

CHAPTER - I

INTRODUCTION

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CHAPTER - IINTRODUCTION

The role of qualified teachers for the national development is of immense importance. Since the quality of the system of education is determined by the professional competency of the teachers, hence any investment in the field of education will be of little value if the teachers are weak and incompetent. The effective teachers can contribute more in the classroom and in improving the whole system of education. Ryans (1960), rightly remarks: "if the competent teacher can be obtained, the likelihood of attaining desirable educational outcomes is substantial, on the other hand, although school may have excellent material resources in the form of equipment, building and text book, and although curricula may be appropriately adapted to community requirements, if the teachers are misfit or are different to their responsibilities the whole programme is likely to be ineffective and largely wasted". As education in any country is a process to develop their people and society, the teacher has a pivotal role in the process of socialisation which in turn caters to the needs and objectives of a society. This process of socialisation is carried out in the educational institutions of the country.

1.1 TEACHING

Different educators define teaching in different ways. Most of the definitions narrowly view the teaching process. For example, if teaching is seen as an interaction between the teacher and the pupils, it only explains one set of behaviours of teacher; and more important dimensions of teaching are ignored. Several definitions of teaching, such as 'imparting knowledge'; 'giving lessons'; 'training to some action'; or 'making to know how'; described in the dictionary, are also incomplete as they lack direction regarding conditions, means and ends. (Henderson and Lanier, 1973).

Teaching could be defined as 'a process of helping pupils to grow'. But this definition is too broad to explain clearly the professional practice of teaching. So, Henderson and Lanier (1973) suggest the following precise definition describing the unique elements and activities practised by a teacher. 'Teaching is manipulating the variables of instruction to produce intended changes in learner's behaviour'.

Teaching, according to Sanders and Schwab (1980) is a complex task, which involves extensive interaction with a large number of students in the same classroom. The job requires the teacher to understand clearly the complex characteristics of his pupils, because he has to encourage certain forms of behaviour of his students and discourage other forms of behaviour.

Teaching is a human activity, which deals with pupils, parents, and other teacher educators. Teaching involves various kinds of knowledge, skills, human relation techniques and a host of other attributes. Teaching is manipulating the variables of interaction, and these variables are classified into three major classes: humane, environmental and curricular. These variables are present in the context: classroom, school, home and community.

The most fundamental principle of teaching is helping a child to do things on his own. The teacher, therefore, is a mediator, causing learning, helping development and enabling the child to establish his own relationships with his subjects.

Teaching in a generic sense has three focal points: the teacher, the child and the subject. Teaching establishes the relationship between these three. In the process of teaching the teacher is an active agent to establish and develop the relationship between the pupils and the subjects. Teaching, therefore, is considered as a characteristic activity of a teacher.

Today, Science is on a plane of high importance. It is no longer the prerogative of a selected few but it touches, influences and moulds the life of almost all human beings. The role of science as a great social force and major influence on

the economic and technological development of the country has been gaining great significance during recent years, and increasing emphasis is being laid on science education at all levels. Several measures have been taken to strengthen science teaching, specially at the crucial stage of secondary education. Science has been introduced as a part of the core curriculum so that every secondary school pupil should be able to gain a basic understanding of the fundamental principles of scientific phenomena in the midst of which, he lives. In addition, provision has been made for teaching science of an advanced standard for those who have a special aptitude for and a desire to pursue deeper studies in the subject. In view of growing importance of science in the developing industrial economy of the country, and the potential for lucrative employment which it holds, the popular demand for science courses in secondary schools is outpacing the state's capacity to meet it. This is partly due to the lack of sufficient funds to meet the cost of laboratories and equipment which such an expansion would demand. But the greater difficulty lies in the short supply of qualified and trained science teachers.

1.2 SCIENCE EDUCATION AND NATIONAL DEVELOPMENT

The discipline of education today comprises many and varied field of human inquiries, and science has the major share. It is rightly said that the human progress is largely the progress of science and technology. Bangladesh like many other countries, has a colonial past. In 1971, with the emergence of Bangladesh

as an independent nation increasing attention has been paid to the maximum utilisation of its resources by developing agriculture and industry aiming at economic growth and prosperity of the nation. Considering the role of education in general and science education in particular for the national development, the Government of Bangladesh has taken keen interest in reforming the existing system of education in order to fit it best to the national development in the country. The curriculum and the syllabi from class I to class X have been modified and introduced all over the country with special emphasis on science education. The basic objectives of this curriculum have been derived from the National Education Policy (1974) for providing a meaningful education to the learner. The main ideas in this regard are to make the learner well acquainted with the resources around him and develop scientific outlook in order to enable him/her to use scientific knowledge to solve various problems of everyday life.

Secondary education in the country is both preparatory and terminal stages of education. It is terminal for the vast majority of learners who leave school as semi-skilled manpower and join the various developmental sector of the country; and preparatory stage for a few who desire to go for higher education. It is a preparatory stage of education where the basic science is taught for building up a career with the knowledge of science i.e., Doctors, Engineers, Technologists and the Scientists. Harbison and Myers (1962), also prescribe the reform and expansion

of secondary education, placing stress on teaching fundamentals of science and mathematics for developing countries, to build the base for industrialization and agricultural expansion. Therefore, the science education has become a major concern in Bangladesh for its agricultural and industrial developments. The National Science and Technology Policy of Bangladesh (1980), envisaged the ground work of the science education which contributes 60% efforts in any development work. So, high priority is being given to its expansion and qualitative development.

1.3 SCIENCE EDUCATION IN BANGLADESH ?

Curriculum is the totality of experience, it is much more than subject matter. It is as broad as experience itself. It is experience with facts and principles of content, experience in the development of attitudes, habits, skills and understanding. It is the inter-relation of experience in the school and the experience that comes from other aspects of the students' life. Since, learning results from meaningful experience, the curriculum can be more accurately defined as the experience that the students actually have under the direction of the school. The science curriculum thus becomes a series of those school experiences that involve, promote or depend upon the method and content of science and their relation to the life of the students. The present science curriculum of Bangladesh *are* prepared by a number of committees in 1977, following the proposals, suggestions and recommendations of Education Commission (1974).

1.3.1 General Objectives of Science Education

The objectives of science education as a whole upto the secondary level as considered in the curriculum are:

- to develop interest and curiosity about the natural phenomenon and environment;
- to develop skills of observations through the study of natural environment around the students;
- to develop the ability for using scientific method of work;
- to develop ability to think logically;
- to help the student to improve their quality of life and those around them through useful conservation of natural resources;
- to provide students with scientific knowledge and skills to solve problems of daily life;
- to link science education to productivity;
- to help to develop certain vocational productive skills so that the school leavers can keep themselves gainfully occupied by self-employment or such other avenues; and
- to develop in learner a system of values related to their personal and cultural life.

1.3.2 Teacher Training Programmes at the Secondary Level of Bangladesh

For teaching science at the secondary level the quali-

fications required for a teacher are a first degree in appropriate science subject and a one year B.Ed./Dip-in-Education or M.Ed. degree. However, about 35% of the existing science teachers have the professional degrees. And most of them are engaged in teaching at urban schools.

The teacher training colleges (TTC), and the Institute of Education and Research (IER) offering B.Ed./Dip-in-Education, and M.Ed. degree to the secondary school teachers. Bangladesh Institute of Distance Education (BIDE) is also giving B.Ed. degree.

With the tremendous growth of the number of students and schools, there is an acute shortage of trained teachers in the country. Moreover, the further training of existing teachers is essential to keep them aware of modern developments and new methods of teaching. Therefore, the Education Extension Centre in the country organises short-term courses for secondary school teachers in various subjects. It also organises administrative courses for educational administrators, policy makers, consultants, and other people, trying to improve education. Here, in this centre, the teachers are trained to teach effectively by developing personal contact with their students.

1.3.3 Teaching Materials

A detailed list of teaching materials has been given

in the report of curriculum and syllabus against each category of item of the content to be used in the classroom teaching. In the curriculum, emphasis has been given on the use of locally available materials instead of sophisticated teaching materials; and suggestions were given to prepare the low cost teaching materials by the teacher himself. To prepare and develop the design and to control the quality of teaching materials, the Government of Bangladesh has set-up a board, namely, 'Bangladesh Shiksha Upakaran Board' under the Ministry of Education.

1.3.4 Methods to be Used in the Classroom

Methods of teaching science are different from the methods used for teaching of other disciplines. The detailed procedure of using different methods to achieve different skills is mentioned in the curriculum. Teacher's Guide has been produced to help the teacher to teach the lesson effectively.

1.3.5 Laboratory Facilities

Most of the secondary schools of Bangladesh have no proper laboratory facilities. Almost all of the urban schools and some rural schools have only one general laboratory for all the science classes. Only a few urban schools have separate laboratory for Physics, Chemistry

and Biology. Most of the secondary schools have no adequate science equipment and instruments. Some rural schools have only one or two microscopes for all the classes. The situation is better in urban schools. To ensure minimum laboratory facilities in all secondary schools, the government has established an Equipment Development Board, under the Ministry of Education. This organisation supplies essential laboratory equipment usually made of local materials to the school on a priority basis, and also provides training through workshops on the use and making of improvised apparatus to the secondary science teachers.

1.3.6 Evaluation Procedure

It has been suggested in the curriculum that the existing evaluation (annual examination) system has to be re-organised. The Bangladesh Education Commission Report (1974), mentions that the present method of determining the standard and quality of pupils' knowledge at the secondary level is confined to measure his power of memory; and this is done on the basis of written examination held at the end of the academic year. There is no system of comprehensive evaluation at the secondary level. In the Curriculum Report (1976), it has been suggested that the method of evaluation of the student will be of written test (both internal and external), oral test,

practical examination, essay type test, objective test, individual projects, work experience, observation, excursion and students involvement in science club etc. Thus, a number of activities are suggested in the curriculum to gear up the science education. But the entire process depends upon the skill or the competency of the science teacher.

1.4 CONCEPT OF COMPETENCY

From the historical point of view, the term competency is not new. Kinney (1952) in co-operation with California Council of Teacher Education, used the term in his study, 'The Measurement of Good Teacher'. Although educators have referred to competencies over two decades, still there is lack of agreement among educators as to what constitutes competency and how to describe it.

Hema\Chak (1969), believes that competent teachers personalise their teachings, know their subject matters, and related areas, and can percieve the world from the student point of view. Selakovich (1961), indicates that, more learning occurs when the teacher maintains a neat personal appearance, uses correct English, adjusts the programme to individual differences in students, organizes materials, ^{Possesses} a good background of subject matters and shows enthusiasm in teaching. McDonald (1977), mentions about professional competency in teaching. According

to him professional competency of teaching involves continuous problem solving. He observes that pupils differ in a variety of ways. They differ in their interests, abilities, and rate of learning. So, it is obvious that the same instructional procedure may not work for all pupils. A particular instructional procedure may be helpful for a group of pupils. Therefore, McDonald suggests that the teacher should engage in a complex and adaptive form of problem solving. Brunner (1974), mentions that competency is not only confined to problem solving, but also problem finding. Teacher effectiveness is not only the characteristics of the individual teacher but something shared by the teacher and the pupils. How effective the particular teacher is, depends on the nature of the pupil who is being affected.

To some educators, competency is seen as the application of knowledge; to others, it is knowledge and skill combined; still others maintain that knowledge and skill constitute separate competencies. Some equate competencies with behavioral objectives; others see competencies as more global and general; some hold that competency like a behavioral objective demands a very specific set of knowledge; while others state that competencies address only broad process skills that are essentially content and knowledge-free. Some claim that only directly measurable performance comprises competency, while others maintain that unexpected and unmeasurable learning outcomes are included in the concept of competency; (Butlar, 1978).

So, it is seen that there is disagreement among educators about the concept of competency. The move from 'Performance' to competency is one way of looking at the next stage of development in science education. Teachers have learnt to 'Perform' teaching science as inquiry rather than as a collection of informations; they have learnt to 'perform' experiments, activities which are necessary, but not sufficient conditions for the next stage. A variety of skills which should enable a teacher to teach science as inquiry, as problem oriented activity, and enables a teacher to teach science considering the students' environment.

Barr (1961), found investigators who have used various terms to describe or designate the successful teacher. Frequently the term efficiency was applied to the teacher's success and sometimes the teacher behaviours as in teaching efficiency. Gage (1972), mentions that successful teachers' behaviour or teacher characteristics are those that found through empirical research, to be related to something desirable about teachers.

According to Flanders (1970), teacher effectiveness is an area of research which is concerned with relationships between the characteristics of teachers, teaching activities and their effects on the educational outcomes of classroom teaching.

So, the concept of competency is nowhere defined

clearly. The opinions are so different among teachers, educators, and administrators, that each person can be said to have been using his own definition. On the other hand the ambiguities may arise due to lack of interest, adaptability, determination and the initiative taken by the educationist. Problems regarding personality, value system and situational difference make one's behaviour non-static. This non-static behavioural aspects create the problem of measurement and draw conclusion. Though standardised tests, direct classroom observation, ratings and such other activities are the standard practices, the ultimate conception of teacher competency is neither empirical nor logical. So, Travers, (1971) opined that the process of defining effectiveness and ineffectiveness evolved from the reasoned judgement, stands outside the perview of research.

1.5 THE TASK OF TEACHER AND THE REQUIRED SKILLS

According to Henderson and Lanier (1973), a teacher is to perform four major tasks, (a) Assessment; (b) Objectives; (c) Strategies; and (d) Evaluation. Henderson and Lanier explain clearly the tasks of the teachers and the skills needed for performing these tasks effectively.

- (a) Assessment of variables present the instructional situation is the first task of a teacher. Before starting teaching and making any decision about the needed and possible instructional goals and strategies

the teacher studies the behaviour of his pupils and other variables of instruction. The process includes collection of the learners' behavioural data, and data for humane, environmental and curricular variables with which the learner interacts and analyses to draw hypothesis. The learner uses specifications of knowledge and performance of skills required for their growth. So, the skill areas needed by the teacher for performing their assessment tasks, are: skills for collecting data; diagnostic skills; and data analysing skills.

(b) Specification of expected changes in the learners' behaviour is the second task of a teacher. Specification of objectives starts during the assessment period. The teacher identifies the cognitive and affective needs for the growth of their pupils. The specification of objectives must include: (i) a specified set of behavioral outcomes (cognitive and affective aspect of behaviours); (ii) a set of conditions to evaluate the outcomes; and (iii) a specific criterion level. So, the skills needed by the teacher for performing the objectives specification tasks, are: skill of identifying the objectives, skill for specifying the objectives, skill for communicating and negotiating objectives.

(c) Selection, preparation and implementation of strategies for bringing about the desirable changes in the pupils' behaviour is the third task of teacher. There are number of strategies such as operant, respondent and modelling used for human learning. The

skills needed for the tasks, are: decision making skills, preparation skills and implementation skills.

(d) Assessment and evaluation is the fourth task of a teacher. These tasks include: the knowledge of designing, preparing, and implementing assessment alongwith the task of evaluation of instruments and procedure.

Assessment is an important task as it provides the information about the effect of teaching as well as acquisition of knowledge and skills by the pupils. So there should be a continuous effort to assess pupils' progress and teacher's performance by collecting and analysing the data.

The skills required for the task of assessment and evaluation, are: decision making skills; skills for preparing assessment test; data collection skills; data analysis skills; and communication skills.

1.6 PARADIGM OF TEACHING COMPETENCY:

There *has* always been a quest for quality-education which warrants a set of competent teachers to translate the national objectives into action in the classrooms. Questions automatically arise; what this competency means and how it could be generated in the teachers? These questions have attracted the attention of teachers, administrators, researchers

and others who are interested in the quality of education since several decades as it is directly related with the quality of education as well as qualities of teachers, a society needs.

~~There is~~ No clear-cut definition of teaching competency has been identified. Good (1973), defines competency and teaching separately; teaching is narrowly the act of instructing in an educational institution and competencies are those skills, concepts and attitudes needed by all workers regardless of their occupations or specific jobs. Therefore, combining this two definitions the following definition can be arrived at: "Teaching competency is those skills, concepts and attitudes needed by teachers for the act of instructing in an educational institution".

Mitzel (1957) categorises the variables of teaching into 4 types:

1. Human characteristics variables;
2. Contingency variables, which influence the whole complex of behaviours of educational process;
3. Classroom behaviour of teachers and pupils; and
4. Criteria or standards, consisting of intermediate educational goals. (By analysing the Paradigms, it could be said that above said variables, Type-1 is direct determinant of teacher behaviours and pupil variables; and Type-2 is the determinant of pupil behaviours and the environmental variables indirectly

influence the behaviour of both teacher and pupil. The Type-3, Classroom behaviour i.e., teacher pupil interactions in the class is the main source for pupil development).

According to Hoyle (1969), a competent teacher is one who: (1) has the skill to form accurate perceptions of the classroom situation and the changes that occur within the classroom; (2) is aware of the teacher roles which are appropriate to different situations and (3) possesses the personality skills which allow him to adapt to changing situations.

Teacher competency is knowledge, attitudes, skills and self perceptions of the products that derive from the mix of these behaviours resulting in consistent patterns of behaviour leading to the attainment of predicted outcomes (Wilson, 1973).

Teacher competency is the ability of teachers to behave in specified way within a social situation in order to produce empirically demonstrated effects approved by these in the environment in which the teachers function; (Rosencranz and Biddle, 1964).

Butler (1978) puts forward a taxonomy of competency, classifying into three major groups:

- (a) Generic competencies:- All basic learned knowledge and performances which provide fundamental skills for every human activity. Butler also describes Gagne's

hierarchy such as simple responding, motor and verbal chaining, discriminating, classifying, rule using and problem solving, to give a clear idea of generic competencies.

(b) **Definitive competencies:-** These are permanent skills that derive from a programme or institutional goals. As these competencies define the general content of the curriculum and present a complete and comprehensive definition of the institution and its students, so, they are definitive in nature. They are also general to the needs of the students of a major educational programme.

(c) **Enabling Competencies:-** Butler describes enabling competency as the knowledge, skills, attitudes and context through which students can demonstrate the definitive competencies. Here the emphasis has been given on the demonstration of competency not on the acquisition of competency.

Close observation of paradigms makes evidently clear that the teaching ability of teacher is restricted to the act of teaching, i.e. imparting of instruction by the teacher in the classroom. On the other hand, teacher competency is a more global term which expresses a number of teacher acts such as, setting examination paper, maintaining attendance register, attending parent teacher meetings, participating in extra-curri-

cular activities, and the like alongwith the teaching. Butler's taxonomy of competency clearly indicates the skills required to be a competent teacher. The skills are: (1) a mastery in skills; (2) necessary inputs, viz. attitudes, interest, intelligence etc; and (3) a proper participation of the predetermined outputs. According to him, a competent teacher is essentially skilled but a skilled teacher may not be competent. A skilled teacher can only exhibit the different skills in an appreciable manner, but he/she may lack the knowledge about when, where and how to use each skill. So, considering the discussion above, it is possible to derive a tentative conclusion that measurement and prediction of teacher competency is possible by conducting research on classroom teaching.

It is essential to study what goes on in the classroom and how they are related with achieving the objectives. The effectiveness of the teachers counts a great deal in translating these objectives into learning outcomes on the pupils. As such teacher competency plays a vital role in the entire teaching - learning process. The National Policy on Education in Bangladesh (1977) attributes to teaching of science as a major thrust area for national development. Hence, the competency of the science teachers (secondary education) of the country is regarded as the most essential in the present day of demand.

1.7 TEACHING COMPETENCIES

Continuing efforts have been made over the years to

describe the attitudes of an effective teacher and to identify the skills which good teachers must possess, because once the necessary skills are identified, training programmes would be established by the professional education instructions, so that pre-service teachers may achieve their skills.

Olive (1972) analyses teaching through examining what an effective teacher is, rather than what an effective teacher does. He has also described an effective teacher as one who:

1. is fully prepared in his/her subject.
2. has a broad general education.
3. understands the role of the school in the society.
4. holds an adequate concept of himself/herself.
5. understands basic principles of the learning process.
6. demonstrates effective techniques of instruction.
7. efficiently handles management of the classroom.
8. possesses personal characteristics conducive to success in classroom.

But current efforts to describe effective teaching focuses on specification of performance or competencies which the teacher may be expected to demonstrate. When the teacher's behaviours and expected performances are specified, the teacher can work to prepare himself to perform in the desired manner and teacher education programme can be designed accordingly.

Efforts have been made in recent years to specify the skills which are generic or common to teachers at all levels.

Allen and Ryan (1969) have suggested fourteen such skills:

- (1) Stimulus variation
- (2) Set indication
- (3) Closure
- (4) Silence and non-verbal cues
- (5) Reinforcement of student participation
- (6) Fluency in asking questions
- (7) Probing questions
- (8) Higher order questions
- (9) Divergent questions
- (10) recognising attending behaviour
- (11) Illustrating and using examples
- (12) Lecturing
- (13) planned repetition and
- (14) Completeness of communication.

Cooper, Jones and Weber (1973) have specified and explained four different bases related to teacher competencies. These are: (a) Philosophical base (b) Empirical base (c) subject matter base (d) Practitioner base. All the four different bases from which statement of teaching competencies can be generated, are important.

The State of Florida has been a leader in the identification of generic teacher competencies and in the movement of competency based teacher education. In 1975, the Council of Teacher Education (COTE), a group of prominent educators appointed by the State Board of Education spearheaded a project to identify those competencies which are most essential to all teachers. The council involved a large number of educational personnel throughout the State and conducted an extensive review of similar research in Florida and other States. Forty eight generic competencies

which consistently appeared from investigation were selected for a final survey instrument. A random sample of five percent of all certified personnel in the state were asked to rate the competencies. Twenty three competencies met the acceptance criteria. So the State of Florida has included the twenty three generic competencies in State Policy, requiring all persons to demonstrate them in order to be certified as a teacher in the State.

Those 23 generic competencies are grouped around five major categories:

- a. Communication skills;
- b. basic knowledge;
- c. technical skills;
- d. administrative skills and
- e. interpersonal skills.

The twenty three competencies are divided into one hundred and seventeen elements or sub-competencies.

1.8 TEACHER COMPETENCY RELATED TO SECONDARY SCHOOL SCIENCE TEACHING

Simpon and Brown (1977) in their study have identified and validated seven fundamental areas of skills, representing basic science teaching competencies. The skills are as follows:
(1) knowledge of science (2) professional knowledge and attitude
(3) human relation skills (4) planning skills (5) Instructional

skills (6) Management skills and (7) Evaluation skills. With these seven areas of skills a list of 23 basic competencies for teaching secondary school science is prepared.

Butzo and Qureshi (1978) have identified twelve competencies using secondary school science teachers and have validated the statements by using expert judges. The competencies are knowledge; good rapport; individual difference; interest in lessons; discipline; planning lessons; critical thinking; relating ideas; evaluation; responding to students diversions and thoughts, laboratory safety and professional responsibilities.

Chiappetta and Collette (1978) have determined fifteen skills and knowledge which practising teachers needed for secondary science teaching. In their study competencies are ranked as number one, two and three. They have firstly placed human relations, secondly, enquiry teaching and thirdly, employing a variety of instructional techniques.

Thus, from the above presentation it can be understood that to know the quality of teaching, the analysis of effective teaching has to be done in a more specific way. Therefore, it should be more meaningful to identify those desirable competencies of science teachers in teaching of science within the social situation, and to analyse their teaching for the purpose of finding out the factors which influence the teacher to be competent one. These factors may also give us an idea about the

necessary inputs that are to be provided in our teacher development programme. In the light of above discussion the investigator arrived at the competencies and prepared the draft of competencies list.

1.9 RATIONALE OF THE STUDY

In order to chalk out any meaningful programme of quality improvement, we shall have to first identify determinants of quality education. Physical facilities, qualified and competent teachers, curriculum and instructional materials, support materials and equipments, teaching learning strategies, comprehensive and continuous evaluation, and effective management are the major determinants of quality of education. By improving the quality of each one of those elements, we can hope to bring about significant improvement in the overall quality of education. Availability of minimum required facilities is a must for ensuring desirable standards of education. In Bangladesh many primary and secondary schools do not have even the basic facilities. In Aziz's study (1984), it is indicated that none of the schools had specially built classroom for science teaching. About 19 percent of the secondary schools had no laboratory at all. About 61 percent schools have a single laboratory. In the majority of the schools, science laboratories had shortage of water, electricity and gas supply. The schools' libraries had very poor collection of books of science. A large number of the schools of Dhaka City had no playgrounds. The buildings and facilities may

not appear to be directly related to the quality of instruction but these are undoubtedly the pre-requisites for any programme aimed at qualitative improvement of education. It is true that first we create buildings and facilities and then buildings and facilities create us.

Teacher is the most vital input in an educational system. Availability of teachers is inadequate in number and the level of their competency are most essential ingredients to move towards excellence in education. In the absence of institutionalisation of in-service training programmes on a continuing basis, teachers' skills and competencies are fast becoming outdated. They need to be trained in the use of progressive methods of teaching and modern educational technologies. Above all, it is the motivation and professional attitude where our teachers are lacking in. It is well recognised that hidden curriculum plays more significant role than the manifest or stated curriculum in shaping the personality of pupils. It will be in the fitness of things if selection procedures for the recruitments are made more rigorous by putting more premium on personality traits of prospective teachers. Needless to say that rigorous selection of teachers will have to be accompanied by professionalisation of teaching profession which should obviously entail salary scales comparable with those of other professionals.

The teacher occupies unquestionable position in the entire process of education. The super structure of education

will be weak and ineffective if a strong infrastructure in shape of competent teachers are not embodied in the process of education. So the chief concern is to have teachers with certain degrees of competency to teach science to the secondary school students. Only a careful selection of competent teachers will have a positive effect of the system of education. It is not the qualifications or trainings but the quality that counts, and the competency gives rise to the quality in teaching.

The investigator^{is} thus prompted by these quality of teaching, and is interested to study the nature and concept of competency and how it has a direct bearing on teaching of science in Bangladesh. In other words, the researcher has attempted to assess the competency of the science teachers in secondary schools of Bangladesh.

There is almost no empirical study in the field of teacher effectiveness in Bangladesh. Similar is the case of India and abroad. Teacher education has suffered a great deal during the last 50 years or so due to lack of experimental and innovative practices and sustain research work. Especially, "there is a society of experimental classroom studies in which variations for instructional procedures have been manipulated and effectiveness measured", (Rosenshine and Frust 1971). This is chiefly^{the} tone of the practice programme, which has attracted severe criticism from all concerned, mainly for its having no

relevance with the desired change in the teacher behaviour. The studies conducted by Upasani (1966), Joseph (1967), Sharma (1968), Mallaya (1968), Harr et al (1969), Khosla (1970), Saikia (1971), Mehrotra (1974) and observation made by Buch and Yadav (1974) bear testimony to this fact.

The conditions abroad have not been very different. The result of the studies conducted by Biddle and Ellena (1964), Popham and Baker (1968), Popham (1969), Cope (1969), Davies (1969), Flanders (1967), Peterson (1973) and others bring the same fact to the force and one has to agree with Gage (1968) who observes grimly: "Instruction method constitutes one of the most important and promising, but also the utmost frustrating of the areas of educational research and development", and that "Research on teaching has yielded relatively few solid and usable result".

In India too, "teacher education is almost without a sound research base and it would continue to be so if it does not think of alternatives (Passi, 1976).

There are few studies in the field of science education in Bangladesh. The study done by Aziz (1984) has pointed out that during the period of long twenty years no initiative has been taken to assess the status of science education in the country. In 1977 the Government of Bangladesh has reformed the curriculum and syllabus of the school education. As per the

modifications, science has become a compulsory subject at all stages of school education.

Aziz's study also has reflected the gradual development of science teaching resources, physical facilities, and the general structure of science teaching in the country and those developmental activities continuing till now. But to what extent and how competently the science teachers are using those resources to achieve the goal of science education is not known? So, a thorough inquiry about the competency of science teachers ~~are~~ is needed; and the relation between the competency and the different attributes of science teachers may help to develop a better teacher training programme in the country. And if it is possible to determine the characteristics which are commonly associated with good teaching, the in-service teacher training programme could be directed towards increasing the desirable characteristics.

Though a number of related studies lay a foundation of criteria of teacher competencies, still this study may bridge the gap in teacher education programmes; and teacher competency profiles may lay foundation for teacher preparation. Apart from these, this study may help to know the status of science teaching in the classroom of Bangladesh.

Therefore, the present study is an attempt to investigate competency of the science teachers in teaching of science, and to identify the relationship between the competency and inherent

capacity of science teacher, his academic background, and environmental facilities both in home and school.

1.10 STATEMENT OF THE PROBLEM

The present study is " A STUDY OF TEACHING COMPETENCY OF SECONDARY SCHOOL SCIENCE TEACHERS OF DHAKA CITY ".

1.11 OBJECTIVES OF THE STUDY

The objectives of the present study are as follows:

1. To identify the competencies of science teachers in teaching of science.
2. To identify the competent science teachers with the help of the rating scale (constructed by the researcher).
3. To study the competent science teachers in relation to the different attributes such as inherent capacity, environmental facilities (home and school), and academic background.

1.12 SCOPE OF THE STUDY

1. As this study primarily falls in^{to} the scope of understanding the nature of science teaching process in context of Bangladesh classroom teaching and as there are about 200 secondary schools in Dhaka city, this study has therefore been proposed to confine only^{to} 25 percent of the schools.
2. As the proposed study was on the science teacher's teaching competency, only the science teachers of those 50 schools would be included into the sample. Hence teachers involved in teaching other than science subjects are not coming within

the scope of the study.

1.13 OVERVIEW OF THE THESIS

It is obvious that teaching of all disciplines, at all stages, of all the teachers should be improved. To get the better feed back one has to provide better input. In case of teaching the quality teacher can provide quality teaching. Firstly, there is necessary to know the teaching - learning status and the teachers' potentiality in the field of teaching; secondly, by analysing the teaching of those master teachers who are already proved to be competent under the same system; Thirdly, by finding out the attributes which influence competency of those competent teachers. This will help in providing proper inputs for our teacher training programmes also. But, there may not be a universal pattern of teaching adopted by all competent teachers. It is logical to think that different disciplines need different techniques and procedures to make the teaching effective. Thus, the problem emerged as "The study of Teaching competency of secondary School Science Teachers". The study was conducted with objectives like; identifying the competencies of science teachers in teaching science, rating the teachers regarding those competencies and relate the different attributes with the competency of teachers and arriving at a general conclusion of competent teaching of science. Regarding all these the details are given in this chapter of the study of this report.

After giving a review of studies on teaching competency

in India, Bangladesh and abroad a theoretical bases is provided by operationalising the conceptual bases on which the present study was conducted. These are presented in the second chapter i.e., 'Review of Related Literature' of the report.

To analyse the teaching competencies of science teachers, the necessary pre-requisites were to be identified. Thus, the study was conducted under four phases, viz. Phase-I - Identification of science teaching competencies; Phase-II - Development of rating scales; Phase-III - Selection of sample and rating the science teachers; Phase-IV - Interview of 30 competent science teachers rated by the above process and study the relationship between competency and different attributes like, science teachers, academic background, professional qualifications, home and schools environment etc.

Various number of competencies are discussed earlier in this chapter to arrive at the list of competencies used for this study. It is seen that Stanford School of Education suggested 17 competencies in their Competency Appraisal Guide, Allen and Ryan (1969) have suggested fourteen skills which are common to teachers at all levels. The State of Florida identified 23 competencies known as 'Florida's Twenty Three Essential Generic Competencies' which are most essential to all teachers. These competencies are divided into one hundred and seventeen sub-competencies. After thorough investigation the researcher prepared a list of competencies and gave it to the classroom teachers and educationist for rating. Thus, in the first phase of the study,

a list of 30 competencies which are divided into the one hundred and twenty sub-competencies were evolved. On the basis of that list, three different rating scales were prepared, namely,

- a. teachers self evaluation sheet (TSES);
- b. teachers evaluation sheet used by head masters (TES-H); &
- c. teacher evaluation sheet used by pupils (TES-P) in the second phase of the study.

In the third phase, the samples of the study were selected. The rating of those sampled science teachers regarding their competencies were done by the three different raters. In the fourth phase of the study the interview schedule was constructed and the top most thirty science teachers were interviewed. All these are discussed under the methodology of the study which forms the third chapter.

After collecting the data, they were analysed from three different angles as per the objectives of the study. Thus, analysis of teaching competency of 150 science teachers, drawing individual profile of thirty competent teachers in graphic form and connection of thirty top most teachers' competency with their academic qualifications, experience, job satisfaction, home and school environment etc. were done. All these are discussed in three phases in the fourth chapter i.e. analysis part of the report.

The fifth chapter is the last chapter which gives summary and suggestions of the study.