedied. The dentist of tomorrow should fill the following roles.

The dentist should be an oral diagnostician. He should be qualified to diagnose and treat all types of oral disease.

The dentist must be a competent treatment planner. He has to function as a quality control and supervision expert.
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