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CHAPTER-I
INTRODUCTION

1.1. TEACHER EDUCATION

Clarke 1970 says that, Teaching constitute activities that are designed and performed to produce change in pupil behavior. Statement of Komisar 1966 is that, Teaching include so many activities such as introducing, demonstrating, citing, hypothesizing, reporting, conjecturing, conforming, contrasting, explaining, questioning, elaborating, etc. According to Gage 1968 teaching skills are specific instructional technique and procedure that a teacher may use in classroom. They represent an analysis of the teaching process into relatively discrete components that can be used in different combination in the continuous flow of teacher's performance.

Education commission 1964-66 has emphasized the role of a teacher as “Of all the different factors which influence the quality of education and its contribution to national development, the quality, competence and character of teachers are undoubtedly the most significant. Nothing is more important than securing a sufficient supply of high quality recruits to the teaching profession, providing them with the best possible professional preparation and creating satisfactory conditions of work in which they can be fully effective.”
National policy on education, 1986 and its Programme of Action, 1992 emphasized the need for restructuring and strengthening of teacher education having several components. Accordingly a centrally sponsored scheme in each district was launched to improve the quality of teacher education. The establishment of District Institute of Education (DIET) in the country is one of the most important components of the scheme. The mission of DIET is to provide support to elementary education, Non formal Education and Adult literacy.

The major functions of DIET are

a) To organize pre-service and In-Service teacher education for elementary school teachers.

b) To Provide resource support (Extension/guidance, development of materials, aids, evaluation tools etc,

c) To conduct action research.

District institute of education and training are visualized as vibrant institutions at the district level to provide academic and resource support at the grass root levels for the success of various strategies and programmes being undertaken in the areas of elementary and adult education.” Quality of education has emerged as an important priority. The DIETs have a critical role in this direction. Teacher education is a continuous process. Pre-service and in-service training of teachers
therefore form an important component of this process. The role of DIET can be broadly classified as transactional and transformational. The transactional role the DIET undertakes the training of headmasters and teachers at elementary stage through pre-service and in-service training. Transformational role the DIET has to act as agent of change by introducing new ideas and methods through refresher courses at the grass root workers.

1.2. TEACHING COMPETENCY

In general competency is a set of elements which leads not only to develop a skill but also a good combination of knowledge, understanding, problem solving abilities and values (attitudes). Competency is equipping the teacher with adequate knowledge and ideas to begin with profession career. Competency is the demonstration of knowledge, skills and attitudes required to perform a given task or act. Competency is transformation of inborn/innate qualities and concealed/hidden strength of the individual into application (utility).

According to Medley and Mitzel, 1962, teaching competency is defined as the average success of all of teacher’s behaviour in achieving his intended effect. Teaching competency is said to be the knowledge, attitude, skills and self perception or the products that derive from the mixture of these behaviours resulting in consistent pattern of behaviour leading to the attainment of predicted outcomes (Wilson, 1973). The
possessions of the teacher, his knowledge, skills, attitude, personality configuration and the like are referred to as competencies; they lend the character dimensions to teaching (Haskew, 1956). The competency of a teacher is defined as the average success of all his behaviours in achieving their intended effects “Successful teaching is a teaching that brings about effective learning. The decisive question is not what methods or procedures are employed but whether they are old fashioned or modern, time tested or experimental, conventional or progressive (James,1954), Teaching competency is one or more abilities of a teacher to produce agreed upon educational effects (Biddle, 1964).

A competent teacher is one who has the skill of accurate perceptions of the classroom situation and the changes that occur within the class-room is aware of the teacher’s role which are appropriate to different situations, and Possesses the personality skills which allow him to adopt to changing situations; (Hoyle 1969). “Teacher competencies are various attitudes, understanding, skills and behaviors that facilitate intellectual, social, emotional and physical growth in children” (Copper et, al., 1973). “Teaching competency is those skills, concepts and attitudes needed by teachers for the act of instruction in an educational institution” (Good, 1973). “Competent teaching is assumed to be made up of a collection of modular skills and a chain of performances on such modules constitutes effective teaching performance” (Travers, 1973).
According to the Common Wealth Report 1974, A competent teacher must have knowledge of child development, the material to be taught and suitable methods of teaching it, the culture of his pupils. His skills must enable him to teach advise and guide his pupils, community and culture with which he is involved. His attitudes should be positive without being aggressive so that his example is likely to be followed as he transmits explicitly and implicitly the national aims and ideas and moral and social values.

1.3. COMPETENCY BASED TEACHER EDUCATION

From the aspect of Passi and Sharma, 1981, the concept of teaching competency in India emerged from competency based Teacher Education (CBTE) programme. The education commission of India provides for free compulsory education for all children up to the age of 14 years. Children have to be moulded and guided for proper development of their talents and for that purpose the teacher must possess the required competencies skills and the bent of mind. Competency means the right way of doing things. The Quality of Competence are enthusiasm, fluency, industry, neatness, originality, adaptability and thrift. In teaching, the competency means the right way of conveying the units of knowledge, application, and skills to the students and the knowledge of contents, methods, and communication. Teacher education is the research based
understanding of teachers competencies like contextual, conceptual, content, transactional, evaluative, management competencies.

1.4. SCIENCE EDUCATION

Science-Encyclopedia (1963) states that “Science is an accumulated and systematized learning in general usage restricted to natural phenomenon. The progress of science is marked not only by an accumulation of fact, but also the emergence of scientific method and of the scientific attitude.” “Science surpasses the old miracles of mythology” –Emerson.

Hurd 1954 states that “Science can justify its place in the curriculum only when it produces important changes in young pupils, changes in their ways of thinking, in their habits of action and in the values they assign to what they have and what they do.”

Paul Hurd states that the objectives of science teaching were the teachers first consideration in planning curriculum. All India Seminar on Teaching of Science in secondary schools, 1956 states that “one of the aims and objectives of teaching general science should be to acquaint the pupil with the scientific method and enable him to develop scientific attitude.”

Education Commission 1964-66, states that “Science Education must become an integral part of school education; and ultimately some
stuff of science should become a part of all courses in the humanities and social sciences. The quality of science teaching is to be developed considerably so as to achieve its proper objectives and purposes, to understand basic principles; to develop problem solving, analytical skills and ability to apply them to the problems to material environments and social living besides promoting the spirit of enquiry and experimentation. Science strengthens commitments of man to free enquiry and search for truth as its highest duty and obligation, by its emphasis on reason and free enquiry it even helps to lessen ideological tensions”

First Asian Regional conference on school Biology, recommended in Asia to develop and instill in student the scientific attitude of inquiry and experimentation. National Council of educational Research and Training, also stated that the pupil should develop scientific attitude towards scientific phenomena. Science educators have recognized that the scientific attitude as one of the most important outcomes which should result from science teaching.

1.5. OBJECTIVES OF SCIENCE EDUCATION

The NCERT suggested the objectives of teaching general science at the elementary stage of education covering the age group 6-14 is to acquire knowledge of biological, physical and material environment, to develop skills of solving problems and their application to life problems, to locate problems as well as to design procedures to solve them, collect
proper data and methodically organize them, observe accurately and interpret results logically, develop scientific attitude of mind and inculcate good personal and social habits such as objectives and unbiased outlook, love for truth, inquisitiveness, accuracy and precision, right health habits, habit of enquiry, initiative and logical thinking, develop interest and appreciation such as interest in scientific phenomena and scientific activities as well as scientific literature and habits, understand the impact of science on everyday life and the society, contributions of the scientist and their sacrifices.

The aim of teaching science can be summarized under the following categories.

a) Acquisition of knowledge and information.

b) Development of interest and appreciation

c) Development of favorable habits.

d) Training in scientific method

e) Development of scientific attitude.

f) Development of skills and abilities.

g) Science studies as a basis of future career

h) Provision of utilization of leisure.
The National policy on Education 1986 has also emphasized the generation of scientific attitude among the students through its curriculum and teacher, as follows

- Science education will be strengthened so as to develop in the child, well defined abilities and values such as the spirit of inquiry, creativity, objectivity, the courage to question, and an aesthetic sensibility.

- Science education programme will be designed to enable the learner to acquire problem solving and decision making skills and to discover the relationship of science with health, agriculture, industry, and other aspects of daily life, every effort will be made to extend science education to the vast numbers who have remained outside the place of formal education.

1.6. COMPETENCIES IN TEACHING SCIENCE

The General Competencies in Science Education are,

- The Teacher candidate understands the central concepts of science, tools of inquiry, and structures of the discipline and can create learning experiences that make science personally, vocationally and academically meaningful and relevant for students.
• Teacher candidate understands that children construct meaning and can provide learning opportunities that support their intellectual, social and personal development.

• The Teacher candidate understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to diverse student needs including: gender, cultural or ethnic background, disabilities, aspirations, or interest in science.

• The Teacher candidate understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem solving, and performance skills and matches these strategies to content learning theory and student diversity.

• The Teacher candidate uses an understanding of individual and group motivation and behavior to create a safe, ethical, and legal learning environment that encourages positive social interaction, active engagement in learning, and self-motivation.

• The Teacher candidate uses knowledge of effective verbal, nonverbal, and media communication technique to foster active inquiry, collaboration, and supportive interaction in the classroom.

• The Teacher candidate plans instruction based upon knowledge science and students in the context of the community, and curriculum goals.
• The Teacher candidate understands and uses a variety of formal and informal authentic assessment strategies to evaluate and ensure the continuous intellectual, social and physical development of the learner and encourage student self-assessment.

• The Teacher candidate is a reflective practitioner who constantly analyses, evaluates, and strengthens their practice in order to improve the quality of their students' learning experiences.

• The Teacher candidate fosters relationships with school colleagues, parents and agencies in the larger community to support individual students, learning needs and overall teaching practice.

• Accomplished science teachers create opportunities for students to integrate and coordinate the context of science with other subject areas.

• Science Teachers are aware of and act on a knowledge related to social, ethical and legal aspects of teaching.

1.7. METACOGNITION AND EDUCATION

Many researchers are shifting their attention from the theoretical to the practical, from the laboratory to the classroom. For example, Borkowski and Muthukrishna (1992) argue that metacognitive theory has "considerable potential for aiding teachers as they strive to construct classroom environments that focus on strategic learning that is both
flexible and creative" and Paris and Winograd (1990) argue that "students can enhance their learning by becoming aware of their own thinking as they read, write, and solve problems in school. Teachers can promote this awareness directly by informing students about effective problem-solving strategies and discussing cognitive and motivational characteristics of thinking".

Metacognition is important for two reasons. One is that it enables us to use our knowledge and strategies much more efficiently by being selective. Students with high levels of metacognition engage in deeper processing and learn more even though they do not allocate more time or effort to learning. A second reason is that metacognition compensates for average or low ability. Research shows that, when metacognitive awareness is high, students perform faster and more efficiently even when their ability is no higher than other students (Swanson, 1990).

Students need to understand the role of metacognition in self-regulation. To facilitate this understanding, teachers can discuss the importance of metacognitive knowledge and regulation. Ideally, such a discussion helps students construct an explicit mental model of the self-regulation process (Schraw & Moshman, 1995). Another way is for teachers to model their own metacognition for their students. Too often teachers discuss and model their cognition (i.e., how to perform a task)
without modeling metacognition (i.e., how they think about and monitor their performance). A third way is to provide time for group discussion and reflection, despite time demands. Peer modeling of both strategies and metacognition not only improves performance, but increases self-efficacy as well (Schraw, 1998a).

1.8. MOTIVATION

The International Encyclopedia of Education – vol:6 defines motivation as the term referring to the causes for the initiation, continuation, (or cessation) and direction of behaviour. The intensity and direction of motivation may vary from person to person.

The Encyclopedia of Psychology defines Motivation as “a concept used to explain different amounts of effort or persistence shown by different people on the same task”.

The various authors statements about motivation are,

“Motivation is the direction and regulation of behaviour towards a goal” Yokam and Simpson.

“The organism must be motivated to learn” McConnell

“Learning will proceed best if motivated” Anderson

“Motivation is an essential condition of Learning” Melton
“The problem of motivation is central both to educational psychology and to the class room procedure” Harris

“Motivation is the basic problem of psychology in education” Bernard

“Motivation is the central factor in the efficient management of the process of learning. Some type of motivation must be present in all learning” Kelly

“All motives are learned” McClelland

“The arousal of tendency to act to produce one or more effects” Atkinson

“Motivation is the stimulation of actions towards a particular objective where previously there was little or no attraction to that goal”, Bernard

“A motive is any particular internal factor or condition that tends to initiate and sustain activity”, J.P. Guilford

“Motivation in school learning involves, arousing, persisting, sustaining and directing desirable behavior”, B.F. Skinner.

“Motivation is the process of arousing, sustaining and regulating activity “Good.
Motivation is “a process in which the learner’s internal energies or needs are directed towards various goals or objects in his environment”, Blair, Jones & Simpson

“Motivation is a process by which man is impelled to seek some goal” Brink.

“Motivation is a drive toward learning the specific objectives at hand” Morrison

“Motivation is a process whereby a person is internally or externally stimulated towards activity“, Rusk.

“The study of motivation broadly as a research for determinants-all determinants of human and animal activity.” Young

“It is a general name for the fact that an organism acts are partly determined by its nature or internal structure.” Murphy 1947

“Those factors which tend to increase or decrease the Virus in an individual. It determines level of activity in him, It imitates and directs the activity.” Dececco

Hebb states that in the motivation process, pattern and direction and not the arousal of activity have been taken into account. Motivation then refers to the existence of an organized phase sequence, to its direction or content, and to its persistence in a given direction.
1.9. NEED FOR THE STUDY

The role of science teachers demand new skills and competencies in addition to the curriculum oriented roles. The science teacher is supposed to be the guide of the community and he should know the new developments in the field of science and technology. The science teacher need to equip them with skills and competencies to meet the challenges in teaching and learning process. The science teaching in its content and methodology needs renewal. The teacher trainees have to identify the requisite skills /competencies and strategies to teach effectively. The objective of science education is to equip all science teachers with such skills so that a complete transformation will be possible.

1.10. NEED FOR RESEARCH IN SCIENCE EDUCATION

Science education research is aimed at improving the teaching and learning of science, and will improve the quality of science education. New knowledge and ideas is an essential function of higher education. Knowledge is the ultimate goal of educational research. The research findings help to teachers improve their ability to make professional decisions concerning how to successfully implement the curriculum.

1.11. STATEMENT OF THE PROBLEM

The competency in teaching is a function of efficiency and motivation. Intrinsic motivated teachers give their best to the students. Students with intrinsic motivation enjoy learning for their own sake.
More over the metacognition and self-regulation enhance the performance of the students. So in the present investigation, the investigator intends to develop the competencies in teaching science through the metacognitive and motivation intervention strategies. Hence the problem for the present study is stated as follows:

“EFFECT OF METACOGNITION AND MOTIVATION INTERVENTION STRATEGIES ON DEVELOPING COMPETENCIES IN TEACHING SCIENCE AMONG DIET TRAINEES”

1.12. SCOPE OF THE STUDY

The National Policy insists on the quality education means a competent teacher and competency based teacher education. Unless the teacher is trained in required competencies, the quality education is not possible. During the In-service programme for the primary teachers conducted in the DIET, the researcher had noticed that the teachers themselves lack proper orientation and training in various competencies needed for teaching. Unless they are given need based training in developing the competencies in teaching, they can not do justice to their job. As proposed by the National Policy on Education (1986) there is an urgent need to modify the curriculum and methodologies of learning through appropriate research and development to incorporate elements of science process skills and creativity. The study makes its attempt in these lines.