Chapter – III

Review of Related Literature

3.1 INTRODUCTION

3.1 STUDIES CONDUCTED IN ABROAD

3.2 STUDIES CONDUCTED IN INDIA

3.1 Introduction
The purpose of the present chapter is to survey and review the research studies carried out on curriculum for secondary level physical science education. Such a review should help in formulating the research problem, specifying the objectives, developing a conceptual framework, selecting appropriate tools and methodology and also in drawing meaningful conclusions. However, it should be remembered that, unlike many other types of research studies, curriculum evaluation is mainly a context specific activity. In other words, the main focus of any curriculum evaluation study is on specific concepts and practices that are in vogue in a particular region and at particular time. Thus it is quite evident that it is only those studies which have been conducted in Tripura that can be of direct import and assistance for present investigation. This is not to mean that studies carried out in other countries will bear no relevance to the present study. Rather it implies that the relevance becomes more and more remote and indirect as one move away from the context in which the present study is to be carried out.

The major focus of review of research in the present study should have been exclusively on studies on the secondary physical science curriculum in Tripura. A researcher is compelled to take lead from the researches conducted in the western countries and other states of India. It is in this context that an attempt has been made to present in this chapter a general review of studies on secondary curriculum conducted in various countries and other states of India. The review has been presented in the form of brief abstracts of the studies highlighting their objecting, content facilities for implementation and academic achievement. These have been classified and presented under two sections as studies in other countries and studies in India.

3.2 Studies conducted in Abroad

Taipei Normal Junior College (1966) conducted an investigation of the school curriculum in Taiwan. The main aspect of the study involved were the examination of the course load, method of teaching in the class room, instructional materials etc. The study revealed that the curriculum was overloaded and contained too many abstract concepts which were overlapping.
The necessity and importance of audio-visual aids as means of instruction should be emphasized. There was a necessity to create a governmental organ in order to improve school curricula. The findings of the study also indicate that the teacher should be provided with guide book and teaching aids in various subjects. The method of instruction was not adjusted to the nature of the topic taught. The influence of the examination system on the workload of the pupil was too strong. Similar study had conducted by Phelps (1975) on survey of middle school in Georgia with a view to investigating the status schools with regard to the facility, the community, the staff and the curriculum. The investigator developed a questionnaire and surveyed all schools in Georgia. The study showed that the student teacher ratio was 18:1. The study also revealed that the organization for instruction was largely departmentalization with six or seven periods a day. A better facility in terms of space was needed.

The Department of Research and Evaluation under the Ministry of Education in Iran (1966) examined the first grade textbook for the primary schools in Iran. A textbook containing 161 words was used as the basis for evaluation. The study revealed that the first grade textbook was valid for the level of first grade pupils’ characteristics. Wacira (1973) evaluated the relevance of the new primary school syllabus of Kenya. The study was designed to find out the extent to which the syllabuses were suitable to the rural primary school children and how far was in line with the development of the rural economy in New Kenya. After a brief discussion of the pre- and post-independence elementary education and its impact on society as a whole, a comparison of the 1967 syllabuses with there of 1962 was made by the researcher. The study revealed that the new syllabus, rather than revising and reordering the priorities of elementary education, was in large part, an exact copy of the earlier syllabus. It also showed that the implementation of English as a medium of instruction and the science curriculum completely devoid of rural application would, in the long run, tend to socialize the children into an alien culture and to further dissociate them from their rural environment.

Piper (1974) analysed the content of selected public elementary school curriculum guides in American schools with a view to determining the extent
of the content reflected in the printed guide and the extent of using the guides as basis references. Four subjects areas namely, language arts, mathematics, science and social studies from 38 curriculum guides, one from each city district, were surveyed by the investigator. He found that there were many divergent practices with respect to organizational structures of the curriculum guide from one district to another. He also showed that neither science nor social studies areas included any content which dealt with the contemporary problems. The study was concluded by stating that curriculum guides, despite their prevalence, were not a completely reliable guide to actual content. Esterly (1974) made an effort for assessing the “Impact of the Afghanistan Ministry of Education Curriculum, and Text-book Project on primary school student learning”. He analysed the historical development of the project within the educational environment of Afghanistan between 1966-1973. The study revealed that the textbooks and the teachers’ guides produced by the project were contributing positively to Afghan primary school pupil learning.

Md.Anowarul Aziz (1984), studied on Science Education Programme in the Secondary Schools of Bangladesh. The objectives of his study were (i) to study the science education programme of Bangladesh with reference to physical facilities, budget allocations, science teachers, methods of teaching science, evaluation procedures and problems of science teaching, (ii) to study the science textbooks in terms of content, language etc., and (iii) to study the science education practice in selected schools with varied physical facilities. The major findings were: 1. All schools showed a general shortage of science teachers, except non government rural schools. The shortage of science teachers was more in non-government urban schools. 2. The average class size was much larger than the optimum size of forty in all types of schools, except non-government rural girl schools. 3. Due to their non-science background, the majority of the heads of the schools did not take special interest in science education. 4. The number of periods allotted per week for science teaching was less than the number officially prescribed. 5. About 19 per cent of the schools had no science laboratories. 6. The majority of the science laboratories did not have water, gas and electricity supply. 7. Very few schools had audio-visual gadgets. 8. The libraries of all the schools were poor. 11. Only 6% of
the science teachers were M.Sc.s, 87.2% B.Sc.s and about 7% were undergraduates. 12. Only about 39% of the science teachers were professionally trained. 13. The average teaching load of science teachers was about 34 periods per week. 14. Almost all the science teachers used lecture method for science teaching. 15. The community resources were not used by science teachers. 16. A large majority of the science teachers evaluated the students through annual and terminal examinations. 17. Monthly and fortnightly tests and class quizzes were not reported from any school. 18. The physical aspects of science textbooks were rather poor. 19. In schools of both types, teaching aids remained underutilized. 20. The students of schools of both types had a favorable attitude towards science. The major educational implications of the findings of this research are: 1. The supervision of science teaching should be streamlined. 2. The supervisor should see that innovative science reaching methods are used by the teachers. 3. Objective-centered evaluation through objective types of tests should be introduced. 4. A planned programme of in-service education of science teachers should be developed. 5. Orpwood and Werdelin (1987) have explored the partnership between education, science and technology in support of national development. They point out that technology, defined in terms of tools, materials and techniques to meet basic human needs and desires, has traditionally been passed down through generations. In history, technology has preceded science while technology education has been independent of science. The partnership between science and technology which developed over the years was not successfully transferred to the classroom, while the partnership between technology and education that existed in traditional cultures did not survive the take-over of education by formal schooling. In the meanwhile, science, which was always a matter of formal schooling, retained its academic orientation (Orpwood and Werdelin, 1987). A meaningful technology curriculum might be one way to challenge this state of affairs.

A UNESCO survey of science and technology in school curricula in India, the Maldives, Nepal, Pakistan and Sri Lanka found that, with the exception of the Maldives, the total hours of schooling were higher than the world average, while the time devoted to science teaching was lower.
Exceptionally in the Maldives, where the total hours of schooling were found to be less than the world average, the time given to science at the secondary level was more (UNESCO, 1986). As for demand, only 26 per cent of South Asian students at the tertiary level are enrolled in the natural and applied sciences, compared with an average of 30 per cent for all developing countries (SURF-UNDP, 2001). In recent years, Bangladesh has seen a dramatic decrease in the percentage of students enrolling in the science stream at the secondary school level (Bangladesh Education Statistics, 1995 and BANBAIS, 1996, cited in Mian, 1998). Using a data set from the National Education Longitudinal Study, Anderman (1998) reported that students with learning disabilities scored nearly one standard deviation lower than students without learning disabilities on science achievement tests.

Carlisle and Andrews (1993) reported that students with learning disabilities performed significantly lower than their peers on a science curriculum-based assessment. These students also rated themselves, and were rated by their teachers more negatively. Parmar, Deluca, and Janczak (1994) found that students with learning disabilities read science text at only about half the fluency rate as students without disabilities. The eighth grade student with learning disabilities reads similarly to a typical third or fourth grade normally achieving student. In a second study, students with learning disabilities performed poorly on a test of reading comprehension of science texts, while a third study demonstrated that students with mild disabilities performed substantially more poorly on both reading and listening science vocabulary measures. The authors concluded, "students with disabilities will not learn effectively in science if instruction is primarily language based" Shepard and Adjogah (1994) reported that students with learning disabilities at elementary-age and intermediate-age levels performed significantly more poorly on expressive and receptive science vocabulary tests, as well as on a test of science meanings. McFarland and Shepard (1995) reported that middle school students with learning disabilities performed poorly on written science compositions, and exhibited little reflective thought through this format.
The House of Commons Science and Technology Committee Report on Science Education 14-19 (HOCSTC, 2002) found that the science curriculum was “inflexible, irrelevant, repetitive and prevents debate” (p15), while the report was specifically referring to the English curriculum, the debate on what a suitable curriculum should consist of has been considered in the past in Scotland. The Scottish Consultative Committee on the Curriculum, responding to growing awareness of the need for an increasing public understanding of science and a more scientifically literate citizenry, established a Science Review Group, the remit of which was to go beyond immediate concerns over quality and effectiveness of provision, to consider broader questions about “the nature of science and the science component of the curriculum” (SCCC, 1996, p4). The result of the Science Review Group’s deliberations was to define science in terms of scientific capability which consisted of five distinct aspects: scientific curiosity – an enquiring habit of mind; scientific competence – ability to investigate scientifically; scientific understanding – understanding of scientific ideas and the way science works; scientific creativity – ability to think and act creatively; and scientific sensitivity – critical awareness of the role of science in society, combined with a caring and responsible disposition.

A report in England and Wales, Beyond 2000: Science Education for the Future (Millar and Osborne, 1998), concluded that the National Curriculum for England and Wales had failed to meet the needs of contemporary society, much less anticipated the needs of future society. The authors acknowledged that ‘the changing curricular position of science has not been accompanied by corresponding change in the content of the science curriculum . . . This has remained fundamentally unaltered and is, essentially, a diluted form of the 1960s GCE curriculum’ (p.4). The report goes on to give ten recommendations which include that there should be more emphasis on technology and the applications of science; greater attention should be given to the social processes used to generate, test and scrutinize knowledge claims; teachers should employ a wider range of teaching and learning approaches, including the use of case studies of historical and current issues; new and broader approaches to assessment should be devised and implemented in order to
focus attention on the more important aspects of learning. Hodson (2003) examining the science curriculum from a Canadian perspective, but dealing with issues of global concern, stated, when referring to the SCCCs report in largely positive terms, “it is interesting and extremely disappointing that a document purporting to be action-oriented does not include preparation for sociopolitical action by students in its definition of scientific capability” (p653). However, it should be noted that Hodson’s view of the necessary changes to the science curriculum to be one geared to socio-political action which equips “students with the capacity and commitment to take appropriate, responsible and effective action on matters of social, economic, environmental and moral-ethical concern”, is a position which, while not restricted to him (Roth and Desautels, undated, Roth & Desautels, 2002) is, in Hodson’s own words “…likely to be disturbing to science teachers, severely testing both their competence and confidence. Traditionally, science education has dealt with established and secure knowledge, while contested knowledge, multiple solutions, controversy and ethics have been excluded.”

Hipkins et al. (2002) in examining the research literature on learning and teaching in science for the Ministry of Education in New Zealand suggest implications in three broad areas. While the third of these specifically mentions New Zealand, the issues are likely to be just as pertinent to the Scottish situation.

1) **Professional development and pre-service teacher education.**
   - To conceptualize and plan for meeting a wider range of purposes for learning in science, teachers need to develop deeper understandings of the nature and characteristics of science and, in some cases, a richer pedagogical content knowledge to draw on when teaching science.
   - Basic literacy strategies and knowledge of the particular challenges of reading and writing in science need to be part of every teachers’ pedagogical content knowledge.
   - Science teachers at the secondary level may need support to become confident in using pedagogies for the purpose of drawing out and exploring a range of student ideas and opinions.
• New strategies such as the use of narrative in science learning are likely to be unfamiliar to many teachers. With increasing familiarity and confidence in these strategies, existing curriculum resources could be better utilized than is currently the case.

• Developing teachers’ knowledge requires enough time for in-depth engagement with these ideas and the opportunity to develop conceptual frameworks that they can successfully apply in their teaching. The short length of pre-service teacher education programs and sporadic opportunities for in-service teacher development in science education needs to be addressed.

2) Curriculum.

• Wide dialogue about the purposes for learning science could unsettle the usual practice of ‘science for the preparation of future scientists’ as the main purpose of science learning for all students.

• Curriculum content reduction could ease the imperative of ‘curriculum coverage’ that appears to constrain the use of the well-researched wide range of successful classroom pedagogies.

Aikenhead (2003), in his review of research on humanistic perspectives in science curricula, concludes that students do positively respond to and can learn usefully from humanistic science curricula but that there are paradoxes and trade-offs evident from the research. Thus he observes that relevant contexts alone do not ensure more learning of science; that values and self-identity necessarily count; where there are contentious issues, the more important the values the less important the content; the more explicit the instruction and the assessment regarding humanistic content, the better the learning, but the greater the challenge to teachers and teaching. Aikenhead suggests that we should be cautious in believing that the minority of students’ intent upon specializing in science (‘pipeline’ students) will respond to humanistic science. In his discussion of the implications of the research he so carefully reviews, he remains concerned over the fundamental dilemma as to whether science courses should serve humanistic ends (general educational ends, akin to those served by other subjects in the school curriculum) or whether they should continue to feed ‘the pipeline’. Aikenhead wants researchers to amalgamate the educational and the political to ensure that real
progress will be made; consensus-making research and development on a reasonable scale is essential. Kelly (2000) described 141 studies that have investigated various learning outcomes from science centre visits, including those relating specifically to visiting school groups (Rennie and McClafferty, 1996). Studies confirm that these visits can provide valuable and often motivational opportunities for students to learn science. It is well documented that informal learning experiences can more effective than formal schooling in bringing about awareness of issues, attitudinal shifts and willingness to engage in action (Ramey-Gassert and Walberg, 1994; Rennie and McClafferty, 1996; Jeffrey-Clay, 1999; Pedretti, 2002). Informal learning experiences are particularly well positioned to facilitate the affective and social components of learning (Alsop and Watts, 1997; Meredith, Fortner and Mullins, 1997). As stated by Barker et al. “the evidence in support of the educational impacts of fieldwork on children is conclusive (eg. Bogner, 1998; Nundy, 2001), but is largely focused on younger children. There is also clear evidence in other areas of education that a mix of teaching and learning approaches – including ‘hands-on’ and differentiated learning, which characterises much outdoor teaching – does help to meet the needs of the whole class. It also helps to motivate and inspire children who may otherwise be sidelined by a more formal classroom situation (Nundy, 2001)”.

While Davies’ (2004) study suggests that, “as a result of joint planning and implementation of a bridging unit, there had been an increase in the secondary school teachers’ understanding of both the range of the science curriculum covered in primary schools and pupils’ levels of attainment in the procedures of scientific enquiry. There was also evidence that transfer assessment information was informing planning and that pupils were experiencing greater continuity in their science education”. Galton suggests giving “less attention to the production of curriculum materials, as with the current emphasis on the use of bridging units, and to pay more attention to establishing greater continuity in teaching (approaches)”. Assessment one of the key problems to be addressed is that of assessment. While, some recent work has contributed significantly to this (Black and Wiliam, 1998), much of the assessment pupils are likely to encounter in a secondary science class is
based on exercises and tasks that rely heavily on memorisation and recall, and are quite unlike those contexts in which learners might wish to use science knowledge or skills in later life (Millar and Osborne, 1998). Jones and Baker.(2005). points out by research that the importance of teaching science in real contexts in order to engage students interest, to increase the relevance of science to students’ lives, and to help students develop better understandings in science and about science. Related to the moral, ethical and social aspects of science are the local and global implications of science issues and how, as well as being important for the development of scientific literacy and citizenship skills, they provide real-life contexts for the study of scientific knowledge as well as providing relevance and motivation for the students engaged in their study (Colucci-Gray et al., in press; Carter, 2005; Hodson, 2003). In addition there is a growing body of literature which suggests that the current science curriculum is dominated by “western” science and more acknowledgements should be given to science derived from other cultures as well as indigenous science e.g. (Hipkins, 2002; Snively and Corsiglia, 2001).

3.3. Studies conducted in India

Gothivererkar (1947) evaluated the school curriculum in Bombay highlighting the objectives of education as laid down during the British period. He reported that the aims of education in British regime were narrow and the curriculum did not fulfill the aim of developing an individual’s body, mind and spirit in consonance with his ability, aptitude and interest. Physical education was completely neglected and such useful subjects as drawing art, craft, music and moral education did not find place in the curriculum. Gupta (1973) also critically analysed the elementary curriculum in NEFA of Arunachal. His main aim was to examine the extended to which the curriculum was suited to the socio-economic and cultural needs of the children. He observed that the curriculum suffered from overemphasis on the three R’s. It was subject-centered, dominated by examination and isolated from the real life and environment of the children.
Walavalkar (1971) critically evaluated the mathematics textbooks for standards II, III and IV in Maharashtra adopting the technique of content analysis with a view to finding out errors and examining the suitability of these textbooks for the level of understanding of the pupils. There were a number of minor faults in the textbooks which needed to be rectified. It was necessary to provide an answer key for all the exercise given in textbooks. Joshi (1972) also followed the same procedure for analyzing the science textbook for standard IV in Maharashtra focusing on the suitability of the content, illustrations, language, and vocabulary provided in the text book. He observed that the contents of the textbook except in the case of one lesson were suitable to the age of the pupils. The sequence of presentation of information was quite proper. The content was free from errors. There was need to increase the coloured pictures in the text book, some of the pictorial illustrations were not accompanied by definite description and instructions regarding what to look for. Singh, U.S. (1977) studied on Development of Curriculum in Science for Secondary School in the state of Maharashtra. The study found that, significant difference between the means of achievement in knowledge objective was found in three out of six schools, significant difference between the means of achievement in skill objective was found in all the schools, significant difference between the means of achievement in application objective was found in five out of the six schools.

Sali (1978) surveyed the Kolhapur district of Maharashtra with view to finding out the difficulties in implementing the new curriculum of the secondary schools. Questionnaire, interview, record survey, discussion and observation techniques were used for the conduct of the study. He reported that it was difficult to implement the new curriculum in schools with inadequate physical facilities such as buildings, laboratories, libraries etc. Non-availability of adequate number of teachers from the education departments, teachers’ lack of understanding of the objectives of the curriculum, inept management of in-service training, lack of proper guidance by parents and their poor economic background were the main barriers for the effective implementation of the new curriculum. Nearly same study had been done by Banerjee (1981) undertook an investigation relating to the
implementation of the primary school curriculum in Tripura. The data were collected from 30 primary schools of Tripura. He found that only 20 per cent of the schools had pucca buildings while the other 20 per cent were of mixed type. The rest 60 per cent were kutcha constructions which were no better than thatched schools. Classroom accommodation was inadequate in about 63 per cent of the schools. Maps, charts, Globes were inadequate in all the schools. Nearly 24 per cent schools had no drinking water provision inside the schools. 69 per cent of the students were provided mid-day tiffin and 20 per cent students received free books. Of the teachers working in the schools, 21 per cent were graduates, 66 per cent were matriculates and 80 per cent of the teachers were trained. Also 85 per cent of the teachers had more than 5 years of teaching experience. Bharadwaj (1981) carried out a research with regard to the availability and use of teaching aids in schools. He surveyed in all 200 primary, junior high and higher secondary schools, in Kaval, with view to finding out the position of audio-visual teaching aids. He showed that appropriate audio-visual teaching aids were not available easily.

Bajaracharya, R. K. (1986), conducted a study of science education in the secondary schools of Nepal with a view to evolving a functional model for improving the science education. The study was designed in three phases. The 1st phase was conducted with a view to knowing the conditions of the existing secondary science education programmed. 75 secondary science teachers and 10 science teacher educators were taken as sample. The data had collected by survey method. The 2nd phase was conducted with formulation of model. The 3rd phase covered evaluation of developed models and formula of a functional model. The findings of the study revealed that the existing curricular objectives of the secondary science curriculum were unsystematic and insufficient. The existing curricular content of grades IX and X was theory–oriented and far from the pupils’ daily lives. The techniques of teaching science which were practiced in most of the schools were traditional. The only teaching aid used in the classroom was the blackboard and chalk. Some methods such as discovery and free choice activity were not known to many teachers. Most of the secondary schools did not have a science room or laboratory, adequate materials and science teachers. Aids such as aquarium,
microscopes, films, slides, tapes, etc., were absent. The prescribed textbook contained inappropriate topics and diagrams. It reflected only reading skill and did not provide for practical skill and concept development. Science teachers felt the need for in service training in construction of apparatus from local materials, techniques of teaching curriculum development and test construction. The existing science curriculum indicated the need for content specialists in the field of curriculum development and other areas of secondary science education. The study had its implications for educational planners and administrators that proper study materials and appropriate facilities should be provided to the science teachers, science educators and students. Desai, Shantadevi S., (1986), undertook a critical study of Science Teaching Programme at Middle School level in Karnataka State. The study used two specially constructed questionnaires addressed to headmasters and assistant teachers as tools in the collection of data mainly in the form of opinions. The sample consisted of 348 headmasters and 667 assistant teachers at belonging to 460 higher primary schools from the four educational divisions of Karnataka. He reported that teachers had the practice of writing lesson plans. Schools did not have science clubs. Schools had no laboratory. Scientific knowledge in the science text was suitable in day-to-day life. Teachers were not specialized to teach science subject.

Mohanty, S. (1988), conducted an investigation with a view to identifying an appraisal of teaching science in the high schools of Cuttack City. The purpose of the study was to examine the problem of an appraisal of teaching science in the high schools of Cuttack City. The study revealed that according to the experts the present syllabus was very tough. They opined that the Board of Secondary Education, Orissa, should appointed more experts in science to improve science syllabus keeping in view the teachers’ position, laboratory facilities, etc. As regards the equipment and laboratory all the schools were deficient. All the teachers followed the demonstration-cum-discussion method for teaching science which was suitable for their condition. The schools were deficient in audio – visual aids like projecters, overhead projecters, television sets, etc. The out comesof learning were not properly assessed by the schools. The questionnaire revealed that the outcomes of
cognitive domain were assessed to some extent and the outcomes of affective domain were not assessed at all. The science funds available to the schools were very meager. So the schools could not do a lot for the development of Science Education by organising science fairs and science exhibitions in the schools.

Shyam Singh, (1988), studied on Attitudes of secondary stage students towards science curriculum and its relationship with achievement motivation. His study was focused on assessing the attitudes of secondary stage students towards science curriculum and its relationship with achievement motivation. Researcher used a tools of Attitude Scale developed by himself and motivation Test developed by Prayag Mehta. Survey method was used by taking a sample 500 students. The study found that students from rural and urban schools as well as male and female had favorable attitude towards science curriculum. The study revealed that students from urban schools scored highest on the achievement test and most of the weak students scored higher than their male counter parts. Female students scored higher than their male counter parts.

Majumder, Tarun Ranjan, (1988), studied on the total system of secondary school education in Calcutta with the objective To make an in depth study of the secondary school system in relation to its significant compounds- schools, pupils, teachers, guardians, curriculum, timetable and environment- in order to locate its points of weakness as well as potentialities revealing there by a real picture of the system. Researcher used a field sample survey which was based on representative number of all types of secondary schools of Calcutta. The data were gathered both from primary as well as secondary sources. Finding of the study indicate that, many changes brought about the stage of school education in West Bengal after Independence had often be implemented in haste with out necessary care and precaution, as a result of which the expected objectives and targets could not be achieved. Curricular and organizational changes created certain gaps and confusion. Pupils faced problems under the pressure of abrupt changes. The educational environment in school was found to be far from satisfactory, liking in many essential requirements. The relationship among the components under study revealed certain discordant
features disturbing the equilibrium of the total system and its smooth functioning.

Begum, Khatija H. (1990), undertook an investigation on problem of teaching new science syllabus for standard VII in Andhra Pradesh and their impact on pupil achievement. Her study was aimed at examining the impact of different problems that the teachers were facing in teaching new science syllabus on the achievement levels of pupils. Hence this study also meant to reveal the impact of certain curricular problems on pupils’ achievement in teaching the new syllabus with regards to examine the difficulty level and suitability levels of all lessons and exercise by science teacher, the problems involved in the implementation of the students’ activities suggested in the new science text book and the problems there in, the problems faced by teacher about the content and teaching methods in the in service training programmers. Also he studied the nature of execution of the exercise faced by the with in the context of content, teaching methods, audio visual aids, suggested pupil activities level of achievement and suggest measures which would improve the quality of science teaching? He found that, more than 60% of the teachers found the content of the recent syllabus, new as well as over loaded, dictation of notes by teachers was the dominant method of getting exercises done by students lack of facilities for science teaching continued to bother teacher a lot, it was observed that achievement in science favored significantly those students, whose teachers had attended an in-service education programme, it was proposed that school condition need to be improved through, say supply of science kid and hand books for teachers so that pupils may participate in the teaching learning process by practicing processes of science such as classifying inquiring and experimenting etc.

Mohapatra, B.C. (1990) studied on the problem of the secondary school mathematics curriculum of Orissa. Researcher prepared Questionnaires as a tool to collect data for the students studying mathematics and for teachers teaching mathematics. The collected data were treated with calculation of percentage of teachers and students opinions on different aspects of the mathematics curriculum. The study found that the mathematics teachers of
Orissa were conservative in their outlook so far as the objectives of teaching mathematics were concerned. They emphasized the fundamental mathematical operations, familiarity with mathematical concepts and terms, development of mathematical skill. The student by and large was pragmatic in their approach and considered mathematics to be a utilitarian subject. The mathematics syllabus of Orissa contained a more detailed description of the objectives of teaching mathematics than the other syllabuses. Some teachers opined that the objectives had been well reflected in the topics, but an almost equal number of teachers refuted this. The provision of optional mathematics was a good feature of the Orissa syllabus. The syllabus committee, constituted of ten members, had four mathematics secondary school teachers, three University teachers, two headmasters and one primary school teacher. The teachers provided higher ranking to the traditional topics. Geometry and its application were more highly satisfying than algebra and its applications. Textbook did not contain the objective in clear term. Most of the teachers as well as students did not appreciate the physical aspects of the Mathematics Textbooks. The teacher adopted the discussion method was largely neglected. Mohapatra, B.C.(1990) studied on the problem of the secondary school mathematics curriculum of Orissa. Researcher prepared Questionnaires as a tool to collect data for the students studying mathematics and for teachers teaching mathematics. The collected data were treated with calculation of percentage of teachers and students opinions on different aspects of the mathematics curriculum. The study found that the mathematics teachers of Orissa were conservative in their outlook so far as the objectives of teaching mathematics were concerned. They emphasized the fundamental mathematical operations, familiarity with mathematical concepts and terms, development of mathematical skill. The student by and large was pragmatic in their approach and considered mathematics to be a utilitarian subject. The mathematics syllabus of Orissa contained a more detailed description of the objectives of teaching mathematics than the other syllabuses. Some teachers opined that the objectives had been well reflected in the topics, but an almost equal number of teachers refuted this. The provision of optional mathematics was a good feature of the Orissa syllabus. The syllabus committee, constituted of ten members, had four mathematics secondary school teachers, three University
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Vijaya Kumar.B.(1990), studied on development of an optional model of chemistry curricula, at college level. Both survey and experimental methods were used for the study. A sample of 564 students and 315 teachers was drawn from 10 colleges affiliated to Kerala University; urban as well as rural areas were sampled. The students sample comprised 260 males and 304 females, of these 279 were from rural areas. Three tools viz. chemistry learning approach inventory, a judgment schedule and an additional schedule, were used for data collection. In all seven models viz. the concept attainment model, the inductive thinking model, the inquiry training model, the advance organizer model and biological science inquiry model were used and their effectiveness tested. The data were analyzed through percentage, chi-square, inter correlations and Kendal’s coefficient of correlation. The study found that the inquiry training model was optimally effective in terms of the overall criteria of effectiveness. The advance organizer model was the least effective. The use of all the seven models had a favorable effect on students learning and performance.

Prakash, Vidhya.(1991) studied on curriculum policies planning implementation at the primary school level in Delhi during 1966-76 with objective to investigate into curriculum policies planning implementation at primary school level in Delhi. The respondent sample comprised teachers teaching in the school of the Municipal Corporation of Delhi, teachers from aided and unaided school were not included in the sample. The study found that data analysis revealed a depressing scenario in MCD schools during the period 1966-76, which was characterized by lack of teacher initiative, sub-standard pre-service and in service training of teachers, political interference in schools, ineffective school supervision, in adequate finances, the burden of
heavy syllabi and defective teaching of science. Besides the teacher felt that the policy of recruiting Education Officers from were a defective policy.

Shah, P.A. (1992) studied on critical evaluation of the mathematics syllabus introduced in the schools of Gujarat state for Grades I to IV. Tools and techniques used to collect the data were questionnaires, opinionnaires, academic tests and interview schedule. The collected data were treated with percentages, weighted mean scores and Spearman’s rank difference method. The study found that, the grade wise correlation was found between the opinion of the teachers for essential learning outcomes and the results of assessment of the pupils by testing ELOs were found significant. About 45% of teachers of Grades I and II agree that the content of the syllabi could sustain the interest of the pupils, while teachers of Grade II and IV agreed very little with the same. 45% of teachers of Grade I and II agreed that rational thinking in the pupil could be developed by the existing content, while teachers of Grades III and IV had different views. About the development of mathematical aptitude, 40% of teachers of Grade I, II and III had positive opinion while the teachers of Grade IV had their doubts. 50% of teachers of agreed on the completion of the syllabi in time. However, there were least possibilities for personal guidance for weak pupils. 50% of the supervisors confirmed the use of audio-visual materials used by teachers in the classroom teaching.

Hassan, Arif. (1992) studied on Textbooks with primary grade children with The study found that the physical facilities in the schools, particularly in rural areas were inadequate. However in terms of teaching strength, the condition of schools was fairly good. With regards to inter district differences in textbook availability; Ranchi was placed in a relatively better position compared to remaining three districts under survey. The parents reported unavailability of on times and they complained that booksellers compelled them to buy ‘keys’ along with the textbooks. They were satisfied with different aspects of the textbooks.

Mlanga, Andre. Titus. Omolo. (1992), studied on Perceptions of high school teachers, students parents and educational administrators regarding the
principles, practices and procedure of curriculum development programme for high schools in Nairobi, Kenya. Researcher used survey based study by using four randomly selected samples of 2000 high schools teachers, 150 high school students, 200 parents and 50 educational administrators. Data were collected about various aspects curriculum development programme in Kenya with help of a questionnaire based on the Likkert Opinion Scale. Besides percentages and descriptive statistics, rank correlation was used for data analysis. The study found that, according to the perceptions of the various interest groups, the curriculum should be an organized whole of learning in school. The majority of the respondents practices of curriculum development. The majority of the respondents agreed that curriculum evaluation should determine the extent to which educational objectives were being attained by the schools. It was suggested that teacher should participate in regular evaluation of the constructed curriculum and its implementation. It was proposed that the Govt. of Kenya should set up a National Council for Curriculum Development.

BASU,C. K.(1977).-studied on Development of Science and Mathematics concepts in children at Primary Grades in India, NCERT, New Delhi. The study found that, on the whole, the urban children were faster in the acquisition of the Science and Mathematics concepts selected for the study. The urban children of all the grades performed better than the rural children of their respective grades on all the tasks designed to study the development of concepts. Among the concepts selected for the study, the performance of the rural children was found to be comparable to that of the urban children with regard to the development of the concept of weight. The easiest of all the concepts was the concept of number for the urban group while for the rural group the easiest was the concept of weight. The concept of energy was found to be the most difficult for both rural and urban children even at the fifth grade level. Krishna, K.( 1981), conducted a comparative study of the Secondary School Science Curriculum of Kerala and Tamilnaru.He had prepared twenty sets of guidelines for analysis and the specially developed evaluative criteria both in original form and the rating scale form and the original documents of the science curricula and science text
book prescribed for standard V through X of both the sets were supplied to 20 specialist. The finding of the study revealed that the science curricula of the states of Kerala and Tamilnadu were both ‘moderately satisfactory’ with respect to all dimensions except methodological instructional. The science curricula of two states did not satisfy most of the criteria prescribed for both traditional and modern science curricula. The curriculum of Tamilnadu was found to be weak in the provision for understanding. Of basic science based social functions provision for accepted forms of curricular organization, representation to important scientific movements, basic laboratory work and comprehensive evaluation of learning outcome and provision of text books and audio-visual materials. The two curricula did not give adequate importance to self-study or practical work.

Pande, P. (1984) conducted an analytical study of Secondary School Curriculum in Maharastra. The main objectives of the study were to find out rational or traditional scope, practical utility for students, flexibility, individual difference in terms of abilities, interests and needs, dominancy in examination, fulfillment of aims of secondary education etc. Data were collected by administering an opinionnaire constructed by the researcher to a sample of experts, heads of secondary schools, teachers of secondary schools, guardians and, students studying in different faculties of education chosen from all over the state of Maharastra. It was a normative survey kind of research. The findings of the study revealed that the consensus of experts, heads of schools, teachers, guardians and students was that the curriculum was rational in scope. More than two-thirds of the members of all the groups thought that the curriculum was traditional. Only half of the persons from all the groups thought that the curriculum was of utility to the students in particular and to society in general. Opinion seemed equally divided on the point that the curriculum had to be flexible. Nearly half of persons from different categories agreed that the curriculum had enough variety to allow for individual differences in terms of abilities, interest and needs. Half of total persons, mostly teachers agreed that the curriculum was integrated at all levels. Experts disagreed with the statement that the present curriculum prepared the pupils for the next stage of education. Gupta, S.M., and Verma, L.K. (1985), studied
on Significant Correlates of J and K High Schools Showing Consistently Above and Below Average Results at the Board’s Examinations for the Last Five Years (1980 – 1984). Findings of the study indicated that the average number of teachers, both trained and untrained, was more in schools showing consistently above average results. The workload of teachers working in schools showing consistently above average results was less in comparison to schools showing below average results. Experience of heads was more in case of schools showing above average results. Most of the schools showing above average results were situated in urban areas; the students of these schools had not to cover long distances to reach the schools. The institutions showing above average results had pucca and planned buildings. These institutions had facilities like a dispensary, library, laboratories, science room, staff room, auditorium, study hall, craft room, canteen etc. There was a separate office for the head in these institutions. Most of the schools showing above average results had the facility of electricity, heating by charcoal and fans. The class rooms in the institutions showing above average results were ventilated. The institutions showing above average results had notice boards for the students; the number of desks in the classrooms and number of chairs in staff room was more in these institutions. More institutions showing above average results used models, charts and maps during the teaching process than schools showing above average results, debates, quiz, music competitions, dances, poetic symposia, painting competitions, science fairs etc. were organized more frequently. Moral education was regularly provided in most of schools showing above average results. The economic condition of the schools showing above average results. The heads in schools showing consistently above average percentage of results ranked in five positions the following factors affecting the matriculation results: ability of students, teachers’ style of dealing with the children, teachers’ expression, teachers’ general ability, teachers’ fund of knowledge. The heads of the institutions showing below average results ranked in five positions the following factors: institutional environment, ability of students, teachers’ expression, teachers’ style of dealing with the children and seriousness among students. There was a low correlation between competence of teachers and their adjustment scores.
Mehdi, Baqer. (1988) conducted an investigation with a view to identifying instructional development and social objectives of education at the secondary stage, (National Council of Educational Research and Training (ERIC Funded)). The data study for the study was collected using a questionnaire for teachers on the instructional, developmental and social objectives of secondary level of education. This study was done by taking a working group meeting of well-informed teachers from the schools of Delhi was also held for eliciting their opinion about the school curriculum as it is implemented. The finding indicated that the curricula for various subjects were not well balanced and did not help to achieve the various categories of objectives. Dhar, Dubey R.N.(1989) studied on Effect of school environment and approval motive on memory and achievement. The findings of the study were the mean performance of science students in academic achievement as well as in Hindi were found to be satisfactory. The mean performance of arts students on recall tests of memory was above 50% of the aggregate marks. The mean performance of science students on recall tests of memory was above the average. The main effects of all the three treatments, i.e. school location, school environment and approval motive were found to be significant on academic achievement arts and science students. Rozario, L.(1989) studied on construction and standardization of achievement tests in physics, chemistry and biology for Standards VIII and IX for students studying through English medium in suburbs of Bombay with a view to diagnostic analysis and remedial teaching in Standard IX and its appraisal Researcher prepared an standardized achievement test item for testing the attainment of the specific objectives of teaching the science subjects. The validity of test was established by determining the concurrent validity. The study found students, in general, to perform high in Physics, chemistry and biology. Three was no difference between boys and girls in their achievement in science subject. The remedial programme drawn up by the researcher was found to be effective as students showed significant improvement over their previous performance under going the programme. The study observed that students lacked scientific conceptualization, scientific reasoning and did not exhibit an interest in science nor appreciation of the subject. The students were found to be
unfamiliar with the scientific instruments and unable to apply the knowledge of scientific principles to new situation.

Bhatta, Ganesha H.S. (1989), studied on Appraisal of the secondary education system based on the systems approach with objective to examine the overall performance of the secondary school system with regard to three major output variables namely, achievement, equality and relevance. Researcher used system analysis technique for analysis data. He was taken a 12% random sample from 1818 secondary schools spread in urban and rural areas of Karnataka state. Another sample, micro level study was chosen from 9 government and private schools. The study revealed an overall considerable expansion of secondary education in Karnataka State inasmuch as the number of students appearing in the school final examination has been steadily growing. It was, found that the proportion of successful students at the state level examination had vacillated between 36% and 58% of the students who appeared in the examination in successive decades. Though the growth of secondary education during the past three decades showed a positive upward trend, two types of inequalities were found to exist: a) disparities between the sexes and the social groups such as between SC/STs, backward castes and others and b) inter regional, inter district and rural urban disparities 4. When the relevance of the secondary education system was analyzed in a macro and micro perspective, the system of secondary education was found to have contributed to modernization as well as equalization of opportunities.

Radhamonyamma. (1988) studied on Evolving Instructional Techniques appropriate to the development of various scientific skills among secondary school pupils in Kerala. Researcher prepared an opinionnaire and an achievement test in science for collecting data which were analyzed by using statistical techniques such as central tendencies, mean standard deviation, Cr values and Person product-moment correlation. The study found that whereas the achievement in science as well as acquisition of scientific skill was low, it observed that new evolved method for teaching of scientific skills through tested lesson plans was more effective than the traditional method. The correlations between marks scored in different science subjects were higher
for the experimental group as compared to the control group. Prakash, Brahma,( 1990), studied on Effectiveness of concrete materials to enhance learning in physical science with objective To study whether concretized instruction helps in learning formal level concepts. Researcher prepared materials for concretized instruction for all the four formal level concepts. Tests of multiple choice items was developed and administered to both the groups (class IX students in two different schools as control and experimental group). The differences were qualitatively analyzed. The findings of the study revealed that the performance of student’s learning by concretized instruction was better than those learning by traditional instruction. The average increments in marks of the experimental group of students on concert level items were 8.8% and that of formal level items, 8.4%. As the tests comprised of items based on different logical operations and of concrete and formal operational level, the responses of such tests may be used to diagnose the learning difficulties of students. Remedial help can also be provided to them accordingly.
REFERENCES


