**DIFFICULTIES FACED BY SECONDARY SCHOOL TEACHERS OF BIOLOGY IN IMPLEMENTING
THE INSTRUCTIONAL STRATEGIES
IN KERALA**

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**Dissertation submitted to the**

**University of Calicut in partial fulfilment of
the requirements for the Degree of**

**MASTER OF EDUCATION**

**FAROOK TRAINING COLLEGE**

**UNIVERSITY OF CALICUT**

**2005**

**D E C L A R A T I O N**

 I, **Balqis T.M.,** do hereby declare that this dissertation entitled, **DIFFICULTIES FACED BY SECONDARY SCHOOL TEACHERS OF BIOLOGY IN IMPLEMENTING THE INSTRUCTIONAL STRATEGIES IN KERALA** has not been submitted by me for the award of any Degree, Diploma, Title or Recognition before.

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**C E R T I F I C A T E**

 I, **Dr. M. Jesa**, do hereby certify that this dissertation entitled, **DIFFICULTIES FACED BY SECONDARY SCHOOL TEACHERS OF BIOLOGY IN IMPLEMENTING STRATEGIES IN KERALA** is a record of bonafide study and research carried out by **Miss. Balqis T.M.,** under my supervision and guidance and has not been submitted by her for the award of a Degree, Diploma, Title or Recognition before.

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**ACKNOWLEDGEMENT**

 At the very outset the investigator thanks the most benevolent God Almighty who enabled her to successfully complete the task.

 The investigator wishes to acknowledge her deep sense of gratitude and indebtedness to the supervising teacher, Dr. M. Jesa, Lecturer in English, Farook Training College, for her healthy criticism and inspiring guidance in completing this study.

 The investigator extends her thankfulness to Prof. C. Abdusalam, Principal, Farook Training College for the encouragement he provided.

 The investigator is highly thankful to the Heads of Schools and Teachers of Biology in the different schools of Palakkad, Malappuram and Kozhikode districts for the co-operation and assistance they provided for the collection of data.

 The investigator also extends her sincere thankfulness to the lecturers of Farook Training College who have always been helpful to her. Her special gratitude goes to the Librarian, Farook Training College for the help rendered in making the study a success.

 Finally, the investigator extends her special thanks to her classmates and family for constant encouragement given by them throughout the study.

Farook Training College,

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**B I B L I O G R A P H Y**

**A P P E N D I C E S**

**INTRODUCTION**

 Life is meant not merely to live but also to endure. The plethora of philosophies and cultural refinings done by Time in its incessant flow is endless. To purge Man from his ignorance and vicissitudes, generations of great thinker have made great efforts. Man is a mixture of mind and material. He requires constant enlightenment for his mind and continuous exercise for his body. This was left in oblivion though great men often pointed out the need of such an integrated, experiential system of instruction or teaching or learning.

**Teacher Centered Education**

History as we know it today, has often given an elite position to teachers because our ancestors had a view that the system of education can be fully defined by single component; the teacher. The education was fully teacher oriented in the past, where the learner had no authentic existence of his own. Learners were considered as the source and centre point of all ignorance. They were compelled to study and studentship was an affair of obedience wrapped with the shroud of one's innate inquisitiveness . Nothing was to be questioned. The urge to question was considered as a sign to outcast the individual. Knowledge was thought to be bequeathed by teachers to their students and it was believed that if the student whole heartedly accepted the teacher, he would be endowed with wisdom that finally leads to success in life. But man always swayed between the two end of his existence, that earthly and ethereal.

**Learner Centered Approach**

By the end of the middle ages, and towards the beginning of the modern age, when heated intellectual debates and appraisals churned the world in general and Europe in particular, vibrant rays of new sunrise dawned the world. It was a time when nobody wanted to be overruled by the quanta of deterministic knowledge, through the deterministic view of the universe then ruled the world. The need of education was preoccupied in the minds of people as 'learning to know' provided the knowledge was transmitted into the mind of the learner by the teacher. The 'why' of education was till then answered by the thought of 'learning to know' that preoccupied in their minds.

 The Copernican revolution in education was brought about by Russian, who tried to fly beyond the predetermined boundaries of the society. For naturalists 'why' and 'what' of learning was entirely different. 'Learning to do' was their watch word rather than 'learning to know' alone. They had a bent towards nurturing the learner's innate desire to manipulate his environment.

 Still, the verdigris of the past system more or less remained in the hearts of people who were related to the educational system. So giving full freedom to one's animate nature was unacceptable though it was said to be 'refined' by bringing the child to the forefront, the system remained unbaptised for hearts that demanded some more humanistic, philanthropic ingredient in the recipe education.

 Though waves of optimism and pessimism rippled in the society, 'learning to live together' helped develop hearts that could feel and sympathise. Still the learner had the stand of a spectator. This was not acceptable to hearts and brains that needed a separate, authentic existence. A group of existentialist thinkers and other persons who thought in the same way about man's existence, defended against the educational system which fails to develop authentic genius of individuals, who think differently, though they stay in the crowd. Existence was more emphasized Education was for existence and learning was for 'learning to be' that is being oneself.

**Learning Centered Approach in Teaching**

The questions 'how', 'why' and 'what' of education defined centuries before was pruned and trimmed by different thinkers. A cascade of inventions and developments occurred in the twentieth century has urged man to rethink about the goals of education. The constructivist thinkers both radical and realist perspectives (Husen, 1994) have proposed knowledge as something that should be created by the individual though it is actually recreated by the learner. Today, we have a lot of information and tonnes and tonnes of pages of knowledge accumulated through history. We are living in the sea of information and still lack the wisdom that leads to success. They underline the importance of 'learning how to learn' than learning 'what' and 'when'. When the deterministic view of science about the universe was replaced by the indeterministic view, educational philosophers too accepted it by replacing the deterministic objective based teaching. For meeting today's learning needs, a theory of multiple intelligences and construction are both appealing and consistent with intuitive impressions about learning. As Von Glasersfeld (1995) wrote constructivism does not claim to have made earth-shaking inventions in the area of education, it merely claims to provide a solid conceptual basis for some of the things that until now inspired teachers had to do without theoretical foundation.

 Without a proper 'how' or well defined 'how' of learning the knowledge we acquire will be just the sequential arrangement of foolishness piled upon foolishness to take us into the summit of intellectual voidity.

 Constructivist approaches to teaching reject rote learning, memorization, telling and lecturing on the basis that students 'ought' to be constructing their own meaning. Students can construct knowledge even through lectures if they listen to and think about what is appropriate to them. In the constructivist point of view teaching involves identifying a learners' existing schema and then arranging experiences that challenge those schema and that promote the construction of more advanced intellectual structure. None of these tasks is easy, and the learners have shown resistance to such challenging experiences.

**Process Oriented Learning**

'Constructivism' presently is a dominant way of thinking about learning 'The idea that learning is a constructive process is widely accepted; learners do not passively receive information but actively construct knowledge as they strive to make sense of their worlds' (Cobb, 1994).

 Successful teaching of complex skills in science greatly depends on instructional plan that carefully considers what is to be learned; what technology contributes, what the learning environment and the teacher must provide. The instructional plan must ensure that students receive on going guidance that come from the teacher but that may come from instructional materials and other students as well. Hence not only should the teachers teach science but should also teach learners what it means to be learning science.

**Process Skills in Biology Teaching**

The basic objectives of teaching Biology is to allow the pupil to acquire the process skills needed to be acquired as a young scientist along with the development of an affective domain that has a positive attitude towards all that is natural, pure and virtuous. The body of science includes facts, concepts, principles and laws, and theories. The acquisition of this must be done through well planned activities either individually or in groups. The application of acquired concepts, principles etc. in various life situation reveals its acquisition.

 The major process skills emphasized by SCERT in the Biology curriculum are thirteen in number. They are observing, classifying, measuring, communicating, using number relationships, using space and time relationships inferring, predicting, making hypotheses, identifying and controlling variables, interpreting data and experimenting.

**Collaborative and Cooperative Approaches in Instruction**

As new goals of science educationgives greater emphasis on the social context of learning, increased understanding of contextual influences on problem-solving, and growing respect for learner's struggle to make sense of scientific phenomena.

 Student collaboration is often an important aspect of learning process when learning because more socially oriented. Teachers are called upon to play a variety of roles; to be learning environment managers as well as information providers.

 Peer tutoring and scaffolding or supporting proposed by Vygotsky (1978) and the cooperative learning adopted by the constructivists from Gestalt psychology have increasingly demanded group teaching and inclusive strategies.

**Nurturing the Hitherto Forgotten Creative Element**

 Diversity is the essence of life. Hence teaching should enable learner to develop a mind which is creative and unique in the sense that it has a special form of thinking, a way of viewing the world and interacting with it in a different manner, divergent from that of the general population. They should think aesthetically, naturally and should develop the ability to lone nature and the whole increase. Creativity is fostered and nurtured through richness of learning experience. Teaching should allow the learner to recreate the knowledge already available.

**The Process of Learning How to Learn**

Enabling the learner to understand the processes underlying the whole system of education by making him familiar with the 'how of learning' through proper methodology is one of the aims of the revised curriculum of SCERT (2003). Learning is an active process in which learners construct new ideas or concepts based upon their current or past knowledge. The learner selects and transforms information, constructs hypothesis and makes decision, relying on a cognitive structure to do so. This essentially demands discovery learning. When this discovery is done in a social setting where enough social instruction is available, full cognitive development will take place as Vygotsky (1978) proposed. These processes of learning, however, must meet the unique profiles of separate intelligences of each pupil because we do not have one underlying general intelligence, but instead have Multiple Intelligences each being controlled by an independent system in the brain (Gardner, 1983). Thus learning must be geared to make each learner feel free and high in the realm of his life situations. For this the four pillars of learning for primary education proposed by Dellor's Commission Report, UNESCO, namely learning to know 'learning to do', 'learning to live together' and 'learning to be can be' extended to secondary education. 'Learning to be' in essence relies on 'learning to create'.

 Thus, viewed in the constructivist way, learning biological concepts is a process of conceptual change and addition.

**NEED AND SIGNIFICANCE OF THE STUDY**

 "Perspectives of science education that grew out of the fields of developmental psychology, differential psychology, science teaching and problem solving are beginning to converge" (Eylon and Linn, 1994). Debates about science education are joined by experts representing a broad range of relevant areas including classroom teaching, natural science, curriculum developments, technology and cognitive psychology. The complexities of teaching and learning science have been increasingly appreciated while at the same time science has become more and more important in the lives of all citizens. Moreover, science learning is now commonly studied in classroom settings, allowing investigators to examine these complexities more systematically. This new consensus incorporates greater emphasis on the social context of learning, increased understanding of contextual influences on problem-solving, and growing respect for the learner's struggles to make sense of scientific phenomena.

The new revised Biology curriculum for the secondary school classes by the SCERT in Kerala visualises a Biology learning considering the Cognitive, Affective and Psychomotor domains with equal degree of importance. The creative aspects are given special emphasis to help learners construct their mental images and build an idea about the nature of the subject.

 The secondary school Biology curriculum in Kerala is designed so as to enable the learner to acquire the competencies in the processes and methods of science and to develop scientific temper and an awareness in the contemporary problems in different fields of science particularly relating to industry, agriculture, food technology, health and hygiene, transportation, communication, space exploration, information technology and the protection of environment

 One of the major aims of teaching Biology is to develop scientific literacy, which means a firm understanding of the nature of science and interrelationship between science, technology and society. A person with ability to make value judgments in our day to day life can be considered to be scientifically literate.

 Science is a human enterprise, no different is the case of Biology. It relies on reasoning, insight, energy, skill and creativity. What future holds in store for individual human beings, the nation and the world largely depends on the wisdom with which humans use science and technology. But that is turn, depends on the character distribution and effectiveness of education that people receive.

 The present system of Biology teaching in our country is often accused of being defective. The aims of Biology teaching can be truthfully fulfilled only if teaching learning process is made more exciting, experiential, adventurous and above all well planned and implemented based on strong theoretical supports. This demands science discovery, through science clubs oriented environmentally. At the same time necessary skills are to be achieved from the science laboratory of the school in time.

 The revised curricular strategy in the secondary schools demand cooperative and independent inquiry approaches to learning. Though teachers are provided with refresher courses and in-service training, most often they complain that the courses and training are defective in one way or the other. Hence the teachers do not have a clear understanding of the curriculum. In addition to this the implementation of grading and continuous comprehensive evaluation in secondary schools have put additional burden on their shoulders.

 The much exaggerated cooperative learning techniques which need teaching of large groups present problems of student anonimity and passivity in learning. It is possible to use both approaches of increasing control over student learning or increasing the degree of autonomy of students have over their own learning, while teaching in classroom. But a beginner finds this approach tedious and difficult even if he or she has years of experience. In regular schools teacher in bogged down by a large number of students in the classroom. The role of teacher is to understand difference, change interactional patterns, promote social integration, provide information about origins of differences and reasons for them to be taken.

 These are not easy jobs because there exists a lot a difficulties to implement the inclusive, process oriented, child centered discovery approach which emphasis learning how to learn. It needs extensive home work to practice the idea of persistent reconstruction of abstract ideas given in the textbooks in the schools, which lack enough infrastructural facilities and other resources. So enabling the child to restructure its scheme as proposed by Piaget (1972) will be difficult to practice or realize.

 This is a multi-pronged approach and the teacher should raise to a status which allows him or her to pin point what should be rectified. Along with the resurrection in the teacher's mind set and attempts, the administrators, the public and those related to the educational scenario should also become ready for a parallel revision.

 Actually, the revised curriculum strategy was thought to be implemented in a time span of few years, but technical problems made the government to accelerate its implementation in secondary schools in an abrupt way. This is a crucial problem to be pontered on because secondary stage is one of the most important stages in the educational voyage of a student. Any defects in the education provided here will remain as a scar on the domain of child's development. Biology being a living subject or subject with heart and life, which remains close to one's affective domain has to be taught in the most efficient manner.

 Heated discussions were filling the social scenario of Kerala till recent times about the curricular revisions done in 2003 in secondary schools by SCERT. Hence pinpointing the difficulties in implementing the revised curricular strategy will be much valuable. So the investigator intended to find out the major difficulties faced by the secondary school teachers of Biology in implementing the instructional strategies.

**STATEMENT OF THE PROBLEM**

 The present study is entitled as "DIFFICULTIES FACED BY SECONDARY SCHOOL TEACHERS OF BIOLOGY IN IMPLEMENTING THE INSTRUCTIONAL STRATEGIES IN KERALA".

**DEFINITION OF KEY TERMS**

**Secondary School Teachers**

Secondary school teachers are teachers who are teaching in standards VIII, IX and X in schools.

**Difficulties**

Difficulties refers to problems faced by secondary school teachers of Biology in implementing the instructional strategies.

**Instructional strategies**

It refers to the current system of teaching and learning which considers learning as a process than a product. It was implemented by the state Government in the year 2003.

**OBJECTIVES OF THE STUDY**

The objectives of the study were the following

1. To identify the major difficulties faced by secondary school teachers of Biology in implementing the instructional strategies.

2. To identify the major difficulties faced by secondary school teachers of Biology in implementing the instructional strategies based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

3. To test whether there exists any significant difference in the suggestions given by secondary school teachers of Biology in implementing the instructional strategies based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

**HYPOTHESES OF THE STUDY**

The hypotheses set for the study were:

1. The secondary school teachers of Biology face significant difficulties in implementing the instructional strategies.

2. There exists significant difficulties faced by secondary school teachers of Biology is implementing the instructional strategies based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

3. There exists no significant differences in the suggestions given by secondary school teachers of Biology in implementing the instructional strategies based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

**METHODOLOGY IN BRIEF**

Methodology deals with the precise description of the sample used for the study. Tools employed for the study and method adopted for the study.

**Sample selected for the study**

The sample taken for the study comprised of 207 secondary school teachers of Biology from various schools of Palakkad, Malappuram and Kozhikode districts in Kerala. The list of schools selected for the collection of data is given in appendix 1.

**Tool used for the study**

The tool used for collecting data was a questionnaire to identify the difficulties faced by secondary school teachers of Biology prepared by the investigator under the supervision of the guide.

**STATISTICAL TECHNIQUES USED FOR THE STUDY**

The objective and the hypotheses of the study required the use of the following statistical techniques.

 1. Percentage

 2. Chi-square test of Independence.

**SCOPE AND LIMITATIONS OF THE STUDY**

The present study was specially intended to identify the major difficulties faced by secondary school teachers of Biology in implementing the instructional strategies. It was conducted in order to help the teachers of Biology sharpen their tools used for moulding the youngsters. The study attempts to bring into light what all loop holes are there in the transaction of the revised curriculum. This helps rejuvenate and reorganize the unorganized system. Enhancing effective Biology teaching is in one way or the other related to empowering teachers to make students who think both with their heart and brain and not the heart alone. The results of the study can be used in other science subjects too to improve teaching learning process.

 Since the study has been conducted as a part of the course, the investigator had to complete it with the limited time. Hence it was decided to carry out the study only in three districts namely Kozhikkode, Palakkad and Malappuram. A Sample of 207 teachers were drawn from 80 schools of these the districts. Due representation was given to gender and locale of school but for the types of school the investigator couldn't fully fulfill the correct proportion as there is a total of 1381 government schools only for 2236 promote & aided schools in these three districts.

**ORGANIZATION OF THE REPORT**

The report has been presented in five chapters.

 Chapter I contains a brief introduction of the problem, need and significance of the study, statement of the problem, definition of key terms, objectives, hypotheses, methodology, scope and limitations of the study.

 Chapter II describes the theoretical outline of Constructivism and Multiple Intelligences which forms the basis of the revised curriculum. It contains reviews on studies about difficulties and studies about different teaching learning strategies.

 Chapter III deals with the methodology of the study which is described in detail. It consists of hypotheses of the study, tool used, selection of sample, procedure of collection of data and statistical techniques used for analysis of data.

 Chapter IV presents statistical analysis of data and interpretation of results based on objectives.

 Chapter V provides an overview of the summary, findings and conclusions along with tenability of hypotheses, suggestions for further research, educational implications and remedial suggestions.

**REVIEW OF RELATED LITERATURE**

 The present study is an attempt to find out the difficulties faced by secondary school teachers of biology in implementing the instructional strategies.

 The reviewed literature are classified and presented under the following heads.

**Theoretical Overview of the Problem**

◼ Constructivism and Multiple Intelligences as the framework of Instructional Strategies.

◼ Constructivism in Teaching Learning Process.

**Review of Related Studies**

◼ Studies on difficulties in teaching process and teaching-learning strategies.

**A. THEORETICAL OVERVIEW**

**Constructivism and Multiple Intelligences; the Framework of Instructional Strategy**

 Constructivism is a learning theory that has its foundation in philosophy and anthropology and also psychology. It gives importance to the cognitive processes of human being. Since it consider the cognitive ability of man it is known as cognitivism. The cognitivists have the assumption that formation of mental construction is that which is occurring during learning. Hence they are also called constructivists. Piaget, Bruner, Noam Chomsky, Schemp, Vygotsky etc are the famous constructivists. Cognitive constructivism and social constructivism are its two types.

 Though Piaget made foundations for child centered education, his cognitive constructivism was later questioned because it assumes that child's development is solely natural. This resulted in the formation of social constructivism, which considers man not to be limited in the sphere of biological development, rather it claimed that social relations, that social relations, cultural heritage, history and language makes man intellectually able. Vygotsky (1962) argues that the capacity to learn through instruction is itself a fundamental feature of human intelligence.

 In addition to these, the instructional strategy, adopted has much to do with Howard Gardner (1983) who wrote "Much of human representation and communication of knowledge takes place via symbol systems- culturally contrived systems of meaning which capture important forms of information" (p.66). He says that language, mathematics, visual representation, musical notation, dance and print are all culturally valued systems. They mediate our thoughts about the world and our experiences of the world. They support our ability to abstract, to manipulate, to analyse, to conceptualise, to remember and to synthesise . They are tools of thought. Thus the multiple intelligences proposed by him namely linguistic, logical-mathematical, spatial, bodily-kinesthetic, musical, interpersonal, intrapersonal, naturalistic, existential and spiritual intelligences; serve as an analytical tool for thinking about the potentials of a learner, but they do not dictate an instructional process.

 Understanding that all learners are able to know the world through language, logical-mathematical analysis, spatial representation, musical thinking, the use of body to solve problems or to make things, an understanding of others, and an understanding of ourselves points to many ways in which learners can be approached.

**Constructivism in Teaching-Learning Process**

 Constructivism rests on four central tenets (Fosnot, 1989). First, knowledge depends on past constructions. Second, constructions come about through systems of assimilation and accommodation. Third, learning is an organic process of invention, rather than a mechanical process of accumulation. Fourth, meaningful learning occurs through reflection and resolution of cognitive conflict, negative earlier, incomplete levels of understanding and teachers can only mediate this process.

 In addition to these four tenets, an understanding of learning recognizes the learner's cognitive developmental abilities as a major factor in the process of constructing understanding. Student's developmental abilities range from being able to do something with assistance to being able to do something alone. This is referred to as a learner's zone of proximal development (Vygotsky, 1978).

 It is the teacher's role to assist students in making sense of the input in the classroom by structuring the learning environment.

 A constructivist view of learning suggests at least five instructional principles. Brooks and Brooks (1999) identify these instructional principles as:

 (i) Posing problems of emerging relevance to students.

 (ii) Structuring learning around primary concepts.

 (iii) Secking and Valuing Student's point of view.

 (iv) Adapting curriculum to address student's suppositions.

 (v) Assessing student learning in the context of teaching.

 Jonassen (1994), for instance, summarises the implications of constructivism for instructional design as:

 (i) Provide multiple representations of reality

 (ii) Represent the natural complexity of the real world

 (iii) Focus on knowledge construction, not reproduction

 (iv) Present authentic tasks (contextualizing rather than abstracting
 instruction)

 (v) Provide real-world, case-based learning environments, rather than predetermined instructional sequence

 (vi) Foster reflective practice

 (vii) Enable context- and content-dependent knowledge construction
 and

 (viii) Support collaborative construction of knowledge through social
 negotiation.

 Polin (1992) suggests that when selecting tools to support the construction of knowledge educators should look for the following characteristics:

(i) the tool promotes learning as a whole, meaningful, task, not a subskill

(ii) the tool carries some of the burden of the task-it "scaffolds" the elements of the task the learner cannot accomplish alone and

(iii) the tool allows for increasingly complex versions of the task to be carried out by gradually turning back some of the task burden to the learner.

The teacher is diagnostician, co-learner, facilitator, democratic leader, mediator and guide. The teacher should-invite students to discover information, arrange for discontinuity, strive to help students reach a deeper understanding fewer topics, use interclass competition to motivate, use pupils' personal interests to motivate, encourage students to create learning and considers a reasonable amount of noise and movement necessary and acceptable.

Today constructivist teaching is based on recent research about human brain. The major views of constructivism can be summarised as follows:

– emphasizes learning and not teaching

– encourages and accepts learner autonomy and initiative

– sees learners as creatures of will and purpose

– thinks of learning as a process

– encourages learner inquiry

– acknowledges the critical role of experience in learning

– mixtures learner's natural curiosity

– takes the learner's mental model into account

– emphasizes performance and understanding when assessing learning

– bases itself on the principles of cognitive theory

– makes extensive use of cognitive terminology such as predict, create and analyse

– considers how the student learns

– encourages learners to engage in dialogue with other students and teachers

– supports cooperative learning

– involves real world situations

– emphasizes the context in which learning takes place

– provides learners the opportunity to construct new knowledge and understanding from authentic experience.

Constructivist approach to learning is based on students active participation in problem. It encourages cooperative learning and large group instruction. This is to inculcate cooperativeness which is positively related to a number of indices of psychological health, such as emotional maturity, well-adjusted social relations, strong personal identity, ability to cope with adversity, social competencies, and basic trust in and optimism about people (Johnson and Johnson, 1998). It also ensures teaching of constructive conflict resolution by frequently structuring academic controversies in the classroom allowing students to practice their conflict skills daily (Johnson and Johnson, 1995).

**SURVEY OF RELATED STUDIES**

 According to Mouley (1963) "the survey of related literature is a crucial aspect of planning of the study and the time spent in such a survey invariably is a wise treatment".

 Any research problem needs adequate and sufficient review to be done before it is fully accepted. It makes the researcher aware of the present status of the problem selected for study and also the different levels in which the same problem or variable was studied by different researchers till then and the possible ways in which the same study can be approached.

 The review of related studies gives an idea of what has already happened and also what and all can happen in the field of this study.

 Jesa (2004) conducted a survey among 100 high school teachers in Kozhikode District to identify the major difficulties faced by secondary school teachers in implementing the revised curricular strategy. Percentage was calculated and the following findings were obtained;

– Training programmes received are not adequate and proper. Hence more inservice training programmes have to be provided.

– Lack of infrastructural facilities is a serious problem faced by secondary school teachers.

– The revised curricular strategy which demands continuous and comprehensive evaluation has increased the workload of teachers.

– Proper school-community relation has to be maintained to make instruction more real life oriented.

 Rao, P (2004) studied the relationship between physical facilities, teacher facility and the academic attainment in municipal secondary schools and it was found out that most of the municipal secondary schools do not have proper buildings, either they are in dilapidated condition or need major repair, the classrooms are also short of many facilities like proper ventilation, furniture for students to sit on, good black board etc. Unless these basic physical, human and other infrastructural facilities are met with, no proper and effective learning will take place in the schools.

 A well equipped laboratory need to be established in all the municipal schools. Inorder to foster the experimental and scientific skills among students right from the school days. Secondary education is a crucial link between the elementary and higher education. It is considered to be a real training and preparation for life. It trains the future citizens to take an effective role in the socio-economic reconstruction of the country.

 Hence NPE strongly favoured strengthening of secondary school education. Quality in the system of secondary school education can be achieved by improving school facilities, teaching-learning materials, adequate number of teachers and good supervisory staff. The attainment level of students is one of the indicators of the efficiency and quality of the schools.

 Kumaraswamy and Venkateswarlu (2004) found that while implementing the DPEP by the district administration caution should be taken to enable the teachers to feel free with the children by playing games with them providing quality education in schools and to motivate teachers to contact the community to improve physical conditions of the school and to sent their children to school.

 Aruna (2004) studied the relationship between process outcomes in science and classroom climate of secondary school pupils and found that there was significant positive correlation between process outcomes in science and classroom climate.

 Kumar and Bindhu (2002) stated that to create desirable change of behaviour of the students in the classroom all activities of the teacher are to be strategically designed with utmost precision and effectiveness. Methods of teaching is more general plan of action of the teacher. At the same time strategies of teaching is more clear cut and specific, preplanned activities which has very definite point of starting, progress and ending.

 Saurino *et al.,* (2002) conducted a study on how an understanding of Multiple Intelligences might translate into a variety of teaching techniques and strategies directed towards specific intelligences they found in their eighth grade science classroom. It featured a collaborative group conducting action research to explore low visual or spatial teaching techniques and strategies might affect the integration of the curriculum. Unit lesson plans were developed and evaluated for multiple intelligences to be included. By exploring regular, deliberate use of the visual spatial Multiple Intelligences in lesson planning and evaluating the success, the group was able to address the students needs and integrate the curriculum in ways that otherwise would not have occurred.

 Berkmeier and Ginny (2002) studied about Multiple Intelligences teaching and learning of science at higher education levels., specifically within community colleges. The purpose of this study was fourfold. The first purpose was to investigate adult learning through Multiple Intelligences theory at community college level. The second purpose was to determine where there were any differences among students in their perceived Multiple Intelligences with regard to age and gender. The third purpose was to investigate the relationship between perceived and tested Multiple Intelligences strength with regard to science and non-science courses. The study suggested the need for a variety of education and curriculum reform that should start with students attitudes instead of classroom instruction or method of teaching.

 Mishra and Nath (2000) found that competency based teaching is an approach to encourage cognitive and non cognitive development of pupils.

 Mohapatra (1991) conducted a comparative study of the problems of secondary school teachers of government and private schools of Cuttack town and found out the following problems.

* The classes of both these schools were overcrowded because the number of secondary schools was not adequate to feed the number of students demanding schooling in the urban area.
* Majority of the teachers opined that the prescribed syllabus was not suitable to fulfill the aims and objectives of education.
* About 70% of the teachers felt that than present system of education creates unemployment.
* Most of them expressed dissatisfaction about the text books.
* Majority of the teachers were found to be in favour of the materialistic approach for the improvement of our country and didn't attach importance to religion.

Beegum (1990) studied the problems of teaching new science syllabus for Standard VII students of Andra Pradesh and their impact on Pupil's achievement. The following problems were observed:

* more than 60% of the teachers found the content in the new syllabus as overloaded.
* lack of facilities for teaching science continued to bother teachers
* achievement in science favoured significantly those students, whose teachers had attended an inservice education programme.
* dictation of notes by teachers was the dominant method of getting exercises done by students.
* It was proposed that the school conditions need to be improved through, say supply of science kits and handbooks to teachers so that pupils may participate in teaching learning by practicing processes in science.

Alexander (1989) observed that the least occurred behaviours in the science classroom were appreciating, responding to the students questions, showing exhibits, specimens, displaying models or charts and labelling charts. Teachers exerted more direct influence in science classes and most of them showed explaining behaviour but very few showed appreciating behaviour.

Sudararajan (1988) tried to evaluate the teaching of biology in higher secondary stage in Tamil Nadu and the major findings were as follows.

* The teachers didn't encourage discussion or other student centered teaching-technique instead they followed expository type of teaching strategies.
* The syllabus was not conducive to the development of scientific method, the development of scientific interest and a favourable attitude towards the study of biology in them and an appreciation of the contribution of biology to human civilization. Moreover, it was traditional, product oriented and overloaded with facts.
* The biology textbook too was found to be defective in many aspects.
* The biology laboratories were in bad shape. Many necessary chemicals, equipments and teachings aids were found to be lacking.

Mohanty (1988) conducted a study that addresses the problem of science teaching in the high schools of Cuttack city and found out the following problems.

* The schools were deficient in audio visual aids, equipments and laboratory facilities.
* Due to the lack of science funds, the schools could not do a lot for the development of science education by organising science fairs and science exhibitions in the schools.
* The present syllabus was very tough and hence thorough revision of the syllabus keeping in view of the teacher's position, laboratory facilities and the standard of students were recommended.
* The outcomes of affective domain were not at all assessed in the schools though that of cognitive domain were assessed partially.

Cheriyan (1988) found out that several facilitating and hindering factors to the modernisation of chemistry teaching in the secondary schools of Kerala were related mainly to the administrative aspects. It was identified that there was a gap of a decade between the introduction of modern concepts in chemistry and the corresponding modern pedagogical approaches.

Singh (1988) noticed that selection of appropriate teaching strategies depends upon a number of factors like objectives to be achieved and nature of the content to be taught. Other factors which are important in the selection of teaching strategies related to the type of the organisational climate prevailing in the school and in the classroom.

Singh (1988) identified that the major aim of teaching strategies is to develop the child as a creative learner. Teaching is a creative endeavour which must result in the development of creative thinking abilities among children. With the use of appropriate teaching strategies, the mind is trained to look at the problems more intelligently and find creative solutions to them.

Singh (1988) pointed out that the teacher should be made to realize the important fact that the objectives of education can be achieved only through the use appropriate teaching strategies, keeping in view the content which has to be taught.

Grewal (1988) observed the six processes in science (such as classifying, inferring, interpreting, predicting, hypothesis making and testing) among four higher secondary schools of Bihar city, and found out that the processes of prediction and interpretation were hardly found in teaching and the most commonly used process were inferring and classifying.

Malhotra (1988) studied critically the existing facilities supervisory practices being adopted in the teaching of science in secondary schools and found that the private, government and central schools differed significantly in the following namely:- the existing facilities for school based co-curricular activities and the existing human facilities, the supervision of science based co-curricular activities, theory classes and practical classes.

Rao (1988) found out that very little was retained by children through rote memory while trying to explore certain intervention materials which enable the optimising learning science in 50 elementary schools of Karnataka, Delhi and Bihar.

Desai (1981) found out that the outstanding problems of teachers of Municipal primary schools of the Marathi language side in Bombay were the educational apathy of the homes of children attending the school. The problems regarding classroom situation, teaching aids, the use of class library and educational guidance ranked from fifth to tenth. The problems of teachers had significant relation with sex, educational background and tenure of service.

Satheesan (1981) conducted a study regarding the difficulties experienced by science teachers in teaching physical science in the secondary schools of Trichur educational district and the study revealed that too much work in imposed on physical science teachers, present syllabus poses a major difficulty to teachers. Teachers are not able to adopt the method of their choice due to work load and other accessories. Teachers are forced to conduct demonstrations in ill suited classrooms. Teachers are not satisfied with the existing facilities for inservice education.

Shah (1981) conducted an experimental investigation on the effect of teaching strategies on the development of creative thinking and achievement in science. Major findings of the study were

* There were significant differences between selected strategies for developing creative thinking and achievement in science.
* The effect of strategies were dependent upon the level of intelligence, sex and creativeness of pupils.

Muddu (1978) studied the problems of secondary school teachers of Nalgonda district in teaching biological science and found out that-majority of the teachers do not have adequate classroom facilities, laboratory facilities and teaching aids such as filmstrips, insect cages, microscopes and physiological apparatus. Most of the schools had poor library facilities where even general books on biology were not available. Most of the teachers were teaching other subjects besides biology and several teachers opined that the existing textbook were not effective for transmitting scientific knowledge.

Joseph (1976) made a study on the potentials and practices of using out of school resources in conducting science club and found that only a very small percentage of teachers make use of out of school resources in conducting science club.

Joan (1971) studied about the motivation of under achieving students in a biology class with lower intellectual abilities. Nineteen students were present in the class. He tried to make biology relevant to the students by continuously relating it to the environment. He arranged field trips to observe living forms of sea life in acquariums. Result was biology made relevant to them through the ecological approach.

Cherian (1965) made a study of the aids used in the teaching of physical science in secondary schools of Kottayam district and concluded that our schools do not possess proper lab facilities, equipments and other conveniences necessary to organise practical works and demonstrations. Most teachers draw diagrams on the board but only half of the teachers make their pupils to do this.

Prasad (1964) made of a study regarding the difficulties experienced by teachers in the teaching of physical science in secondary schools of Kerala. His major findings was that lab facilities are far from satisfactory for the teaching of physical science.

Veerappa (1958) examined the trends in science education from primary through degree course level. The study revealed that due to lack of proper labs, well equipped science teachers and effective teaching methods, science education in India was not on a proper footing.

The studies reviewed reveal that the science teachers in general face difficulties of many kinds due to lack of proper training, infrastructure, lack of awareness of new methodologies etc. Many studies have brought into light the need of a change in the strategies to be adopted in the classroom as process oriented experiential strategies adopted in different studies gave favourable results for achievement in the subject. More over the problem of teaching a revised new syllabus is different in different studies though cardinal problems are of the same nature.

**METHODOLOGY**

The procedures and techniques used for conducting a study are known as methodology. According to Webster (1996), methodology is a set or system of methods, principles, and rules for regulating a given discipline, as in the arts or sciences.

 For every piece of research work, methodology is of vital importance. It involves the systematic procedures by which the researcher starts from the initial identification of the problem to final conclusions. The role of methodology is to carry on the research work in a systematic and valid manner.

 The present study is titled "DIFFICULTIES FACED BY SECONDARY SCHOOL TEACHERS OF BIOLOGY IN IMPLEMENTING THE INSTRUCTIONAL STRATEGIES IN KERALA".

 The methodology of the present study is explained under the following heads.

* Objectives of the study
* Hypotheses of the study
* Tools employed for the collection of data.
* Sample selected for the study
* Procedure of collection of data
* Scoring and consolidation of data
* Statistical techniques used for analysis of data.

**OBJECTIVES OF THE STUDY**

 The objectives of the study were the following:

1. To identify the major difficulties faced by Secondary School teachers of psychology in implementing the instructional strategies.

2. To identify the major difficulties faced by secondary school teachers of Biology in implementing the instructional strangers based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

3. To test whether there exists any significant difference in the suggestions given by secondary school teachers of Biology based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

**HYPOTHESES**

1. The Secondary School teacher of Biology face significant difficulties in implementing the instructional strategies.

2. There exists significant difficulties faced by Secondary School teachers of Biology is implementing the instructional strategies based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

3. There exists no significant difference in the suggestions given by secondary school teachers of Biology in implementing the instructional strategies based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

**TOOL EMPLOYED FOR THE COLLECTION OF DATA**

The investigator identified the areas of difficulty through informal interview conducted among different teachers, experts, and student teachers. By doing so the investigator could identify the different areas of difficulty faced by secondary school teachers of biology in implementing the instructional strategies.

Based on the discussions and information obtained from the pilot study, the investigator developed a questionnaire consisting of 40 item coming under different areas. The areas were as follows.

**1. Planning and Specifying Objectives for Learning**

 This area pertains to the problems and inconveniences faced by Biology teachers while planning and specifying objectives for learning activity in an inclusive, heterogenous classroom. Proper planning leads to better results because it gives self confidence to teacher by proper time management. Planning is most important in instruction because it is the corner stone based on which the castles of objectives and goals are made in the empire of education. There are three items in this area and one item consists of five components (Item numbers 1,2,3).

**2. Development of Multiple Intelligences in Classroom**

 Difficulties faced by teachers in developing the scheme of 10 intelligences proposed by Howard Gardner (1983, 1999) namely Verbal linguistic, Logical mathematical, Visual spatial, Bodily kinesthetic, Musical, Interpersonal, Intrapersonal, Naturalistic, Existential and Spiritual. In this area there are two items with ten and five components respectively (Item number: 16, 18).

**3. Development of Creativity**

 This area consists of questions pertaining to the difficulties faced by Biology teachers in developing creativity among children. Creativity demands diversity. Uniformity can often kill the creative urge. Creativity is the most important instinct of the child. For developing the original creative ability the teacher should organise challenging opportunities to the creative ones, use a variety of methods and techniques to avoid monotony and should provide a democratic classroom environment with enough freedom. In this area there is a single item with five components (Item number: 28).

**4. Development of Scientific Attitude**

 The most important objective of Biology teaching is to develop scientific attitude in the classroom. Scientific attitude includes intellectual honesty, persistence, perseverance, critical outlook, with suspended judgement etc (Vaidya 1968). All these can be fostered indirectly through carefully identified, selected, and planned activities which are either completed in groups or done individually by the pupils. There is a single item under this area with four components (Item number: 23).

**5. Evaluation of Pupils Participation**

 The new scheme of curriculum demands pupil's participation as it is an activity based one. The curriculum committee has suggested continuous and comprehensive evaluation at high school level from 2002-2003 onwards. Continuous evaluation is perform as and when the students are involved in learning and these are of two types – continuous evaluation (CE) and Term-end evaluation (TE). Term-end evaluation consists of time bound score in specific written test. Continuous evaluation consists of performance assessment, and evaluation of co-scholastic areas. It compulsorily demands participation of all students. There is a single item with six components under this area (Item number: 13).

**6. Strategy in Biology teaching**

 The word strategy means skill in managing any affair. Instructional strategy in Biology denotes the process designed systematically to ensure learners' acquire terminal behaviour. It assures the 'what', 'how', and 'when' of instruction. This area includes difficulties faced by teachers in maintaining a pupil centered, process oriented, activity based, democratic classroom environment. There is a single item under this area with five components (Item number: 19).

**7. Development of Desirable Values**

 Value development ought to be the prime concern of any educational system in general. Difficulties in developing values like honesty, discipline, group feeling, regularity in general and an appreciation towards nature along with other values related to Biological science like development of aesthetic sense in particular are included under this. There are four items under this area with twelve components (Item numbers: 20, 24, 25, 26).

**8. Co-curricular Activities in Learning Biology**

Learning by doing and learning by living are two essential components of learning science. Through activities of science club, learning of science becomes joyful. Science, especially Biology demands experiential learning in the lap of nature. These include planting trees, cleaning slums and markets, holding science exhibitions, organised by science club etc. There are two items each with five components pertaining to the difficulties in this area (Item no: 14 and 15).

**9. Inservice Training Programmes**

 Inservice training in an important part of teaching profession. Like any other profession, teachers too have to equip themselves to the winds of change in their realm. Lack of training inputs to teacher's in disability issues are challenges to inclusive strategies (Malhotra R., 2002). The new Biology curriculum being implemented in our schools in thoroughly revised and modernised one. So the teachers must be given adequate training through refresher courses for implementing this. This area attempts to find out difficulty with respect to inservice training provided. There are two items out of which one item consists of seven components (Item number: 35 and 36).

**10. Role of Teacher in the Present Strategy**

 Role of teacher in the present strategy is multiple as the new curriculum has a multipronged approach to the teaching-learning process. The teacher has to be a facilitator, co-learner, mediator, democratic leader, guide, diagnostician and above all a friend in this approach. There is a single item in this area This item attempts to find out the difficulties faced by teachers in playing these roles. This area consists of six components (Item number: 17).

**11. Infrastructural Facilities**

 Physical facilities like a well-equipped laboratory, library and enough teaching aids are the dream of any good Biology teacher. Moreover facilities or provision for conducting field trips for enjoyment of the pupils' senses are of prime importance in the present scheme. All these needs resources and proper facilities. This area attempts to find out the difficulties and inconveniences in this respect. There are two items under this area with seven components (Item number: 30,7).

**12. Provision for Providing Vivid Learning Experiences**

Meaningful and vivid learning experiences are to be provided in the classroom for optimum achievement. The teacher should try to combine life situations and learning context. Children should be actively engaged in the learning process either through team work or peer tutoring. Opportunities for social learning must be provided through imitation, simulation etc. This area attempts to find out the difficulties faced by teachers in providing such learning experiences to children. There is a single item under this area with six components (Item number: 5).

**13. Class Control and Group Management**

 Group activities should be properly managed and controlled. Otherwise the sick groups and social loafers (Johnson and Johnson, 1998) will be benefited and the truly hardworking students will be left off. So any difficulty faced by teachers in avoiding such unnecessary tendencies in group work comes under this area. This area consists of two items with 10 components (Item number: 7, 29).

**14. Difficulties in Guiding the Group**

 Guiding the group by clarifying the doubts and dealing with diverse questions are important in group discussion. If the teacher is unable to guide and monitor the group work properly it would become very difficult to evaluate the work in the end. This area pertains to the difficulties in guiding the group. It consists of a single item with five components (Item number: 6).

**15. Difficulties with respect to the prerequisites of group work**

 Group work can be executed, conducted in a classroom only if the classroom in spacious with proper teacher-pupil ratio and flexible furniture that can be moved in accordance to own need. Moreover previous knowledge of the students and enough instructional time (Husen, 1994) are important for the smooth running of group activity. There is a single item in this area to find out the difficulties in this regard. It has five components (Item number: 4).

**16. Development of Process Skills**

 The development of process skills among pupils is one of the core aims of Biology teaching. The teaching of process skills include the basic steps of scientific method and aims at familiarising the pupils with it just from the school days itself. There are a number of process skills that is to be developed in the pupils. This area consists of two items with eleven components (Item number: 9,10).

**17. Learning through Co-operative Learning**

 Co-operative Learning is the instructional use of small groups so that students work together to maximise their own and each others learning (Johnson, Johnson and Holubec, 1993). The whole field of group dynamics is based on the premise that social skills are the key to group productivity (Johnsons and F. Johnson, 1991). This includes social skills of leadership, conflict resolution, decision making etc along with five elements of co-operation namely clearly defined positive interaction, considerable face to face or promotive interaction, high individual accountability, frequent use of relevant interpersonal and small group skills and regular group processing to improve group's effectiveness. This area attempts to find out the difficulties in developing the qualities that is to be developed through co-operative learning. There are two items with eleven components under this area (Item No. 21, 28).

**18. Handling in the problem of individual difference**

 All students need to learn and work in environments where their individual strengths are recognised and individual needs are addressed. The teacher should disrupt the typical hierarchies of who is 'smart' and who is not, and allow all students to work together, each student experiencing his or her own authentic existence and role as a learner. This area attempts to find out the difficulties in handling the problem of individual difference. There is a single item under this area with seven components (Item No. 27).

**19. Role of Instructional Materials**

Textbooks are central and defining feature of elementary and secondary education (Woodward, 1994). This area attempts to check the quality and effectiveness of the instructional materials like textbooks, source books and handbooks in helping the teacher to improve the teaching-learning process by providing practical suggestions for teaching different units. This area attempts to find out the difficulties with respect to the inadequacy of the role of instructional materials provided. There are four items under this area (Item number: 31, 32, 33, 34).

**20. Services of Resources Persons**

 The present curriculum in activity oriented. It demands the pupils to interact with the society and also the society to interact with them. In addition to physical facilities or other support system, services of resource persons like Agriculturists, Bacteriologists, Medical men and other Research Biologists can become best input materials into the educational system. This area attempts to find out the difficulty in receiving the services of resource persons in improving the teaching process. There is a single item under this area with six components (Item number: 37).

**21. Lack of Time**

 "Time in one among the many resources that have an impact on the quality of education provided to students. At the most general level, the way in which time is allocated and used in schools informs students of what educators believe to be important" (L.W. Anderson, 1994). Moreover, the allocation and use of time has been found to be consistently related to the type and amount of student learning that occurs in schools. Due to the implementation of the curricular strategy, which demands continuous and comprehensive evaluation, the teachers face a problem of lack of time. This will indirectly affect the quality of student learning. This area attempts to find out the difficulty in evaluating the assigned works due to lack of time. There is a single item under the area (Item number 12a).

**22. Overload of work**

 Overload of work is a major problem faced by teachers due to the reformed evaluation strategies. The present continuous comprehensive evaluation includes both terminal evaluation and continuous evaluation. Term-end evaluation which includes time bound score specific written test, performance assessment, and evaluation of co-scholastic areas constitute continuous evaluation. All these need sincere efforts and hard work. There is a single item under this area which attempts to find the difficulties faced by secondary school teachers of Biology in evaluating assigned works due to overload of work. (Item number: 12b).

**23. Lack of clarity of attributes to be evaluated**

 Continuous and comprehensive evaluation demands extensive and strict verification of every item of evaluation. For this purpose each item is provided with certain attributes. Only if the projects, reports, seminars, field notes, collections or records possess such and such attributes defined for it, the teacher can give full complement of the grade points to that item. This is a tideous work unless the teacher is well versed about the attributes to be evaluated. There is a single item under this area which attempts to find out the difficulty in evaluating assigned works due to lack of clarity of attributes to be evaluated. (Item number: 12c).

**Suggestions for the Better Practice of the Instructional Strategies**

 Towards the end of the questionnaire there are three items which aims at getting the suggestions about improvement from the teachers. The different areas coming under the suggestions part are as follows.

**1. Class Size**

 Our classrooms are overcrowded and suffocating ones with a teacher-pupil ratio that is double or triple the normal size of 1:20, 1:25 or 1:30. The teacher-pupil ratio is one of the most important aspects which influence the effectiveness of teaching. There is a single item under area to assess whether the teachers need smaller class size to improve teaching. (Item number: 38a).

**2. Supervision of the teacher**

 The new curricular strategy already implemented by the government was done in a haste. Though much homework had been done for increasing the effectiveness of the programme, that was thought to be implemented in a span of 10 years, was brought into action within 6 months (Janapatham, 2005). Hence continuing programme of action for checking or supervising the developments and improvements seems to be unavoidable. There is a single item under this area (Item number 38b).

**3. Consultancy Service**

 Up-to-date knowledge of important issues are essential for a Biology teacher. In inclusive system of education, teachers develop their professional skills through collaborative consultation (Neena, 2002). It enhances quality of teaching and refines one's role as an effective teacher. Availability of services educationists, subject experts and researchers in social sciences can increase the quality of classes that is being provided. There is a single question under this area to find out if the teachers can improve their role as an effective teacher provided they got enough consultancy service. (Item number: 38c).

**4. Attractive Classroom**

 Physical arrangements of the classroom must be suitable for learning and teaching. Both the teachers and the students should feel comfortable with the settings. For this, first of all the classrooms should be well furnished and clean. The teacher's role as an effective one cannot be fulfilled due to such inadequacies. There is a single item under this area to find out whether attractive class rooms are needed to improve teaching. (Item number: 38d).

**5. Periods available per class**

 The present syllabus demands active participation of teachers. The readiness created by the teachers in the students is not fully utilised because most often, they are not able to complete the group activities in time. Often bell rings before the teacher could consolidate the activities. Moreover, the number of periods alloted for Biology teachers in high school classes are very few that the teachers and students often losses the continuity of the lessons. Above all, the time is not enough for the vast syllabus of Biology prescribed in these classes. This area attempts to find out whether teachers' role can be improved if there was more periods available per class. There is a single item under this area. (Item No. 38e).

**6. Inservice Training Programmes**

 Training programmes can boost the calibre of teachers if provided in the necessary amounts in appropriate time. These can sharpen their professional skills and can help them to improve their role as an effective teacher. This item attempts to know the teachers' opinion about the need of more inservice training programmes. There is a single item under this area (Item number 38f).

**7. Promotions**

 Everyone needs motivation, either external or internal. Promotions can act like reinforcements. Recognition for one's work is everyone's dream. This can boost one's self esteem and confidence. In the case of a teacher it can even improve the quality of teaching. This item attempts to know whether teachers need promotion to improve their teaching. This area consists of a single item (Item number 38g).

**8. Freedom to Take Decisions**

 Freedom is something that every human being needs like one's life breath. To work smoothly, creative ideas need a frictionless platform. A teacher must be able to take decisions or to take part in the decision making process. This empowers the teacher and hence improves the teaching process. This area consists of a single item attempts to know whether the teacher wants more freedom to take decisions regarding teaching to improve teaching. (Item number: 38h).

**9. Non-Teaching Duties**

 Most often teachers complains about doing non teaching duties given to them which other ministerial staff should do. This becomes a burden for teaches and quite often reduces their vigour and pleasure for teaching. This item attempts to know whether teachers need to reduce their non-teaching duties inorder to improve their teaching. There is a single item under this area (Item number: 38 i).

**10. Community Support**

 The present curricular strategy demands the teacher to give life related learning experience. This requires constant interaction with the society. It demands the teacher to make the child aware of different facets of community living. All these curricular activities becomes possible only if the teacher is having a good support from the community. This item attempts to know whether the support of community can make the transaction of curricular objectives easier and satisfying. There is a single item under this (Item number: 39a).

**11. Parental Support**

 Home is the first school of every child. But often our parents forget their duties to the child after they start going to school. A teacher alone can't educate a child. A healthy parent-teacher relationship can boost the educational career of each child. This items to find out whether the parental support can improve transaction of curricular objectives. There is a single question under this area (Item number: 39b).

**12. Support from Colleagues**

 Team work is the essence of the present instructional strategy. It can develop the professional skills of the teacher. This not only provides psychological support to teachers but also leads to better student learning. Interdisciplinary, approaches can be adopted in teaching if there is enough colleagial support. Thus objectives of education can be achieved easily. This item attempts to find out whether the teachers suggest for more colleagial support to improve transaction of curricular objectives. There is a single item under this area. (Item number: 39c).

**13. Support from Administrators**

 Inorder to implement anything new in a school, a teacher needs the strong support from administrators. If the administrators are against it, the teacher would be unable to carryout progressive strategies. If they are supportive the teacher will be confident enough to carry out difference strategies. So she or he would be able to attain the aims of teaching Biology easily. There is a single item under this area which attempts to find out whether transaction of curricular objectives can be made satisfying if there was more support from the administrators. (Item number 39d).

 The final item in the questionnaire is open ended one intended to obtain any other difficulties that the teachers face, other than those mentioned above.

**SAMPLE SELECTED FOR THE STUDY**

 The sample selected for the present study consists of 207 secondary school teachers of Biology from Palakkad, Malappuram and Kozhikode Districts. Stratified Random Sampling was adopted. Due weightage were given to different subsamples namely gender, locale of school and type of school. The details of the schools selected for the collection of data is given in appendix 1.

**Break up of the Final Sample**

Table No.1 shows the break up of the final sample under the 3 variable taken for the study.

**TABLE 1**

**Break up of Final sample**

|  |  |  |
| --- | --- | --- |
| Gender | Type of School | Locale of School |
| Male | Female | Govt. | Aided | Urban | Rural |
| 63 | 144 | 102 | 105 | 89 | 118 |
| 207 | 207 | 207 |

**PROCEDURE OF COLLECTION OF DATA**

**Administration of the Tool**

 The prepared tool was administered on a sample of 207 secondary school teachers of Biology from 80 schools in Palakkad, Malappuram and Kozhikode districts. For this, first of all the investigator obtained permission from the heads of the institutions. Then the tool was handed over to the teachers of Biology in each of these schools and the investigator clarified their doubts regarding the questionnaire (Most of the teachers completed answering it within 20 or 30 minutes but some of them gave the tool back only on the second day or few days later).

 The tool consisted of 40 questions with 169 components including the suggestions part towards the end. The average time taken by teachers for completing the tool was 20 minutes.

**SCORING AND CONSOLIDATION OF DATA**

 After scoring, the data were entered in to a tabulation sheet. Scoring was done as the scoring scheme of the questionnaire. There were five choices or alternatives for each item in the questionnaire namely, 'very high', 'high', 'undecided', 'low', 'very low'. The respondents were asked to respond to the items by putting a tick mark against the correct response of the rated questionnaire.

 Scoring procedure done for positive items were 5, 4, 3, 2, 1 for the alternatives very high, high, undecided, low and very low respectively. For the negative items the scoring procedure done were 1, 2, 3, 4, 5 for the alternatives very low, low, undecided, high and very high respectively. The maximum score is 5 for each subquestion and 1 is minimum score. The positive items are 1, 2, 3, 4, 6, 7, 8, 10, 11, 12, 38, 39 and all others except item 40 are negative items. Item number 40 is an open ended one so that the teachers can write down any other difficulty other than that is given in the questionnaire.

**STATISTICAL TECHNIQUES USED FOR ANALYSIS OF DATA**

 The scores obtained from 207 secondary school teachers of Biology were subjected to statistical treatment. The following were the statistical techniques used for the present study.

1. Percentage

2. Chi-Square Test of Independence

**ANALYSIS AND INTERPRETATION OF DATA**

The analysis of the collected data was done on the basis of the objectives of the study. The objectives set for the study were:

1. To identify the major difficulties faced by secondary schools teachers of Biology in implementing the instructional strategies.

2. To identify the major difficulties faced by secondary school teachers of Biology in implementing the instructional strategies based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

3. To test whether there exists any significant difference in the suggestions given by secondary school teachers of Biology in implementing the instructional strategies based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

 The analysis of the data and interpretation are given under following heads.

A. Identification of major difficulties faced by secondary school teachers of Biology in implementing the instructional strategies.

B. Identification of major difficulties faced secondary school teachers of Biology in implementing the instructional strategies for the subsamples based on sex: male and female.

C. Identification of major difficulties faced by secondary school teachers of Biology in implementing the instructional strategies for the subsamples based on locale of school: urban and rural

D. Identification of major difficulties faced by secondary school teachers of Biology in implementing the instructional strategies for the subsamples based on type of management : government and aided.

E. Identification of the major suggestions given by secondary school teachers of Biology in implementing the instructional strategies based on the following subsamples namely.

i. Sex

 ii. Locale of school

 iii. Type of school

F. Identification of the differences in the suggestions given by secondary school teachers of Biology in implementing the instructional strategies based on the following subsamples.

i. Sex

 ii. Locale of school

 iii. Type of school

**A. IDENTIFICATION OF MAJOR DIFFICULTIES FACED BY SECONDARY SCHOOL TEACHERS OF BIOLOGY IN IMPLEMENTING THE INSTRUCTIONAL STRATEGIES**

 This section of the analysis was done to find out the major difficulties faced by secondary school teachers of Biology in implementing the new learning strategies.

 As the first step of the analysis the investigator calculated the percentage of occurrence of each difficulty area in the total sample. Then the areas of difficulties were arranged in the descending order of their percentage of occurrence. By doing so the investigator could identify the areas of difficulty felt by the secondary school teachers of Biology inorder of their seriousness. After identification of the difficulties according to their rank order of seriousness, the investigator put a criteria for identification of the major difficulties faced by secondary school teachers of Biology in implementing the instructional strategies. The major difficulties were identified by applying the criteria that difficulties which occur in more than 50% of the sample is a major one. By putting this criteria, from the table 2 the investigator could identify major difficulties faced by secondary school teachers of Biology in implementing the instructional strategies. The rank order of each difficulty area in the questionnaire according to their seriousness and its percentage of occurrence are presented in the table 2

**TABLE 2**

**Rank, Percentage of
Occurrence and Areas of Difficulty of Secondary
School Teachers of Biology in Implementing the Instructional Strategies**

|  |  |  |
| --- | --- | --- |
| Rank | % of Occurrence  | Area of Difficulty |
| 1. | 87.149 | Overload of work |
| 2. | 86.473 | Lack of time |
| 3. | 79.806 | Services of resource persons |
| 4. | 72.715 | Difficulties with respect to prerequisites of group work |
| 5. | 71.884 | Lack of clarity of attributes to be evaluated |
| 6. | 70.863 | Infrastructural facilities |
| 7. | 63.816 | Inservice training programmes |
| 8. | 61.504 | Handling the problem of individual difference |
| 9. | 60.070 | Development of process skills |
| 10. | 59.871 | Provision for providing vivid learning experiences |
| 11. | 59.614 | Planning and specifying objectives for learning |
| 12. | 59.324 | Strategy in Biology teaching |
| 13. | 59.163 | Pupils' participation |
| 14. | 56.762 | Difficulties in guiding the group |
| 15. | 56.396 | Class control and group management |
| 16. | 56.348 | Development of creativity |
| 17. | 55.749 | Co-curricular activities in learning Biology |
| 18. | 55.338 | Role of instructional materials |
| 19. | 51.150 | Development of Multiple Intelligence in classroom |
| 20. | 49.130 | Development of scientific attitude |
| 21. | 47.596 | Development of desirable values |
| 22. | 44.959 | Role of teacher in present strategy |
| 23. | 44.585 | Learning through cooperative learning |

 Table 2 shows that in the total sample, the overload of work is a major difficulty faced by the secondary school teachers of Biology in implementing the instructional strategy. The percentage of occurrence of this difficulty is 87.149. The second highest percentage is 86.4734 which reveals that lack of time is a major problem in teaching biology in secondary schools in the present syllabus. The third major difficulty faced by secondary school biology teachers is due to the difficulty in receiving the services of resource persons with a percentage of occurrence of 79.806.

 The percentage of occurrence of difficulties with respect to group work is 72.715. The fifth major difficulty in the total sample is due to the lack of clarity of attributes to evaluated in the case of continuous and comprehensive evaluation. 70.683 percentage of the total sample feel lack of infrastructural facilities as a major problem. 63.81 percentage of the total sample feel difficulty due to lack of adequate inservice training programmes. The difficulties in handling the problem of individual difference ranks eighth with a percentage of occurrence of 61.5045.

 Development of process skills ranks ninth in the order of seriousness of the difficulties faced, with a percentage of occurrence of 60.07.

 Difficulties in providing vivid learning experiences ranks tenth with a percentage of occurrence of 59.871 in the total sample. Difficulties with respect to planning and specifying objectives for learning ranks eleventh in the order of seriousness of the difficulties faced with a percentage of occurrence of 59.61.

 Difficulties in adopting different strategies in Biology instruction ranks twelfth with a percentage of occurrence of 59.324. 59.163 percentage of the total sample feels difficulty due to lack of proper pupil participation in scholastic and co-scholastic activities.

 The rank order of the difficulties in guiding the group is fourteen with a percentage of occurrence of 56.762 while difficulties with regard to class control and group management ranks fifteenth with a percentage of occurrence of 56.3961.

 The percentage of occurrence of difficulties in developing creativity in the classroom in 56.348 while the percentage of occurrence of difficulties with respect to providing co-curricular activities in learning biology is 55.749. The inadequacy of role of instructional materials to meet the need of the educational system in the case of biology ranks to be eighteenth with a percentage of occurrence of 55.338. The difficulty faced by secondary school teachers in developing Multiple Intelligence in the classroom ranks to be nineteenth in the order of seriousness with a percentage of occurrence of 51.15

 The difficulties in the development of scientific attitude has a percentage of occurrence of 49.13 while the difficulties with regard to development of desirable values has a percentage of occurrence of 47.596. Similarly, difficulties in enacting the role of teacher in the present strategy and in learning through co-operative learning is having a percentage of occurrence that is below 50. The rank order of the difficulty in enacting the role of teacher in the present strategy is twenty second with a percentage of occurrence of 44.9597 while difficulties in learning through co-operative learning technique has a percentage of occurrence 44.585 with the lowest rank order of seriousness. Hence these four are not considered as areas of major difficulty.

**B. IDENTIFICATION OF MAJOR DIFFICULTIES FACED BY SECONDARY SCHOOL TEACHERS OF BIOLOGY IN IMPLEMENTING THE INSTRUCTIONAL STRATEGY FOR THE SUBSAMPLES BASED ON SEX: MALE AND FEMALE**

 This section of the analysis was done to find out the major difficulties faced by secondary school teachers of Biology in implementing the instructional strategies for the relevant subsamples based on sex..

 The investigator calculated the percentage of occurrence of each difficulty in the subsamples of male and female teachers. By doing so the investigator could identify the major difficulties felt by the secondary school teachers of Biology of both sexes in the order of seriousness. The rank order of each difficulty in the questionnaire, according to their seriousness and its percentage of occurrence are presented in the tables 3 and 4.

**TABLE 3**

**Rank, Percentage of Occurrence and
Major Areas of Difficulty faced by Secondary School
Male Teachers of Biology in Implementing the Instructional Strategies**

|  |  |  |
| --- | --- | --- |
| Rank | % of Occurrence  | Areas of Difficulty |
| 1. | 85.396 | Overload of work |
| 2. | 85.079 | Lack of time |
| 3. | 75.502 | Services of resource persons |
| 4. | 73.777 | Difficulties with respect to prerequisites of group work |
| 5. | 72.063 | Lack of clarity of attributes to be evaluated |
| 6. | 70.794 | Infrastructural facilities |
| 7. | 65.040 | Inservice training programmes |
| 8. | 61.446 | Evaluation of pupils' participation |
| 9. | 61.079 | Strategy in Biology teaching  |
| 10. | 60.045 | Planning and specifying objectives for learning |
| 11. | 59.365 | Development of process skills |
| 12. | 58.921 | Difficulties in guiding the group |
| 13. | 58.349 | Development of creativity |
| 14. | 58.095 | Handling the problem of individual difference |
| 15. | 57.937 | Provision for providing vivid learning experience |
| 16. | 57.873 | Co-curricular activities in learning Biology |
| 17. | 55.317 | Role of instructional materials |
| 18. | 55.301 | Class control and group management |
| 19. | 52.656 | Development of Multiple Intelligences in classrooms |
| 20. | 51.340 | Development of scientific attitude |
| 21. | 49.670 | Development of desirable values |
| 22. | 46.724 | Learning through cooperative learning |
| 23. | 44.179 | Role of teacher in the present strategy |

**B1** **Identification of Major Difficulties faced by Secondary School Male Teachers of Biology in implementing the Instructional Strategies**

 Table 3 shows that the most significant difficulty felt by male Biology teachers of secondary schools due to overload of work and lack of time with a percentage of occurrence 85.396 and 85.079 respectively.

 75.502 percentage of male biology teachers face difficulty due to lack of services of resource persons while 73.777 percentage of male teachers of Biology face difficulties with respect to pre requisites of group work.

 A percentage of 72.063 male Biology teachers face difficulty due to lack of clarify of attributes to be evaluated. 70.794 percentage of male Biology teachers face difficulty due to lack of infra-structural facilities.

 65.040 percentage of male biology teachers face difficulty due to inadequacy and lack of quality of the inservice training programmes. 61.446 percentage of male biology teachers face difficulty with respect to evaluation of pupil's participation. 61.079 percentage of male Biology teachers face difficulty in adopting different strategies in learning Biology teaching. 60.045 percentage of male Biology teachers face difficulty with respect to planning and specify objectives for learning.

 A percentage of 59.365 male Biology teachers of secondary schools face difficulty in developing process skills in the pupils. 58.921 percentage of male Biology teachers face difficulty in guiding the group while 58.349 percentage of male teachers of Biology face difficulty in developing creativity in the pupils. 58.095 percentage of male teacher of Biology face difficulty in handling the problem of individual difference. A percentage of 57.937 male teachers of Biology face difficulty in providing vivid learning experiences while 57.873 percentage of male Biology teachers face difficulty in conducting co-curricular activities in learning Biology. 55.317 percentage of male biology teachers face difficulty due to the inadequacy of the role of instructional material in implementing the instructional strategies. A percentage of 55.301 male Biology teachers face difficulty with respect to class control and group management. 52.656 percentage of male Biology teachers face difficulty in developing Multiple Intelligences in classrooms 51.34 percentage of male teachers of Biology face difficulty in developing scientific attitude in the learner.

 The difficulties faced in the development of desirable values in 49.67 which is below 50.00 percentage and the percentage of occurrence of difficulty in learning through cooperative learning and difficulty with respect to the role of teacher in the present strategy are below 50.00 percentage and hence are not considered as major difficulty.

**TABLE 4**

**Rank, Percentage of Occurrence
and Major Areas of Difficulty faced by Secondary School
 Female Teachers of Biology in Implementing the Instructional Strategies**

|  |  |  |
| --- | --- | --- |
| Rank | % of Occurrence  | Areas of Difficulty |
| 1. | 87.916 | Overload of work |
| 2. | 87.080 | Lack of time |
| 3. | 81.689 | Services of resource persons |
| 4. | 72.250 | Difficulties with respect to prerequisites of group work |
| 5. | 71.805 | Lack of clarity of attributes to be evaluated |
| 6. | 70.893 | Infrastructural facilities |
| 7. | 63.281 | Inservice training programmes |
| 8. | 62.996 | Handling the problem of individual difference |
| 9. | 60.718 | Provision for providing vivid learning experience |
| 10. | 60.379 | Development of process skills |
| 11. | 59.425 | Planning and specifying objectives for learning |
| 12. | 58.556 | Strategy in Biology teaching |
| 13. | 58.164 | Evaluation of pupils' participation |
| 14. | 56.875 | Class control and group management |
| 15. | 55.861 | Difficulties in guiding the group |
| 16. | 55.472 | Development of creativity |
| 17. | 55.347 | Role of instructional materials |
| 18. | 54.819 | Co-curricular activities in learning Biology |
| 19. | 50.491 | Development of Multiple Intelligences in classrooms |
| 20. | 48.160 | Development of scientific attitude |
| 21. | 46.688 | Development of desirable values |
| 22. | 45.300 | Role of teacher in the present strategy |
| 23. | 43.649 | Learning through cooperative learning |

**B.2 Identification of Major Difficulties faced by Secondary School Female Teachers of Biology in implementing the Instructional Strategies**

 Table 4 shows that overload of work, lack of time, lack of availability of services of resource persons are the most significant difficulties faced by the subsample of female secondary school teachers of Biology. The percentage of these items are 87.916, 87.080 and 81.689 respectively.

 The difficulties with respect to prerequisites of group work ranks fourth in the case of female secondary school teachers of biology with a percentage of 72.250 while 71.805 percentage of female Biology Teachers of secondary schools faced difficulties due to lack of clarity of objectives to be evaluated. 70.893 percentage of female Biology teachers faced difficulties with respect to lack of clarify of attributes to be evaluated.

 A percentage of 63.281 female Biology teachers face difficulty due to inadequacy and lack of qualify of the inservice training programmes. 62.996 percentage of female Biology teachers face difficulty with respect to handling the problem of individual difference. 60.718 percentage of female Biology teachers faced difficulties while providing vivid learning experience. A percentage of 60.379 female Biology teachers felt difficulty in developing process skills.

 In planning and specifying objectives for learning, 59.425 percentage of female teachers of Biology faced difficulty the rank order of seriousness of this difficulty is eleventh. A percentage of 58.556 female teachers of Biology faced difficulty in adopting different strategies for Biology teaching. 58.164 percentage of female teachers of Biology face difficulty worth respect to evaluation of pupil's participation in different activities. 56.875 percentage of female teachers of Biology face difficulties with respect to class control and group management while 55.861 percentage of female Biology teachers face difficulty with respect to guiding the group.

 A percentage of 55.472 female Biology teachers face difficulty in developing creativity among pupils while 55.347 percentage of female teachers of Biology face difficulty due to inadequate role of instructional materials. A percentage of 54.819 female Biology teachers face difficulty in conducting co-curricular activities in learning Biology. 50.491 percentage of female Biology teachers face difficulty in developing Multiple Intelligences in classrooms.

 The difficulties faced in the development of scientific attitude, development of desirable values, enacting the role of teacher in the present strategy and learning through cooperative learning are faced by less than 50 percentage of female Biology teachers. Hence these are not considered as major difficulties.

**C. IDENTIFICATION OF MAJOR DIFFICULTIES FACED BY SECONDARY SCHOOL TEACHERS OF BIOLOGY IN IMPLEMENTING THE INSTRUCTIONAL STRATEGIES FOR THE SUBSAMPLES BASED ON LOCALITY: URBAN AND RURAL**

 This section of the analysis was done to find out the major difficulties faced by secondary school teachers of biology in implementing the instructional strategies for the relevant subsamples based on locality namely urban and rural.

 The investigator calculated the percentage of occurrence of each difficulty in the subsamples of urban and rural teachers of Biology. By doing so the investigator could identify the major difficulties felt by the secondary school teachers of Biology of both locality in the order of seriousness. The rank order of each difficulty in the questionnaire, according to their seriousness and its percentage of occurrence are presented in the tables 5 and 6.

**TABLE 5**

**Rank, Percentage of Occurrence and Major
 Areas of Difficulty faced by Secondary School Teachers of
Biology in Urban Schools in Implementing the Instructional Strategies**

|  |  |  |
| --- | --- | --- |
| Rank | % of Occurrence  | Areas of Difficulty  |
| 1. | 89.213 | Lack of time |
| 2. | 88.764 | Overload of work |
| 3. | 81.610 | Services of resource persons |
| 4. | 74.222 | Infrastructural facilities |
| 5. | 72.539 | Difficulties with respect pre-requisites of group work |
| 6. | 71.685 | Lack of clarity of attributes to be evaluated |
| 7. | 65.084 | Inservice training programmes |
| 8. | 63.692 | Planning and specifying objectives for learning  |
| 9. | 63.531 | Handling the problem of individual difference  |
| 10. | 62.607 | Strategy in Biology teaching |
| 11. | 62.370 | Development of process skills |
| 12. | 60.090 | Difficulties in guiding the group |
| 13. | 58.809 | Class control and group management |
| 14. | 58.502 | Provision for providing vivid learning experience |
| 15. | 58.483 | Role of instructional materials |
| 16. | 57.179 | Evaluation of pupils' participation |
| 17. | 56.809 | Development of creativity |
| 18. | 54.742 | Co-curricular activities in learning Biology |
| 19. | 53.468 | Development of Multiple Intelligences in classrooms |
| 20. | 48.522 | Development of desirable values |
| 21. | 47.265 | Role of teacher in the present strategy |
| 22. | 46.348 | Development of scientific attitude |
| 23. | 44.862 | Learning through cooperative learning |

**C.1. Identification of Major Difficulties faced by Secondary School Teachers of Biology in Urban Schools in Implementing the Instructional Strategies**

Table 5 shows that the secondary school Biology teachers of urban schools faces most serious difficulty due to lack of time and overload of work. The percentage of occurrence of these two difficulties are 89.2134 and 88.764. The difficulty ranking third in the order of the percentage of occurrences is due to lack of services of resource persons with a percentage of occurrence of 81.610.

74.222 percentage of Biology teachers of urban schools face difficulty due to lack of infra-structural facilities while 72.539 percentage of the Biology teachers of secondary schools in urban areas face difficulties with respect to pre-requisites of group work. 71.685 percentage of Biology teachers of secondary schools in urban areas face difficulty due to lack of clarity of attributes to be evaluated.

65.084 percentage of Biology teachers of secondary schools in urban area face difficulty due to inadequacy and lack of quality of the inservice training programmes they received. 63.692 percentage of Biology teachers from secondary schools in urban areas face difficulty in planning and specifying objectives for learning 63.531 percentage of Biology teachers from secondary schools of urban area face difficulty in handling the problem of individual difference. 62.607 percentage of Biology teachers from secondary schools in urban areas face difficulty in adopting strategies in teaching Biology 62.37 percentage of Biology teachers from secondary schools in urban areas face difficulty in developing process skills in the students. 60.09 percentage of Biology teachers from secondary schools in urban areas face difficulties in guiding the group.

The percentage of occurrence of the difficulty with regard to class control and group management in the subsample of Biology teachers from secondary schools in urban areas in 58.809. A percentage of 58.502 Biology teachers from secondary schools in urban areas faces difficulty in providing vivid learning experience. 58.483 percentage of Biology teachers from secondary schools in urban areas face difficulty due to inadequate role of instructional materials. 57.179 percentage of Biology teachers from secondary schools in urban areas face difficulty in evaluating pupil's participation. The rank of order of this difficulty is Sixteen. A percentage of 56.809 Biology teachers from secondary schools in urban area face difficulty in developing creativity, while 54.742 percentage face difficulty in conducting co-curricular activities in learning Biology. A percentage of 53.468 Biology teachers from secondary schools in urban areas face difficulty in the development of Multiple Intelligences in classrooms.

The difficulties faced in developing of desirable values, in enacting different roles of teacher in the present strategy, in developing scientific attitude and in learning through cooperative learning are not considered as major difficulties. The percentage of occurrence of these difficulties are below 50.00

**TABLE 6**

**Rank, Percentage of Occurrence and Major
 Areas of Difficulty faced by Secondary School Teachers of
 Biology in Rural Schools in Implementing the Instructional Strategies**

|  |  |  |
| --- | --- | --- |
| Rank | % of Occurrence  | Areas of Difficulty  |
| 1. | 85.932 | Overload of work |
| 2. | 84.406 | Lack of time |
| 3. | 78.446 | Services of resource persons |
| 4. | 72.847 | Difficulties with respect to prerequisites of group work |
| 5. | 72.033 | Lack of clarity of attributes to be evaluated |
| 6. | 68.329 | Infrastructural facilities |
| 7. | 62.860 | Inservice training programmes |
| 8. | 60.904 | Provision for providing vivid learning experience |
| 9. | 60.659 | Evaluation of pupils' participation |
| 10. | 59.975 | Handling the problem of individual difference |
| 11. | 58.330 | Development of process skills |
| 12. | 56.847 | Strategy in Biology teaching |
| 13. | 56.538 | Planning and specifying objectives for learning |
| 14. | 56.508 | Co-curricular activities in learning Biology |
| 15. | 56.000 | Development of creativity |
| 16. | 54.576 | Class control and group management |
| 17. | 54.305 | Difficulties in guiding the group |
| 18. | 52.966 | Role of instructional materials |
| 19. | 51.229 | Development of scientific attitude |
| 20. | 49.096 | Development of Multiple Intelligences in classroom |
| 21. | 46.897 | Development of desirable values |
| 22. | 44.391 | Learning through cooperative learning |
| 23. | 43.220 | Role of teacher in the present strategy |

**C.2. Identification of Major Difficulties faced by Secondary School Teachers of Biology in Rural Schools in implementing the Instructional Strategies**

Table 6 shows that the most serious difficulties faced by the subsample of Biology teachers from secondary schools in rural areas are due to overload of work and lack of time with percentages of occurrence 85.932 and 84.406 respectively.

 78.446 percentage of the rural subsample of Biology teachers face difficulty due to unavailability of the services of resource persons. 72.847 percentage of the rural subsample face difficulties with respect to prerequisites of group work. 72.033 percentage of the rural subsample face difficulties due to lack of clarity of attributes to be evaluated. The rank order of the difficulty faced due to lack of infrastructural facilities in six with a percentage of occurrence of 68.329 in the rural subsample, while 62.860 percentage of teachers face difficulties due to inadequacy and lack of quality of the inservice training programmes. A percentage of 60.904 Biology teachers from secondary schools in rural areas face difficulty in providing vivid learning experiences. A percentage of 60.659 Biology teachers from secondary schools in rural areas face difficulty in evaluating the pupils' participation.

 59.9758 percentage of Biology teachers of the rural subsample face difficulty in handling the problem of individual difference while 58.336 percentage of the rural subsample face difficulty in developing process skills in learners. 56.847 percentage of the rural subsample of Biology teachers face difficulty in adopting strategies in Biology teaching while 56.538 percentage of the rural subsample of Biology teachers face difficulty in planning and specifying objectives for learning. 56.508 percentage of the rural subsample face difficulties in conducting co-curricular activities in learning Biology while 56.00 percentage of the rural subsample face difficulty in developing creativity in the pupils. A percentage of 54.576 Biology teachers of secondary school in rural areas face difficulty with regard to class control and group management while 54.305 percentage of the rural subsample face difficulties in guiding the group. 52.966 percentage of the subsample of rural school teachers of Biology face difficulty due to inadequate role of the instructional materials while 51.229 percentage of the rural subsample face difficulties in developing scientific attitude in pupils.

 Difficulties in developing Multiple Intelligences in classroom and developing desirable values, in learning through cooperative learning and in enacting different roles of the teacher in the present strategy are having a percentage of occurrence that is below 50.00. Hence these are not considered as major difficulties.

**D. IDENTIFICATION OF MAJOR DIFFICULTIES FACED BY SECONDARY SCHOOL TEACHERS OF BIOLOGY IN IMPLEMENTING THE INSTRUCTIONAL STRATEGIES FOR THE SUBSAMPLES BASED ON TYPE OF SCHOOL: GOVERNMENT AND AIDED**

 This section of the analysis was done to find out the major difficulties faced by secondary school teachers of Biology in implementing the instructional strategy for the relevant subsamples based on locality namely government and aided.

 The investigator calculated the percentage of occurrence of each difficulty in the subsamples of urban and rural teachers of Biology. By doing so the investigator could identify the major difficulties faced by the secondary school teachers of Biology of both type of school in the order of seriousness. The rank order of each difficulty in the questionnaire, according to their seriousness and its percentage of occurrence are presented in the table 7and 8.

**D.1. Identification of Major Difficulties faced by Secondary School Teachers of Biology in Government Schools in Implementing the Instructional Strategies**

**TABLE 7**

**Rank, Percentage of Occurrence and Major Areas
of Difficulty faced by Secondary School Teachers of Biology
in Government Schools in Implementing the Instructional Strategies**

|  |  |  |
| --- | --- | --- |
| Rank | % of Occurrence  | Areas of Difficulty |
| 1. | 87.843 | Overload of work |
| 2. | 86.862 | Lack of time |
| 3. | 77.450 | Services of resource persons |
| 4. | 75.725 | Difficulties with respect to prerequisites of group work |
| 5. | 70.336 | Infrastructural facilities  |
| 6. | 69.607 | Lack of clarity of attributes to be evaluated |
| 7. | 66.789 | Inservice training programmes |
| 8. | 62.016 | Handling the problem of individual difference  |
| 9. | 61.373 | Strategy in Biology teaching  |
| 10. | 60.321 | Development of process skills |
| 11. | 60.140 | Planning and specifying objectives for learning |
| 12. | 59.586 | Evaluation of pupils' participation |
| 13. | 57.330 | Difficulties in guiding the group |
| 14. | 56.863 | Role of instructional materials |
| 15. | 56.601 | Provision for providing vivid learning experience |
| 16. | 56.196 | Co-curricular activities in learning Biology |
| 17. | 56.078 | Development of creativity |
| 18. | 54.588 | Class control and group management |
| 19. | 51.111 | Development of Multiple Intelligences in classroom |
| 20. | 50.098 | Development of scientific attitude |
| 21. | 46.878 | Development of desirable values |
| 22. | 44.848 | Learning through cooperative learning |
| 23. | 44.248 | Role of teacher in the present strategy |

 Table 7 shows that the most serious difficulty faced by the subsample of Biology teachers from government schools are those due to overload of work and lack of time with rank order of seriousness one and two, and a percentage of occurrence 87.843 and 86.862 respectively.

 The rank order of the difficulty faced by the subsample of government secondary school teachers of Biology due to unavailability of services of resource persons is third and the percentage of occurrence of this difficulty is 77.450. Difficulties with respect to pre-requisites of group work are faced by a percentage of 75.725 Biology teachers from government schools while 70.336 percentage of teachers face difficulty due to lack of infrastructural facilities in implementing the instructional strategies.

 A percentage of 69.607 government secondary school teachers of Biology face difficulty due to lack of clarity of attributes to be evaluated while 66.789 percentage of government secondary school teachers of Biology face difficulty due to inadequacy and lack of quality of inservice training programmes received. The rank order of serious of the difficulty in handling the problem of individual difference is eight with a percentage of occurrence of 62.016. The percentage of government secondary school teachers of Biology who face difficulty in adopting strategies in teaching Biology is 61.373 with a rank order of nine. A percentage of 60.321 Biology teachers of the government subsample face difficulty in developing process skills in pupils. 60.140 percentage of Biology teachers government subsample face difficulty in planning and specifying objectives for learning.

 59.586 percentage of Biology teachers of government secondary schools face difficulty in evaluating pupils' participation in different activities. The rank order of this difficulty is twelve. A percentage of 57.330 Biology teachers of government secondary schools face difficulty in guiding the group while 56.863 percentage of Biology teachers of government secondary schools face difficulty due to inadequate role of the instructional materials provided. 56.601 percentage of Biology teachers from government secondary schools face difficulty in providing co-curricular activities in Biology while 56.078 percentage of Biology teachers of government secondary schools face difficulty in developing creativity in pupils. A percentage of 54.588 teachers of Biology from government secondary schools face difficulty with respect to class control and group management while 51.11 percentage of the subsample of government secondary school teachers of Biology face difficulty in developing Multiple Intelligences in classroom. A percentage of 50.098 Biology teachers of government secondary schools face difficulty in the development of scientific attitude in pupils.

 The percentage of occurrence of difficulties in developing desirable values, in learning through cooperative learning and in enacting the different roles of teacher in the present strategy are below 50.00. Hence these are not considered as major difficulties.

**D.2. Identification of Major Difficulties faced by Secondary School Teachers of Biology in Aided Schools in Implementing the Instructional Strategies**

**TABLE 8**

**Rank, Percentage of Occurrence and Major
 Areas of Difficulty faced by Secondary School Teachers of
 Biology in Aided Schools in Implementing the Instructional Strategies**

|  |  |  |
| --- | --- | --- |
| Rank | % of Occurrence  | Areas of Difficulty |
| 1. | 86.476 | Overload of work |
| 2. | 86.095 | Lack of time |
| 3. | 82.095 | Services of resource persons |
| 4. | 74.095 | Lack of clarity of attributes to be evaluated  |
| 5. | 71.374 | Infrastructural facilities  |
| 6. | 69.790 | Difficulties with respect to prerequisites of group work |
| 7. | 63.048 | Provision for providing vivid learning experiences |
| 8. | 61.006 | Handling the problem of individual difference  |
| 9. | 60.929 | Inservice training programmes |
| 10. | 59.827 | Development of process skills |
| 11. | 59.102 | Planning and specifying objectives for learning |
| 12. | 58.751 | Evaluation of pupils' participation |
| 13. | 58.152 | Class control and group management |
| 14. | 57.333 | Strategy in Biology teaching |
| 15. | 56.610 | Development of creativity |
| 16. | 56.196 | Difficulties in guiding the group |
| 17. | 55.314 | Co-curricular activities in learning biology |
| 18. | 53.857 | Role of instructional materials |
| 19. | 51.187 | Development of Multiple Intelligences in classroom |
| 20. | 48.293 | Development of desirable values  |
| 21. | 48.160 | Development of scientific attitude |
| 22. | 45.650 | Role of teacher in the present strategy |
| 23. | 44.329 | Learning through cooperative learning |

 Table 8 shows that the most serious difficulties faced by Biology teachers of Aided secondary schools are due to overload of work, lack of time and unavailability of services of resource persons with percentages of occurrence 86.476, 86.095 and 82.095 respectively.

The rank order of the difficulty faced by Biology teachers of Aided Secondary Schools is due to lack of clarity of attributes to be evaluated is four with a percentage of 74.0952. A percentage of 71.374 Biology teachers of Aided secondary schools face difficulties due to lack of infrastructural facilities in the school.

 69.790 percentage of Biology teachers of Aided secondary schools face difficulties with respect to prerequisites of group work while 63.048 percentage of teachers face difficulty in providing vivid learning experiences. A percentage of 61.006 Biology teachers of Aided schools face difficulty in handling the problem of individual difference while 60.929 percentage of them face difficulty due to inadequacy and lack of quality of inservice training programmes.

 A percentage of 59.827 Biology teachers of Aided secondary schools face difficulty in developing process skills in pupils while 59.102 percentage of them face difficulty in planning and specifying objectives for learning. A percentage of 58.152 teachers of Biology of the subsample of Aided secondary schools face difficulty with respect to class control and group management, while 57.333 percentage of Biology teachers of Aided secondary schools face difficulty in adopting a strategy in learning Biology. 56.610 percentage of Biology teachers of the Aided secondary schools face difficulty in developing creativity in pupils while 56.196 percentage of Biology teachers of Aided Secondary Schools face difficulty in guiding the group.

 The percentage of occurrence of the difficulty faced by Aided Secondary School teachers of Biology in implementing the instructional strategy due to inadequate provision for co-curricular activities in learning Biology is 55.314 while 53.857 percentage of Biology teachers of Aided secondary schools face difficulty due to the inadequate role of the instructional materials provided to them. A percentage of 51.187 Biology teachers of Aided Secondary Schools face difficulty in implementing the instructional strategy due to inconveniences and difficulties in developing Multiple Intelligences in classroom.

 Difficulties faced in developing desirable values and scientific attitude, in enacting the role of teacher in the present strategy and in learning through cooperative learning are not considered as major difficulties as the percentages of occurrence of these difficulties are below 50.00 percentage.

**E.** **IDENTIFICATION OF THE MAJOR SUGGESTIONS GIVEN BY SECONDARY SCHOOL TEACHERS OF BIOLOGY IN IMPLEMENTING THE INSTRUCTIONAL STRATEGIES BASED ON THE FOLLOWING SUBSAMPLES NAMELY SEX, LOCALE OF SCHOOL AND TYPE OF SCHOOL**

**E.1. Identification of the Major Suggestions given by Secondary School Teachers of Biology for Subsamples based on Sex**

**TABLE 9**

**Chi square with Row and
Column Percentages for Different**

**Levels of Difficulties for the Subsamples based on Sex**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Items | Subsamples | Percen-tage | Very Low | Low | Un-decided | High | Very High |
| Smaller Class Size | Male | Row | 1.60 | 3.20 | 3.20 | 39.70 | 52.40 |
| Column | 100.00 | 25.00 | 33.30 | 28.70 | 31.40 |
| Female | Row | 0.00 | 4.20 | 2.80 | 43.10 | 50.05 |
| Column | 0.00 | 75.00 | 66.70 | 71.30 | 68.60 |
| Effective Supervision | Male | Row | 0.00 | 7.90 | 19.00 | 47.60 | 25.40 |
| Column | 0.00 | 50.00 | 46.20 | 28.30 | 25.80 |
| Female | Row | 2.10 | 3.50 | 9.70 | 52.80 | 31.90 |
| Column | 100.00 | 50.00 | 53.80 | 71.70 | 74.20 |
| Consultancy Service | Male | Row | 1.60 | 4.80 | 12.70 | 41.30 | 39.70 |
| Column  | 50.00 | 23.10 | 47.10 | 24.10 | 37.30 |
| Female | Row | 0.70 | 6.90 | 6.30 | 56.90 | 29.20 |
| Column | 50.00 | 76.90 | 52.90 | 75.90 | 62.70 |
| Attractive Classroom | Male | Row | 0.00 | 9.50 | 12.70 | 44.40 | 33.30 |
| Column | 0.00 | 22.20 | 47.10 | 30.80 | 30.40 |
| Female | Row | 2.10 | 14.60 | 6.30 | 43.80 | 33.30 |
| Column | 100.00 | 77.80 | 52.90 | 69.20 | 69.60 |
| Items | Subsamples | Percen-tage | Very Low | Low | Un-decided | High | Very High |
| Periods Available per Class | Male | Row | 1.60 | 1.60 | 7.90 | 44.40 | 44.40 |
| Column | 33.30 | 16.70 | 33.30 | 28.90 | 32.40 |
| Female | Row | 1.40 | 3.50 | 6.90 | 47.90 | 40.30 |
| Column | 66.70 | 83.30 | 66.70 | 71.10 | 67.40 |
| In-service Training Programme | Male | Row  | 3.20 | 3.20 | 9.50 | 47.60 | 36.50 |
| Column | 66.70 | 14.30 | 54.50 | 31.90 | 27.10 |
| Female | Row | 0.70 | 8.30 | 3.50 | 44.40 | 43.10 |
| Column | 33.30 | 85.70 | 45.40 | 68.10 | 72.90 |
| Promotions | Male | Row | 1.60 | 9.50 | 33.30 | 28.60 | 27.00 |
| Column | 33.30 | 21.40 | 48.80 | 26.10 | 26.60 |
| Female | Row | 1.40 | 15.30 | 15.30 | 35.40 | 32.60 |
| Column | 66.70 | 78.60 | 51.20 | 73.90 | 73.40 |
| Freedom to take Decisions | Male | Row | 0.00 | 4.80 | 19.00 | 41.30 | 34.90 |
| Column | 0.00 | 27.30 | 52.20 | 29.50 | 26.50 |
| Female | Row | 1.40 | 5.60 | 7.60 | 43.10 | 42.40 |
| Column | 100.00 | 72.70 | 47.80 | 70.50 | 73.50 |
| Non-Teaching Duties | Male | Row | 1.60 | 14.30 | 25.40 | 28.60 | 30.20 |
| Column | 100.00 | 45.00 | 48.50 | 24.70 | 23.80 |
| Female | Row | 0.00 | 7.60 | 11.80 | 38.20 | 42.40 |
| Column | 0.00 | 55.00 | 51.50 | 75.30 | 76.30 |
| Community Support | Male | Row | 0.00 | 7.90 | 1.60 | 55.60 | 34.90 |
| Column | 0.00 | 50.00 | 11.10 | 30.70 | 30.10 |
| Female | Row | 0.70 | 3.50 | 5.60 | 54.90 | 35.40 |
| Column | 100.00 | 50.00 | 88.90 | 69.30 | 69.90 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Items | Subsamples | Percen-tage | Very Low | Low | Un-decided | High | Very High |
| Parental Support | Male | Row | 0.00 | 9.50 | 4.80 | 41.30 | 44.40 |
| Column | 0.00 | 46.20 | 42.90 | 27.40 | 30.40 |
| Female | Row | 0.00 | 4.90 | 2.80 | 47.90 | 44.40 |
| Column | 0.00 | 53.80 | 57.10 | 72.60 | 69.60 |
| Support from Colleagues | Male | Row | 0.00 | 12.70 | 7.90 | 46.00 | 33.30 |
| Column | 0.00 | 61.50 | 62.50 | 29.30 | 24.10 |
| Female | Row | 0.00 | 3.50 | 2.10 | 48.60 | 45.80 |
| Column | 0.00 | 38.50 | 37.50 | 70.70 | 75.90 |
| Support from Administrators | Male | Row | 0.00 | 12.70 | 9.50 | 42.90 | 34.90 |
| Column | 0.00 | 50.00 | 46.20 | 29.00 | 25.90 |
| Female | Row | 0.00 | 5.60 | 4.90 | 45.80 | 43.80 |
| Column | 0.00 | 50.00 | 53.80 | 71.00 | 74.10 |

Only those suggestions with a row percentage of 50 or above were considered as important suggestions.

The significant interpretations that can be arrived at from the table 9 are:

(i) 52.40 percentage of male Biology teachers of secondary schools suggested that their role as an effective teacher would improve very highly if there was little more smaller class size.

(ii) 50.00 percentage of the female Biology teachers of secondary schools suggested that they can improve their role as an effective teacher if there was smaller class size.

(iii) 52.8 percentage of female Biology teachers of secondary schools suggested that they could highly improve their role as an effective teacher if there was enough consultancy service.

(iv) 55.6 percentage male Biology teachers of secondary schools suggested that the transaction of curricular objectives can be made highly satisfying and easier if there was more community support.

(v) 54.9 percentage of female Biology teachers of secondary schools suggested that the transaction of curricular objectives can be made highly satisfying and easier if there was more community support.

**E.2. Identification of the Major Suggestions Given by Secondary School Teachers of Biology on the Basis of the Subsamples of Locale of School**

**TABLE 10**

**Chi square with Row and
Column Percentages for Different Levels of
Difficulties for Subsamples based on Locale of the School**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Items | Subsamples | Percen-tage | Very Low | Low | Un-decided | High | Very High |
| Smaller Class Size | Urban | Row | 1.10 | 4.50 | 5.60 | 46.10 | 42.70 |
| Column | 100.00 | 50.00 | 83.30 | 47.10 | 36.20 |
| Rural | Row | 0.00 | 3.40 | 0.80 | 39.00 | 56.80 |
| Column | 0.00 | 50.00 | 16.70 | 52.90 | 63.80 |
| Effective Supervision | Urban | Row | 1.10 | 3.40 | 14.60 | 55.10 | 25.80 |
| Column | 33.30 | 30.00 | 50.00 | 46.20 | 37.10 |
| Rural | Row | 1.70 | 5.90 | 11.00 | 48.30 | 33.10 |
| Column | 66.70 | 70.00 | 50.00 | 53.80 | 62.90 |
| Consultancy Service | Urban | Row | 1.10 | 4.50 | 10.10 | 53.90 | 30.30 |
| Column  | 50.00 | 30.80 | 52.90 | 44.40 | 40.30 |
| Rural | Row | 0.80 | 7.90 | 6.80 | 50.80 | 33.90 |
| Column | 50.00 | 69.20 | 47.10 | 55.60 | 50.70 |
| Attractive Classroom | Urban | Row | 0.00 | 16.90 | 9.00 | 41.60 | 32.60 |
| Column | 0.00 | 55.60 | 47.10 | 40.70 | 42.00 |
| Rural | Row | 2.50 | 10.20 | 7.60 | 45.80 | 33.90 |
| Column | 100.00 | 44.40 | 52.90 | 49.30 | 58.00 |
| Periods Available per Class | Urban | Row | 1.10 | 4.50 | 6.70 | 47.20 | 40.40 |
| Column | 33.30 | 66.70 | 40.00 | 43.30 | 41.90 |
| Rural | Row | 1.70 | 1.70 | 7.60 | 46.60 | 42.40 |
| Column | 66.70 | 33.30 | 60.00 | 56.70 | 58.10 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Items | Subsamples | Percen-tage | Very Low | Low | Un-decided | High | Very High |
| In-service Training Programme | Urban | Row  | 1.10 | 9.00 | 6.70 | 34.80 | 48.30 |
| Column | 33.30 | 57.10 | 54.50 | 33.00 | 50.60 |
| Rural | Row | 1.70 | 5.10 | 4.20 | 53.40 | 35.60 |
| Column | 66.70 | 42.90 | 45.50 | 67.00 | 49.40 |
| Promotions | Urban | Row | 1.10 | 14.60 | 20.20 | 28.10 | 36.00 |
| Column | 33.30 | 46.40 | 41.90 | 36.20 | 50.00 |
| Rural | Row | 1.70 | 12.70 | 21.20 | 37.30 | 27.10 |
| Column | 66.70 | 53.60 | 58.10 | 63.80 | 50.00 |
| Freedom to take Decisions | Urban | Row | 0.00 | 6.70 | 11.20 | 41.60 | 40.40 |
| Column | 0.00 | 54.50 | 43.50 | 42.00 | 43.40 |
| Rural | Row | 1.70 | 4.20 | 11.00 | 43.20 | 39.80 |
| Column | 100.00 | 45.50 | 56.50 | 58.00 | 56.60 |
| Non-Teaching Duties | Urban | Row | 1.10 | 11.20 | 21.30 | 30.30 | 36.00 |
| Column | 100.00 | 50.00 | 57.60 | 37.00 | 40.00 |
| Rural | Row | 0.00 | 8.50 | 11.90 | 39.00 | 40.70 |
| Column | 0.00 | 50.00 | 42.40 | 63.00 | 60.00 |
| Community Support | Urban | Row | 0.00 | 5.60 | 4.50 | 58.40 | 31.50 |
| Column | 0.00 | 50.00 | 44.40 | 45.60 | 38.40 |
| Rural | Row | 0.80 | 4.20 | 4.20 | 52.50 | 38.10 |
| Column | 100.00 | 50.00 | 55.60 | 54.40 | 61.60 |
| Parental Support | Urban | Row | 0.00 | 7.90 | 3.40 | 46.10 | 42.70 |
| Column | 0.00 | 53.80 | 42.90 | 43.20 | 41.30 |
| Rural | Row | 0.00 | 5.10 | 3.40 | 45.80 | 45.80 |
| Column | 0.00 | 46.20 | 57.10 | 56.80 | 58.70 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Items | Subsamples | Percen-tage | Very Low | Low | Un-decided | High | Very High |
| Support from colleagues | Urban | Row | 0.00 | 5.60 | 4.50 | 47.20 | 42.70 |
| Column | 0.00 | 38.50 | 5.00 | 42.40 | 43.70 |
| Rural | Row | 0.00 | 6.80 | 3.40 | 48.30 | 41.50 |
| Column | 0.00 | 61.50 | 50.00 | 57.60 | 56.30 |
| Support from Administrators | Urban | Row | 0.00 | 9.00 | 9.00 | 40.40 | 41.60 |
| Column | 0.00 | 50.00 | 61.50 | 38.70 | 43.50 |
| Rural | Row | 0.00 | 6.80 | 4.20 | 48.30 | 40.70 |
| Column | 0.00 | 50.00 | 38.50 | 61.30 | 56.50 |

 Only those suggestions with a row percentage of 50 or above were considered as important suggestions.

The important interpretations that can be arrived at from the table 10 are:

(i) 55.10 percentage of Biology teachers of urban secondary schools suggested that effective supervision would highly improve their role as an effective teacher.

(ii) 53.90 percentage of Biology teachers of urban secondary schools suggested that enough consultancy service would highly improve their role as an effective teacher.

(iii) 50.80 percentage of Biology teachers of rural secondary schools suggested that they would improve their role as an effective teacher if there was more consultancy service.

(iv) 53.40 percentage of Biology teachers from rural secondary schools suggested that they could highly improve their role as an effective teacher if there was more inservice training programme.

(v) 58.40 percentage of Biology teachers of Urban secondary schools suggested that the transaction of curricular objectives can be made highly satisfying and easier if there was more community support.

(vi) 52.50 percentage of Biology teachers of rural secondary schools suggested that the transaction of curricular objectives can be made highly satisfying and easier if there was more community support.

**E.3. Identification of the Major Suggestions given by Secondary School Teachers of Biology on the basis of the subsamples of Type of School**

**TABLE 11**

 **Chi square with Row and
Column Percentages for Different Levels**

**of Difficulties for Subsamples Based on Type of School**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Items | Subsamples | Percen-tage | Very Low | Low | Un-decided | High | Very High |
| Smaller Class Size | Govt. | Row | 1.10 | 2.90 | 2.00 | 44.10 | 50.00 |
| Column | 100.00 | 37.50 | 33.30 | 51.70 | 48.60 |
| Aided | Row | 0.00 | 4.80 | 3.80 | 40.00 | 51.40 |
| Column | 0.00 | 62.50 | 66.70 | 48.30 | 51.40 |
| Effective Supervision | Govt. | Row | 1.10 | 4.90 | 7.80 | 53.90 | 32.40 |
| Column | 33.30 | 50.00 | 30.80 | 51.90 | 53.20 |
| Aided | Row | 1.90 | 4.80 | 17.10 | 48.60 | 27.60 |
| Column | 66.70 | 50.00 | 69.20 | 48.10 | 46.80 |
| Consultancy Service | Govt. | Row | 1.00 | 2.00 | 6.90 | 56.90 | 33.30 |
| Column  | 50.00 | 15.40 | 41.20 | 53.70 | 50.70 |
| Aided | Row | 1.00 | 10.50 | 9.50 | 47.60 | 31.40 |
| Column | 50.00 | 84.60 | 58.80 | 46.30 | 49.30 |
| Attractive Classroom | Govt. | Row | 2.90 | 5.90 | 3.90 | 52.90 | 34.30 |
| Column | 100.0 | 22.20 | 23.50 | 59.30 | 50.70 |
| Aided | Row | 0.00 | 20.00 | 12.40 | 35.20 | 32.40 |
| Column | 0.00 | 77.80 | 76.50 | 40.70 | 49.30 |
| Periods Available per Class | Govt. | Row | 2.90 | 1.00 | 2.90 | 50.00 | 43.10 |
| Column | 100.00 | 16.70 | 20.00 | 52.60 | 51.20 |
| Aided | Row | 0.00 | 4.80 | 11.40 | 43.80 | 40.00 |
| Column | 0.00 | 83.30 | 80.00 | 47.40 | 48.80 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Items | Subsamples | Percen-tage | Very Low | Low | Un-decided | High | Very High |
| In-service Training Programme | Govt. | Row  | 1.00 | 3.90 | 4.90 | 44.10 | 46.10 |
| Column | 33.30 | 28.60 | 45.50 | 47.90 | 55.30 |
| Aided | Row | 1.90 | 9.50 | 5.70 | 46.70 | 36.20 |
| Column | 66.70 | 71.40 | 54.50 | 52.10 | 44.70 |
| Promotions | Govt. | Row | 1.00 | 7.80 | 20.60 | 42.20 | 28.40 |
| Column | 33.30 | 28.60 | 48.80 | 62.30 | 45.30 |
| Aided | Row | 1.90 | 19.00 | 21.00 | 24.80 | 33.30 |
| Column | 66.70 | 71.40 | 51.20 | 37.70 | 54.70 |
| Freedom to take Decisions | Govt. | Row | 0.00 | 2.90 | 5.90 | 51.00 | 40.20 |
| Column | 0.00 | 27.30 | 26.10 | 59.00 | 49.40 |
| Aided | Row | 1.90 | 7.60 | 16.20 | 34.30 | 40.00 |
| Column | 100.00 | 72.70 | 73.90 | 40.90 | 50.60 |
| Non-Teaching Duties | Govt. | Row | 1.00 | 4.90 | 13.70 | 40.20 | 40.20 |
| Column | 100.00 | 25.00 | 42.40 | 56.20 | 51.30 |
| Aided | Row | 0.00 | 14.30 | 18.10 | 30.50 | 37.10 |
| Column | 0.00 | 75.00 | 57.60 | 43.80 | 48.80 |
| Community Support | Govt. | Row | 0.00 | 3.90 | 4.90 | 51.00 | 40.20 |
| Column | 0.00 | 40.00 | 55.60 | 45.60 | 56.20 |
| Aided | Row | 1.00 | 5.70 | 3.80 | 59.00 | 30.50 |
| Column | 100.00 | 60.00 | 44.40 | 54.50 | 43.80 |
| Parental Support | Govt. | Row | 0.00 | 4.90 | 0.00 | 46.10 | 49.00 |
| Column | 0.00 | 38.50 | 0.00 | 49.50 | 54.30 |
| Aided | Row | 0.00 | 7.60 | 6.70 | 45.70 | 40.00 |
| Column | 0.00 | 61.50 | 100.00 | 50.50 | 45.70 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Items | Subsamples | Percen-tage | Very Low | Low | Un-decided | High | Very High |
| Support from colleagues | Govt. | Row | 0.00 | 2.90 | 3.90 | 49.00 | 44.10 |
| Column | 0.00 | 23.10 | 50.00 | 50.50 | 51.70 |
| Aided | Row | 0.00 | 9.50 | 3.80 | 46.70 | 40.00 |
| Column | 0.00 | 76.90 | 50.00 | 49.50 | 48.30 |
| Support from Administrators | Govt. | Row | 0.00 | 2.90 | 4.90 | 52.00 | 40.20 |
| Column | 0.00 | 18.80 | 38.50 | 57.00 | 48.20 |
| Aided | Row | 0.00 | 12.40 | 7.60 | 38.10 | 41.90 |
| Column | 0.00 | 81.30 | 61.50 | 43.00 | 51.80 |

Only those suggestions with a row percentage of 50 or above were considered as major suggestions.

 The significant interpretation that can be arrived at from table 11 are

(i) 50.00 percentage of the Biology teachers from government secondary schools suggested that they could very highly improve their role as an effective teacher if there was little more smaller class size.

(ii) 51.40 percentage of Biology teachers from aided secondary school suggested that they could very highly improve their role as an effective teacher if there was smaller class size.

(iii) 53.90 percentage of Biology teachers from government secondary schools suggested that hey could very highly improve their role as an effective teacher if there was more effective supervision.

(iv) 56.90 percentage of Biology teachers from government secondary schools were of the opinion that they could highly improve their role as an effective teacher if there was enough consultancy service.

(v) 52.90 percentage of Biology teachers from government secondary schools suggested that they could highly improve their role as an effective teacher if there was more attractive classroom.

(vi) 50.00 percentage of Biology teachers from government secondary schools suggested that they could highly improve their role as an effective teacher if there were more periods available per class.

(vii) 51.00 percentage of Biology teachers of government secondary schools suggested that they could highly improve their role as an effective teacher if there was more freedom to take decisions regarding teaching.

(viii) 51.00 percentage of Biology teachers from government secondary schools suggested that the transaction of curricular objectives can be made highly satisfying and easier if there was more community support.

(ix) 59.00 percentage of Biology teachers from aided secondary schools suggested that they could make the transaction of curricular objectives satisfying and easier if there was more community support.

(x) 52.00 percentage of the Biology teachers from government secondary schools suggested that they could make the transaction of curricular objectives highly satisfying and easier if there was more support from administrators.

**F. IDENTIFICATION OF THE DIFFERENCES IN THE SUGGESTIONS GIVEN BY SECONDARY SCHOOL TEACHERS OF BIOLOGY IN IMPLEMENTING THE INSTRUCTIONAL STRATEGIES BASED ON THE FOLLOWING SUBSAMPLES NAMELY SEX, LOCALE OF SCHOOL AND TYPE OF SCHOOL**

**F.1. Identification of the Differences in the Suggestions given by Secondary School Teachers of Biology for the Subsamples based on Sex**

**TABLE 12**

**Chi-square values with Degrees of Freedom and
Levels of Significance for Each Item based on the Subsamples of Sex**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sl. No. | Items | Degrees of freedom | Chi-Square Value | Table Value for Significance at |
| 0.05 level | 0.01 level |
| 1 | Smaller Class size | 4 | 2.5887 | 9.49 | 13.28 |
| 2 | Effective Supervision | 4 | 7.0099 | 9.49 | 13.28 |
| 3 | Consultancy Service | 4 | 6.4742 | 9.49 | 13.28 |
| 4 | Attractive Classroom | 4 | 4.3964 | 9.49 | 13.28 |
| 5 | Periods Available per Class | 4 | 0.9045 | 9.49 | 13.28 |
| 6 | Inservice Training Programme | 4 | 7.1597 | 9.49 | 13.28 |
| 7 | Promotions  | 4 | 9.0318 | 9.49 | 13.28 |
| 8 | Freedom to take Decisions | 4 | 6.6988 | 9.49 | 13.28 |
| 9 | Non-Teaching Duties  | 4 | 12.2072\* | 9.49 | 13.28 |
| 10 | Community support | 4 | 3.8397 | 9.49 | 13.28 |
| 11 | Parental support | 3 | 2.4492 | 7.82 | 11.34 |
| 12 | Support from Colleagues | 3 | 11.5155\*\* | 7.82 | 11.34 |
| 13 | Support from Administrators | 3 | 5.3284 | 7.82 | 11.34 |

\* denotes that significant at 0.05 level

\*\* denotes that significant at 0.01 level

 Table 12 shows that there exists no significant difference between Biology teachers of Urban and Rural secondary schools in their suggestions. So the suggestions are independent of locale of school as the chi-square values obtained with corresponding degrees of freedom are less than the tabled values needed for significance at 0.05 and 0.01 levels of significance.

**F.2. Identification of the Differences in the Suggestions given by Secondary School Teachers of Biology for the Subsamples based on Locale of School**

**TABLE 13**

**Chi-square values with
Degrees of Freedom and Levels of Significance for
Each Item based on the Subsamples of Locale of School**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sl. No. | Items | Degrees of freedom | Chi-Square Value | Table Value for Significance at |
| 0.05 level | 0.01 level |
| 1 | Smaller Class size | 4 | 8.0589 | 9.49 | 13.28 |
| 2 | Effective Supervision | 4 | 2.6554 | 9.49 | 13.28 |
| 3 | Consultancy Service | 4 | 1.8103 | 9.49 | 13.28 |
| 4 | Attractive Classroom | 4 | 4.3440 | 9.49 | 13.28 |
| 5 | Periods Available per Class | 4 | 1.5897 | 9.49 | 13.28 |
| 6 | Inservice Training Programme | 4 | 7.7037 | 9.49 | 13.28 |
| 7 | Promotions  | 4 | 2.8405 | 9.49 | 13.28 |
| 8 | Freedom to take Decisions | 4 | 2.1466 | 9.49 | 13.28 |
| 9 | Non-Teaching Duties  | 4 | 5.9569 | 9.49 | 13.28 |
| 10 | Community support | 4 | 1.9221 | 9.49 | 13.28 |
| 11 | Parental support | 3 | 0.7329 | 7.82 | 11.34 |
| 12 | Support from Colleagues | 3 | 0.2989 | 7.82 | 11.34 |
| 13 | Support from Administrators | 3 | 2.8509 | 7.82 | 11.34 |

\* denotes that significant at 0.05 level

\*\* denotes that significant at 0.01 level

 Table 13 shows that the chi-square value obtained for the suggestions given by male and female teachers are independent of sex except for two suggestions namely the need of reducing non-teaching duties and the need of support from colleagues.

 The chi-square value obtained for fever non teaching duties in 12.2072 which is greater than the tabled value for significance at 0.05 level for 4 degrees of freedom. Hence the need to reduce non teaching duties in independent of sex.

 The chi-square value obtained for 3 degrees of freedom for the need of support from colleagues is 11.5155 which is greater than the tabled values for significance ate 0.05 and 0.01 levels of significance. Hence the need for more colleagial support in independent of sex.

**F.3. Identification of the Differences in the Suggestions given by Secondary School Teachers of Biology for the Subsamples based on Type of School**

**TABLE 14**

**Chi-square values with
Degrees of Freedom and Levels of Significance for
Each Item based on the Subsamples of Type of School**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sl. No. | Items | Degrees of freedom | Chi-Square Value | Table Value for Significance at |
| 0.05 level | 0.01 level |
| 1 | Smaller Class size | 4 | 2.3128 | 9.49 | 13.28 |
| 2 | Effective Supervision | 4 | 4.5459 | 9.49 | 13.28 |
| 3 | Consultancy Service | 4 | 7.3257 | 9.49 | 13.28 |
| 4 | Attractive Classroom | 4 | 19.2489\*\* | 9.49 | 13.28 |
| 5 | Periods Available per Class | 4 | 11.3298\* | 9.49 | 13.28 |
| 6 | Inservice Training Programme | 4 | 4.0762 | 9.49 | 13.28 |
| 7 | Promotions  | 4 | 10.2090\* | 9.49 | 13.28 |
| 8 | Freedom to take Decisions | 4 | 12.4138\* | 9.49 | 13.28 |
| 9 | Non-Teaching Duties  | 4 | 7. 8753 | 9.49 | 13.28 |
| 10 | Community support | 4 | 3.4551 | 9.49 | 13.28 |
| 11 | Parental support | 3 | 8.3567\* | 7.82 | 11.34 |
| 12 | Support from Colleagues | 3 | 3.8401 | 7.82 | 11.34 |
| 13 | Support from Administrators | 3 | 8.8237\* | 7.82 | 11.34 |

\* denotes that significant at 0.05 level

\*\* denotes that significant at 0.01 level

 Table 14 shows that there exists significant difference between the Biology teachers of government and aided schools in the case of their suggestions about having an attractive classroom to improve their role as an effective teacher. The chi-square value obtained for 4 degrees of freedom is greater than the tabled values for significance at 0.05 and 0.01 levels respectively. So the suggestions about the need of more attractive classroom in independent of the type of school of Biology teacher.

 In the case of need of more periods available for class, the chi-square value obtained for 4 degrees of freedom is greater than the tabled value for significance at 0.05 level. Hence need for period available per class in independent of the type of school. So there exists significant difference in the suggestions about the availability of more periods per class among Biology teachers of Government and Aided schools.

 The chi-square value obtained for 4 degrees of freedom is greater than the tabled value needed for significance at 0.05 level of significance for the samples of Biology teachers of Government and Aided schools for the suggestions about the need of promotion. So the need of promotion is independent of the locale of school of the Biology teachers. Hence there exists significant difference in the suggestions about promotions among Biology teachers of Government and Aided schools.

 The chi-square value obtained for 4 degrees of freedom is greater than the tabled values needed for significance at 0.05 level in the case of the suggestion about freedom to take decisions regarding teaching for the subsamples based on type of school. So this suggestion is independent of locale of school of the biology teachers. Hence there exists significant difference in the need for more freedom to take decisions regarding teaching among Biology teachers of Government and Aided schools.

 The chi-square value obtained for the suggestions about the need of more parental support is greater than the tabled value needed for significance at 0.05 with 3 degrees of freedom for subsamples based on type of school so the need for more parental support is independent of the type of schools that is then exists significant difference in the need for more parental support for biology teachers of Government and Aided Schools.

 The chi-square value obtained for 3 degrees of freedom for the suggestions about the support from administrators based on the type of school in greater than the tabled value needed for significance at 0.05 level. Hence this suggestion is independent of the type of school that is then exists significant difference in the suggestions about the need of support from administrators to make the transaction of curriculum objectives more easier and satisfying.

**SUMMARY CONCLUSIONS AND SUGGESTIONS**

 This chapter presents a summary of the procedure adopted for the study along with the findings and suggestions for further research.

**RESTATEMENT OF THE PROBLEM**

 The present study is entitled as "DIFFICULTIES FACED BY SECONDARY SCHOOL TEACHERS OR BIOLOGY IN IMPLEMENTING THE INSTRUCTIONAL STRATEGIES IN KERALA."

**OBJECTIVES OF THE STUDY**

 The objectives of the study were

1. To identify the major difficulties faced by secondary school teachers of Biology in implementing the instructional strategies.

2. To identify the major difficulties faced by secondary school teachers of Biology in implementing the instructional strategies based on the following subsamples.

 i. Sex

 ii. Locale of school

iii. Type of school.

3. To test whether there exists any significant difference in the suggestions given by secondary school teachers of Biology based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

**HYPOTHESES OF THE STUDY**

The hypotheses set for the study were:

1. The secondary school teachers of Biology faced significant difficulties in implementing the instructional strategies.

2. There exists significant difficulties faced by secondary school teachers of Biology in implementing the instructional strategies based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

3. There exists no significant difference in the suggestions given by secondary school teachers of Biology in implementing the instructional strategies based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school.

**METHODOLOGY IN BRIEF**

 The methodology adopted for the study is briefly given below:

**Sample selected for the study**

 The sample taken for the study comprised of 207 secondary school teachers of Biology from various schools of Palakkad, Malappuram and Kozhikode districts in Kerala. The list of schools from where data were collected is given in appendix 1.

**Tool used for the study**

 The tool used for collecting data was a questionnaire to identify the difficulties faced by secondary school teachers of Biology prepared by the investigator under the supervision of the guide.

**Statistical Techniques used for the study**

 The objective and hypotheses of the study required the use of the following statistical techniques.

 1. Percentage

 2. Chi-square test of Independence

**FINDINGS OF THE STUDY**

 The major findings of the study were as follows.

 Out of twenty three major difficulty areas listed in the questionnaire, the most serious difficulty faced by more than 80 percentage of the total sample in implementing the instructional strategies are those difficulties with respect to

 1. overload of work

 2. lack of time

 The difficulties faced by 70-80 percentage of the total sample of secondary school teachers of Biology in implementing the instructional strategies are those with respect to

 1. unavailability of services of resource persons

 2. pre-requisites of group work

 3. lack of clarity of attributes to be evaluated

 The difficulties faced by 60-70 percentage of the total sample of secondary school teachers of Biology in implementing the instructional strategies are those difficulties with respect to

1. inadequacy and lack of quality of inservice training programmes.

2. handling the problem of individual difference

3. development of process skills in pupils.

The difficulties faced by 50-60 percentage of secondary school teachers of Biology in implementing the instructional strategies are those difficulties with respect to

1. provision of vivid learning experiences

2. planning and specifying objectives for learning

3. adopting a strategy of Biology teaching

4. evaluation of pupils participation

5. difficulties in guiding the group

6. class control and group management

7. development of creativity

8. co-curricular activities in learning Biology

9. inadequate role of instruction material

10. development of Multiple Intelligences in classroom.

In the total sample the results shows that the secondary school teachers of Biology does not face major difficulty in the following namely.

1. in the development of scientific attitude

2. in the development of desirable values

3. in enacting the role of teacher in the present strategy

4. in learning through cooperative learning

These are not considered as major difficulties of because the percentage of occurrence of these difficulties is below 50 percentage in the total population.

In the case of the subsample based on sex, the most serious difficulty faced by above 80 percentage of the subsample of male Biology teachers of secondary schools in implementing the instructional strategies are those with respect to

1. overload of work

2. lack of time.

 The difficulties faced by 70-80 percentage of secondary school male teachers of Biology in implementing the instructional strategies are difficulties with respect to

 1. Unavailability of services of resource persons.

 2. the pre-requisites of group work.

 3. lack of clarity of attributes to be evaluated.

 4. lack of infrastructural facilities.

 The difficulties faced by 60-70 percentage of the subsample of male Biology teachers of secondary schools in implementing the instructional strategies are those difficulties with respect to.

1. inadequacy and lack of quality of inservice training programmes.

 2. evaluation of pupils' participation.

 3. adopting a strategy in Biology teaching

 4. planning and specifying objectives for learning activities.

 The difficulties faced by 60-70 percentage of the subsample of male Biology teachers of secondary schools in implementing the instructional strategies are those difficulties with respect to

 1. inadequacy and lack of quality of inservice training programmes

 2. evaluation of pupils' participation

 3. adopting a strategy in Biology teaching

 4. planning and specifying objectives for learning activities.

 The difficulties faced by 50-60 percentage of secondary school male teachers of Biology in implementing the instructional strategies are those with respect to

 1. development of process skills

 2. difficulties in guiding the group

 3. development of creativity

 4. handling the problem of individual difference

 5. provision of vivid learning experience

 6 co-curricular activities in Biology teaching

 7. inadequate role of instructional materials

 8. class control and group management

 9. development of Multiple Intelligences in classroom

 10. development of scientific attitude.

 In the subsample of male Biology teachers of secondary schools, they face difficulty in the development of scientific attitude in the pupils while in the case of the total sample it is not a major difficulty. The other three areas namely development of desirable values, learning through cooperative learning and enacting the role of teacher in the present strategy are not found to be areas of serious difficulty. These are faced by below to percentage of the subsample of male Biology teachers. It is not a major difficulty for the total sample too.

 In the case of the subsample based on gender, the most serious difficulty faced by above 80 percentage of the subsample of female Biology teachers of secondary schools in implementing the instructional strategies are those difficulties with respect to

 1. the pre-requisites of group work

 2. lack of clarify attributes to be evaluated

 3. lack of infrastructional facilities

 The difficulties faced by 60-70 of the subsample of female Biology Teachers of secondary schools are those with respect to

 1. inadequacy and lack of quality of inservice training programmes

 2. handling the problem of individual differences

 3. provision for vivid learning experience

 4. development of process skills.

 The difficulties faced by 50-60 percentage of the subsample of female Biology teachers of secondary schools in implementing the instructional strategies are those difficulties with respect to

 1. planning and specifying objectives for learning

 2. adopting a strategy in Biology teaching

 3. evaluation of pupils' participation

 4. class control and group management

 5. difficulties in guiding the group

 6. development of creativity

 7. inadequate role of instructional materials

 8. co-curricular activities in learning Biology

 9. development of Multiple intelligences in classroom.

 In the case of the subsample of female Biology teachers of secondary schools, the difficulties faced by them implementing the instructional strategies with respect to-development of scientific attitude, development of desirable values, enacting the role of teacher in the present strategy and instructional learning through cooperative learning are not considered as major difficulties because its percentage of occurrence is below 50.00 percentage just as that in the total sample.

 In the case of the subsample based on locale of school, the most serious difficulty faced by above 80 percentage of the subsample of teacher of Biology of from secondary schools in urban area in implementing the instructional strategies are those difficulties with respect to

 1. lack of time

 2. overload of work

 3. Unavailability of the services of resource persons.

 The difficulties faced by 70-80 percentage of Biology teachers of secondary schools in urban area in implementing the instructional strategies are those difficulties with respect to

 1. lack of infrastructrual facilities

 2. difficulties with respect to pre-requisites of group work.

 The difficulties faced by 60-70 percentage of Biology teachers from secondary schools in urban areas in implementing the instructional strategies are those difficulties with respect to

 1. inadequacy and lack of quality of inservice training programme.

 2. planning and specifying objectives for learning

 3. handling the problem of individual difference

 4. adopting a strategy in Biology teaching

 5. development of process skills

 6. difficulties in guiding the group.

 The difficulties faced by 50-60 percentage of teachers of Biology from secondary school of urban area in implementing the instructional strategies are those difficulties with respect to

 1. class control and group management

 2. provision of vivid learning experiences

 3. inadequate role of instructional material

 4. evaluation of pupils' participation

5. development of creativity

6. co-curricular activities from Biology teaching

7. development of Multiple Intelligences in classroom.

 The difficulties in the development of desirable values, difficulties in enacting the role of teacher in the present strategy, difficulties in the development of scientific attitude and in learning through cooperative learning are not considered as major difficulties because the percentages of occurrence of these difficulties are below 50. It is the same as in the total sample.

 In the case of the subsample based on locale of school, the most serious difficulty faced by above 80 percentage of the subsample of teachers of Biology from secondary schools, of rural areas in implementing the instructional strategies are those with respect to

 1. overload of work

 2. lack of time.

 The difficulties faced by 70-80 percentage of the subsample of teacher of Biology from secondary schools in rural areas in implementing the instructional strategies are those with respect to

 1. unavailability of services of resource persons

 2. difficulties with respect to pre-requisites of group work.

 The difficulties faced by 60-70 percentage of the subsample of secondary school Biology teachers from rural areas in implementing the instructional strategies are those with respect to

 1. lack of infrastructural facilities

 2. inadequacy and lack of quality of inservice training programme

 3. provision for vivid learning experiences

4. evaluation of pupil's participation.

The difficulties faced by 50-60 percentage of teachers Biology from secondary schools in rural areas in implementing the instructional strategies are those with respect to

1. handling the problem of individual difference

2. development of process skills

3. strategy in Biology teaching

4. planning and specifying objectives for learning

5. co-curricular activities in learning Biology

6. development of creativity

7. class control and group management

8. difficulties in guiding the group

9. inadequate role of instructional materials

10. development of scientific attitude.

In the case of the subsample of teachers of Biology from secondary school in rural areas, the difficulties faced in implementing the instructional strategies with respect to the development of scientific attitude a major one while in all other subsamples and in the total samples it is not a major difficulty. For this rural sample, development of Multiple Intelligences in classroom is not a major difficulty but scientific attitude.

The difficulties faced by the secondary school teachers of Biology from rural areas in implementing the instructional strategies with respect to the development of desirable values, difficulties in learning through cooperative learning and difficulties in enacting the role of teacher in the present strategy are not considered as major difficulties as the percentages of their occurrence are below 50.

In the case of the subsample based on type of school, the most serious difficulty faced by above 80 percentage of the teachers of Biology from government secondary schools in implementing the instructional strategies are those with respect to

1. overload of work

2. lack of time.

The difficulties faced by 70-80 percentage of teachers of Biology from government secondary schools in implementing the instructional strategies are those with respect to

1. unavailability of services of resource persons.

2. pre-requisites of group work

3. lack of infrastructural facilities.

The difficulties faced by 60-70 percentage of the teachers of Biology from government secondary schools in implementing the instructional strategies are those with respect to

1. lack of clarify of attributes to be evaluated

2. inadequacy and lack of quality of inservice training programmes.

3. handling the problem of individual difference

4. adopting a strategy in Biology teaching

5. development of process skills

6. planning and specifying objectives for learning.

The difficulties which 50-60 percentage of the subsample of teacher of Biology from government secondary schools in implementing the instructional strategies are those with respect to

1. evaluation of pupils' participation

2. difficulties in guiding the group

3. in adequacy of the role of infrastructural materials

4. provision for vivid learning experience

5. co-curricular activities in Biology teaching

6. development of creativity

7. class control and group management

8. development of Multiple intelligences in classroom

9. development of scientific attitude.

Thos difficulties with respect to the development of desirable values, learning through cooperative learning and enacting the role of teacher in the present strategy are not considered as major difficulties in the case of the subsample of aided secondary school teachers of Biology and total sample taken, the development of scientific attitude is not a major difficulty but in the case of government secondary school teachers it is a major difficulty.

In the case of subsamples based on type of school, the difficulties faced by more than 80 percentage of the subsample of teachers of Biology from aided secondary schools in implementing the instructional strategies are those with respect to

1. overload of work

2. lack of time

3. unavailability of services of resource persons

The difficulties faced by 70-80 percentage of teachers of Biology form aided secondary school are those with respect to

1. lack of clarity of attributes to be evaluated

2. lack of infrastructrual facilities

The difficulties faced by 60-70 percentage of teachers of Biology from aided secondary schools are those with respect to

1. difficulties with respect to pre-requisites of group work

2. provision for vivid learning experience

3. handling the problem of individual difference

4. inadequacy and lack of quality of training programmes.

The difficulties faced by 50-60 percentage the subsample of aided secondary school teachers of Biology in implementing the instructional strategies are those with respect to

1. development of process skills

2. planning and specifying objectives for learning

3. evaluation of pupils' participation

4. class control and group management

5. adopting a strategy in Biology teaching

6. development of creativity

7. difficulties in guiding the group

8. co-curricular activities in learning Biology

9. inadequate role of instructional materials

10. development of Multiple Intelligences in classroom.

The difficulties with respect to development of desirable values, development of scientific attitude, enacting the role of teacher in the present strategy and learning through cooperative learning are not considered as major difficulties by the subsamples of aided secondary school teachers of Biology because the percentage of occurrence of these difficulties are below 50. This is similar in the case of the total sample.

Most of the suggestions obtained were regarding the following which demands:

- need for more resourceful inservice training programmes

- maintaining of correct teacher-pupil ratio and reducing the present class size

- more effective supervision

- more attractive and spacious classrooms

- more periods per class for teaching Biology especially in standards IX and X

- more freedom to take decisions regarding teaching

- more consultancy services

- more community support

- more support from administrators

There was no significant difference in most of the suggestions given by subsamples of Biology teachers based on sex, locale of school and type of school except in a few items. In the case of sex, the suggestions given by teachers differ in only in two areas.

They are:- need for reducing the number of non teaching duties and need for more support from colleagues.

 In the case of locale of school there exists no significant difference in the suggestions given by teachers of Biology from urban and rural schools.

 In the case of type of school, the suggestions given by teachers differ in six areas. They are need for attractive classrooms, more periods available per class, more promotions, more freedom to take decisions regarding teaching, more support from percents and administrators.

**TENABILITY OF HYPOTHESES**

 The hypotheses set for the study were

1. The secondary school teachers of Biology face significant difficulties in implementing the instructional strategies.

2. There exists significant difficulties faced by secondary school teachers in implementing the instructional strategies based on the following subsamples.

 (i) Sex

 (ii) Locale of school

 (iii) Type of school.

3. There exists no significant differences in the suggestions given by secondary school teachers of Biology in implementing the instructional strategies based on the following subsample.

 (i) Sex

 (ii) Locale of school

 (iii) Type of school.

 In view of the major findings, the hypothesis number (1) was substantiated because the results of the analysis reveals that there exists nineteen difficulties which more than 50 percentage of the secondary school teachers of Biology face in implementing the instructional strategies.

 The hypothesis number (2) was also substantiated because the results of the analysis reveals that there exists more or less similar number of difficulties which more than 50 percentage of the secondary school teachers of Biology face in implementing the instructional strategies based on the subsamples of sex, local of school and type of school.

The hypothesis number (3) set for the study is only partially substantiated in the case of subsamples based on sex the third hypothesis is partially substantiated because they differed only on two suggestions. They were for the need of more support from colleagues and less non-teaching duties.

In the case of subsamples based on locale of schools, the third hypothesis is fully substantiated because there exists no difference in the suggestions given by urban and rural subsamples.

In the case of the subsamples based on type of school because there exists significant differences in the suggestions regarding the need for attractive classroom, more periods available for class, more promotions, more freedom to take decisions regarding teaching, more support from parents and administrators.

**Suggestions for Remediation**

 From the different suggestions obtained for the open ended item at the end of the questionnaire, it is clear that most of the secondary school Biology teachers are not satisfied with the text books, evaluation duties, and the training they received.

 In the case of text books, they complained it to be highly process oriented. The difficulty is that the poor socio-economic status of most of the children studying in rural and urban government schools do not give them access for current issues and recent changes in the field of research. There are children who doesn't have proper houses, dwelling in slums in Government schools in Palakkad district, where teachers provide the students money for buying necessary things. They won't get access to newspapers, television channels or internet.

 Teachers complained that many of the units in the text book lack clarity. The text books, they said were so process oriented and vast demanding more infrastructural facilities and resourceful teachers. In addition to this the poor library facility in many of these schools does not allow the pupils to know more about the open ended enquiry model questions in the text books. The follow up activities and learning experiences given in the handbooks for teachers of standard IX and X were said to be not in coordination with the available resources in different schools. But there was a consensus in the complementarity and practicality of textbooks and handbooks of standard VIII, because most of them said that the units of standard VIII can be taught in the process oriented manner. In many schools, handbooks were not made available to the teachers of standard X till the end of mid term.

 In the case of continuous and comprehensive evaluation, teachers complained that due to the over emphasis given to continuous evaluation works, the students are getting low marks in terminal evaluation containing written test.

 Teachers complained that there is no time for revision because the teachers and the students are busy with the five continuous evaluation works. They were not satisfied in the way the works were done by students. Many teachers demanded the strict monitoring regarding the works of continuous evaluation. They were of the opinion that the number of these works should be reduced to any one of the three terms in the academic year. In many schools, due to lack of available periods for standard tenth classes teachers were taking classes after regular hours and during holidays. This over concentration to students of standard X resulted in less care for standard VIII and IX. After all these stress and strain, only ten marks is awarded to these works.

 In the case of projects and assignments, there is a regular tendency for copying the leader of each group. Hence the conjoint efforts of group work is not obtained. Many sessions of group discussions are becoming loop hole sessions for free riders, social loafers and hitch hikers.

 Though many aspects of the curriculum demands individual attention for the learner, the teachers are unable to provide it because of overcrowded classrooms and inadequate infrastructural facilities. They demanded that the teacher-pupil ratio must be made at least 1:30 in government schools where 50 or 60 students study in congested classrooms. Class management becomes a burden. Moreover, teachers complain that the sessional system, in many large schools in Palakkad and Malappuram districts, hinders the study programmes and follow up activities. Teachers have to club other teacher's periods to complete group activities sincerely.

 Biology teachers had an extra duty of English teachers in many schools. This must be taken away so as to help them concentrate more on what they teach.

 Some teachers demanded more community support and parental support while some other teachers demanded co-operation of colleagues and administrators. They were of the opinion that teachers should themself prepare unit plans and conduct team teaching. Thus resources must be shared and utilized in the school.

**CONCLUSION**

 The present study was intended to find out the difficulties faced by secondary school teachers of Biology in implementing the instructional strategies in Kerala.

 The results of the analysis of the study shows that out of the twenty three areas listed in by the investigator, the major difficulty areas identified were nineteen. They were in the following areas:

– overload of work.

– lack of time.

– unavailability of the services of resource persons.

– difficulties with respect to pre-requisites of group work.

– lack of clarity of attributes to be evaluated.

– lack of infrastructural facilities.

– inservice training programmes

– handling the problem of individual difference

– development of process skills

– provision for providing vivid learning experiences.

– planning and specifying objectives for learning.

– strategy in Biology teaching.

– evaluation of pupil's participation.

– difficulties in guiding the group.

– class control and group management.

– development of creativity.

– co-curricular activities in learning Biology.

– role of instructional materials.

– development of Multiple Intelligence in classroom.

 In the case of the subsample based on Sex, the difficulties faced by female teachers were exactly the same as those experienced by the total sample while the male teachers of Biology faced one more difficulty in addition to the nineteen areas identified for the total sample. This difficulty was in the area of development of scientific attitude.

 The same nineteen difficulties were identified for the urban subsample.

 In the case of the subsample of secondary school teachers of rural areas the nineteenth difficulty identified for them is in the areas of development of scientific attitude. The first eighteen difficulties are similar to the difficulty areas identified for the total sample.

In the case of the subsample based on type of school, the difficulties faced by aided secondary school teachers of Biology are exactly the same as those nineteen difficulties identified for the total sample.

 In the case of the government schools, one more area of difficulty was identified. This difficulty was in the area of the development of scientific attitude.

 In the case of the thirteen areas of suggestions listed in the questionnaire, the subsamples of secondary school teachers of Biology based on sex differed significantly in only two suggestions for improving their role as an effective teacher. They were for reducing non teaching duties and getting support from colleagues.

 In the case of the subsamples for locale of school, they did not differ significantly in any of the suggestions for improving their role as an effective teacher.

 In the case of the subsamples based on type of school, secondary school teachers of Biology differed significantly in six areas improving their role as an effective teacher. They were for getting attractive classroom, for more periods available for class, for more promotions, for more freedom to take decisions, for support of parents and administrators.

 Hence it can be concluded that the present study reveals a number of different areas of difficulty faced by the secondary school teachers of Biology in implementing the instructional strategies.

**EDUCATIONAL IMPLICATIONS OF THE STUDY**

 The major findings of the study and the conclusions drawn helped the investigator to put forward the following suggestions for the improvement of Biology teaching at secondary level.

 In the present study it was found that the revised curricular strategy in Biology put forth by SCERT in 2003 was not implemented in schools in a proper, organised manner. Hence works should be done in this direction inorder to make its implementation more effective.

 Well planned and prepared activities and programmes should be implemented inorder to reduce the work load of teachers. Either the supplementary works of continuous evaluation should be reduced or the number of periods available per class should be increased inorder to overcome the problem of lack of time.

 The services of resource persons must be made available to each school and this must be given in the form of schedules during an academic year so that they will not miss any of their help. The teachers must be given correct orientation classes and resourceful inservice training programmes inorder to make them well equipped in the new strategies of instruction and evaluation. Effective supervision along with proper support from administrators must be given inorder to close the loop holes made by teachers who dislike the revised system.

 Every school should be provided with *Sastraposhini* laboratories inorder to make experimenting in Science riskless for teachers and students. This will let the administrators to allow teachers to use laboratories whenever necessary.

 Proper funds should be given by the government to schools in rural areas and urban areas where students from poor socio-economic status study. This must be immediately done to kindle the waning wick of Biology education in these schools.

 Teachers should be given full freedom by the administrators to take decision regarding teaching. They must be provided with provisions to conduct field trips, tours, visits to places of scientific importance. The science club must be recognised and rejuvenated to carry out activities in school and society that are environmentally and socially acceptable. Thus vivid learning experiences should be provided to students for learning a live subject like Biology. Audio visual facilities and science museums should be properly managed and utilized in every schools.

 For the development of process skills in pupils, they must be given opportunities to laboratory activities and other enquiry projects. The science kits provided by UNESCO must be available for every student. This mobile laboratory may instill in them an innate desire to explore.

 The teachers must prepare resource units and unit plans in Biology to make planning and specifying objectives for learning Biology easier.

 The teachers must be given proper orientation classes about the process oriented approach. They must be made to know which lessons demands what type of strategy. They must not be forced to teach using the cooperative learning methods in all classes.

 More and more pupil participation must be aimed for because the system will become an utter failure if students won't write reports, assignments or take part in meetings, literacy clubs, or tours.

Necessary arrangements must be done from the side of the authority to reduce the teacher pupil ratio inorder to make group activities, more sincere and honest. The problem of handling individual differences can be overcome to some extend if the number of students is reduced. Group management and class control along with proper guidance can be achieved only if the number of students in the class is less. So immediate measures should be taken to increase the number of divisions of classes. Steps are to be taken to minimise the difficulty in teaching for developing creativity in children.

 The textbooks, source book and handbooks must be reorganised to remove areas lacking clarity. This must be in view of the recent developments and the availability of resources in our schools. So the role of instructional materials must be made worthwhile and real.

 The study reveals that the subsamples of male and government teachers of Biology face an extra difficulty in the area of development of scientific attitude. The rural subsample also faces this difficulty but in their case, this is not an additional difficulty. So measures are to be taken to minimise this difficulty because development of scientific attitude is a cardinal aim of Biology teaching.

 Immediate measures are to be taken to reduce the difficulties faced by secondary school Biology teachers by identifying the sources of difficulty. The male and government teachers of Biology must be specially taken into consideration as they face the more difficulties than other subsamples.

 Improvements in the sphere of Biology recommended above can be generally taken to minimise the difficulties of the present system of Science education in secondary schools of Kerala.

**SUGGESTIONS FOR FURTHER RESEARCH**

 The results obtained for the present study namely DIFFICULTIES FACED BY SECONDARY SCHOOL TEACHERS OF BIOLOGY IN IMPLEMENTING THE INSTRUCTIONAL STRATEGIES has brought into the vicinity of the investigator, the different areas which can be further researched into. The following were the unopened sockets and loop holes which can be studied.

1. Studies can be conducted to find out the difficulties faced by secondary school teachers due to each of the major difficulty areas identified in the present study separately.

2. Studies can be conducted by taking samples from three populations namely, heads of schools, secondary school teachers and students to get a more accurate view of the difficulties faced by secondary school teachers of each subject separately.

3. Studies can be conducted to find out the difficulties faced by secondary school teachers of different subjects in implementing the instructional strategies.

4. Studies can be conducted among secondary school pupils to know the difficulties faced by them in following the present instructional strategies.

5. Studies can be conducted to find out the difficulties faced by secondary school teachers in Physics and Chemistry inorder to get an overview of the present status of Science teaching in our secondary schools. So that proper remedial measures can be suggested to improve their condition of Science education in Kerala.

6. The present study can be extended over the whole population of secondary school teachers of Biology in Kerala for getting more generalisable results. The same thing can be done for other Science and Non-Science subjects.

7. A comparative study of the difficulties faced by secondary school teachers for Science and Language subjects can be done. This will be helpful to know whether the new instructional strategies fosters Science learning or Humanities learning.

**SUMMARY**

 Life is meant not merely to live but also to endure. The plethora of philosophies and cultural refinings done by Time in its incessant flow is endless. To purge Man from his ignorance and vicissitudes, generations of great thinker have made great efforts.

 Education was fully teacher oriented in the past, where the learner had no authentic existence of his own. Learners were considered as the source and centre point of all ignorance. They were compelled to study and studentship was an affair of obedience wrapped with the shroud of one's innate inquisitiveness.

 The Copernican revolution in education was brought about by Russian, who tried to fly beyond the predetermined boundaries of the society. For naturalists 'why' and 'what' of learning was entirely different. 'Learning to do' was their watch word rather than 'learning to know' alone. They had a bent towards nurturing the learner's innate desire to manipulate his environment.

 Constructivist approaches to teaching reject rote learning, memorization, telling and lecturing on the basis that students 'ought' to be constructing their own meaning. In the constructivist point of view teaching involves identifying a learners' existing schema and then arranging experiences that challenge those schema and that promote the construction of more advanced intellectual structure. None of these tasks is easy, and the learners have shown resistance to such challenging experiences.

The basic objectives of teaching Biology is to allow the pupil to acquire the process skills needed to be acquired as a young scientist along with the development of an affective domain that has a positive attitude towards all that is natural, pure and virtuous. Peer tutoring and scaffolding or supporting proposed by Vygotsky (1978) and the cooperative learning adopted by the constructivists from Gestalt psychology have increasingly demanded group teaching and inclusive strategies.

 The major process skills emphasized by SCERT in the Biology curriculum are thirteen in number. They are observing, classifying, measuring, communicating, using number relationships, using space and time relationships inferring, predicting, making hypotheses, identifying and controlling variables, interpreting data and experimenting.

Enabling the learner to understand the processes underlying the whole system of education by making him familiar with the 'how of learning' through proper methodology is one of the aims of the revised curriculum of SCERT (2003). Learning is an active process in which learners construct new ideas or concepts based upon their current or past knowledge. The learner selects and transforms information, constructs hypothesis and makes decision, relying on a cognitive structure to do so. This essentially demands discovery learning. For this the four pillars of learning for primary education proposed by Dellor's Commission Report, UNESCO, namely learning to know 'learning to do', 'learning to live together' and 'learning to be can be' extended to secondary education. 'Learning to be' in essence relies on 'learning to create'.

**NEED AND SIGNIFICANCE OF THE STUDY**

 The revised curricular strategy in the secondary schools in Kerala demand cooperative and independent inquiry approaches to learning. Though teachers are provided with refresher courses and in-service training, most often they complain that the courses and training are defective in one way or the other. Hence the teachers do not have a clear understanding of the curriculum. In addition to this the implementation of grading and continuous comprehensive evaluation in secondary schools have put additional burden on their shoulders.

 This is a multi-pronged approach and the teacher should raise to a status which allows him or her to pin point what should be rectified. Along with the resurrection in the teacher's mind set and attempts, the administrators, the public and those related to the educational scenario should also become ready for a parallel revision.

 Actually, the revised curriculum strategy was thought to be implemented in a time span of few years, but technical problems made the government to accelerate its implementation in secondary schools in an abrupt way. This is a crucial problem to be pontered on because secondary stage is one of the most important stages in the educational voyage of a student. Any defects in the education provided here will remain as a scar on the domain of child's development. Biology being a living subject or subject with heart and life, which remains close to one's affective domain has to be taught in the most efficient manner.

 Heated discussions were filling the social scenario of Kerala till recent times about the curricular revisions done in 2003 in secondary schools by SCERT. Hence pinpointing the difficulties in implementing the revised curricular strategy will be much valuable. So the investigator intended to find out the major difficulties faced by the secondary school teachers of Biology in implementing the instructional strategies.

**STATEMENT OF THE PROBLEM**

 The present study is entitled as "DIFFICULTIES FACED BY SECONDARY SCHOOL TEACHERS OF BIOLOGY IN IMPLEMENTING THE INSTRUCTIONAL STRATEGIES IN KERALA".

**DEFINITION OF KEY TERMS**

**Secondary School Teachers**

Secondary school teachers are teachers who are teaching in standards VIII, IX and X in schools.

**Difficulties**

Difficulties refers to problems faced by secondary school teachers of Biology in implementing the instructional strategies.

**Instructional strategies**

It refers to the current system of teaching and learning which considers learning as a process than a product. It was implemented by the state Government in the year 2003.

**OBJECTIVES OF THE STUDY**

The objectives of the study were the following

1. To identify the major difficulties faced by secondary school teachers of Biology in implementing the instructional strategies.

2. To identify the major difficulties faced by secondary school teachers of Biology in implementing the instructional strategies based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

3. To test whether there exists any significant difference in the suggestions given by secondary school teachers of Biology in implementing the instructional strategies based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

**HYPOTHESES OF THE STUDY**

The hypotheses set for the study were:

1. The secondary school teachers of Biology face significant difficulties in implementing the instructional strategies.

2. There exists significant difficulties faced by secondary school teachers of Biology is implementing the instructional strategies based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

3. There exists no significant differences in the suggestions given by secondary school teachers of Biology in implementing the instructional strategies based on the following subsamples.

 i. Sex

 ii. Locale of school

 iii. Type of school

**METHODOLOGY IN BRIEF**

Methodology deals with the precise description of the sample used for the study. Tools employed for the study and method adopted for the study.

**Sample selected for the study**

The sample taken for the study comprised of 207 secondary school teachers of Biology from various schools of Palakkad, Malappuram and Kozhikode districts in Kerala. The list of schools selected for the collection of data is given in appendix 1.

**Tool used for the study**

The tool used for collecting data was a questionnaire to identify the difficulties faced by secondary school teachers of Biology prepared by the investigator under the supervision of the guide.

**STATISTICAL TECHNIQUES USED FOR THE STUDY**

The objective and the hypotheses of the study required the use of the following statistical techniques.

 1. Percentage

 2. Chi-square test of Independence.

**SCOPE AND LIMITATIONS OF THE STUDY**

The present study was specially intended to identify the major difficulties faced by secondary school teachers of Biology in implementing the instructional strategies. It was conducted in order to help the teachers of Biology sharpen their tools used for moulding the youngsters. The study attempts to bring into light what all loop holes are there in the transaction of the revised curriculum. This helps rejuvenate and reorganize the unorganized system. Enhancing effective Biology teaching is in one way or the other related to empowering teachers to make students who think both with their heart and brain and not the heart alone. The results of the study can be used in other science subjects too to improve teaching learning process.

 Since the study has been conducted as a part of the course, the investigator had to complete it with the limited time. Hence it was decided to carry out the study only in three districts namely Kozhikkode, Palakkad and Malappuram. A Sample of 207 teachers were drawn from 80 schools of these the districts. Due representation was given to gender and locale of school but for the types of school the investigator couldn't fully fulfill the correct proportion as there is a total of 1381 government schools only for 2236 promote & aided schools in these three districts.

**FINDINGS OF THE STUDY**

 The major findings of the study were as follows.

 Out of twenty three major difficulty areas listed in the questionnaire, the most serious difficulty faced by more than 80 percentage of the total sample in implementing the instructional strategies are those difficulties with respect to

 1. overload of work

 2. lack of time

 The difficulties faced by 70-80 percentage of the total sample of secondary school teachers of Biology in implementing the instructional strategies are those with respect to

 1. unavailability of services of resource persons

 2. pre-requisites of group work

 3. lack of clarity of attributes to be evaluated

 The difficulties faced by 60-70 percentage of the total sample of secondary school teachers of Biology in implementing the instructional strategies are those difficulties with respect to

1. inadequacy and lack of quality of inservice training programmes.

2. handling the problem of individual difference

3. development of process skills in pupils.

The difficulties faced by 50-60 percentage of secondary school teachers of Biology in implementing the instructional strategies are those difficulties with respect to

1. provision of vivid learning experiences

2. planning and specifying objectives for learning

3. adopting a strategy of Biology teaching

4. evaluation of pupils participation

5. difficulties in guiding the group

6. class control and group management

7. development of creativity

8. co-curricular activities in learning Biology

9. inadequate role of instruction material

10. development of Multiple Intelligences in classroom.

In the total sample the results shows that the secondary school teachers of Biology does not face major difficulty in the following namely.

1. in the development of scientific attitude

2. in the development of desirable values

3. in enacting the role of teacher in the present strategy

4. in learning through cooperative learning

These are not considered as major difficulties of because the percentage of occurrence of these difficulties is below 50 percentage in the total population.

In the case of the subsample based on sex, the most serious difficulty faced by above 80 percentage of the subsample of male Biology teachers of secondary schools in implementing the instructional strategies are those with respect to

1. overload of work

2. lack of time.

 The difficulties faced by 70-80 percentage of secondary school male teachers of Biology in implementing the instructional strategies are difficulties with respect to

 1. Unavailability of services of resource persons.

 2. the pre-requisites of group work.

 3. lack of clarity of attributes to be evaluated.

 4. lack of infrastructural facilities.

 The difficulties faced by 60-70 percentage of the subsample of male Biology teachers of secondary schools in implementing the instructional strategies are those difficulties with respect to.

1. inadequacy and lack of quality of inservice training programmes.

 2. evaluation of pupils' participation.

 3. adopting a strategy in Biology teaching

 4. planning and specifying objectives for learning activities.

 The difficulties faced by 60-70 percentage of the subsample of male Biology teachers of secondary schools in implementing the instructional strategies are those difficulties with respect to

 1. inadequacy and lack of quality of inservice training programmes

 2. evaluation of pupils' participation

 3. adopting a strategy in Biology teaching

 4. planning and specifying objectives for learning activities.

 The difficulties faced by 50-60 percentage of secondary school male teachers of Biology in implementing the instructional strategies are those with respect to

 1. development of process skills

 2. difficulties in guiding the group

 3. development of creativity

 4. handling the problem of individual difference

 5. provision of vivid learning experience

 6 co-curricular activities in Biology teaching

 7. inadequate role of instructional materials

 8. class control and group management

 9. development of Multiple Intelligences in classroom

 10. development of scientific attitude.

 In the subsample of male Biology teachers of secondary schools, they face difficulty in the development of scientific attitude in the pupils while in the case of the total sample it is not a major difficulty. The other three areas namely development of desirable values, learning through cooperative learning and enacting the role of teacher in the present strategy are not found to be areas of serious difficulty. These are faced by below to percentage of the subsample of male Biology teachers. It is not a major difficulty for the total sample too.

 In the case of the subsample based on gender, the most serious difficulty faced by above 80 percentage of the subsample of female Biology teachers of secondary schools in implementing the instructional strategies are those difficulties with respect to

 1. the pre-requisites of group work

 2. lack of clarify attributes to be evaluated

 3. lack of infrastructional facilities

 The difficulties faced by 60-70 of the subsample of female Biology Teachers of secondary schools are those with respect to

 1. inadequacy and lack of quality of inservice training programmes

 2. handling the problem of individual differences

 3. provision for vivid learning experience

 4. development of process skills.

 The difficulties faced by 50-60 percentage of the subsample of female Biology teachers of secondary schools in implementing the instructional strategies are those difficulties with respect to

 1. planning and specifying objectives for learning

 2. adopting a strategy in Biology teaching

 3. evaluation of pupils' participation

 4. class control and group management

 5. difficulties in guiding the group

 6. development of creativity

 7. inadequate role of instructional materials

 8. co-curricular activities in learning Biology

 9. development of Multiple intelligences in classroom.

 In the case of the subsample of female Biology teachers of secondary schools, the difficulties faced by them implementing the instructional strategies with respect to-development of scientific attitude, development of desirable values, enacting the role of teacher in the present strategy and instructional learning through cooperative learning are not considered as major difficulties because its percentage of occurrence is below 50.00 percentage just as that in the total sample.

 In the case of the subsample based on locale of school, the most serious difficulty faced by above 80 percentage of the subsample of teacher of Biology of from secondary schools in urban area in implementing the instructional strategies are those difficulties with respect to

 1. lack of time

 2. overload of work

 3. Unavailability of the services of resource persons.

 The difficulties faced by 70-80 percentage of Biology teachers of secondary schools in urban area in implementing the instructional strategies are those difficulties with respect to

 1. lack of infrastructrual facilities

 2. difficulties with respect to pre-requisites of group work.

 The difficulties faced by 60-70 percentage of Biology teachers from secondary schools in urban areas in implementing the instructional strategies are those difficulties with respect to

 1. inadequacy and lack of quality of inservice training programme.

 2. planning and specifying objectives for learning

 3. handling the problem of individual difference

 4. adopting a strategy in Biology teaching

 5. development of process skills

 6. difficulties in guiding the group.

 The difficulties faced by 50-60 percentage of teachers of Biology from secondary school of urban area in implementing the instructional strategies are those difficulties with respect to

 1. class control and group management

 2. provision of vivid learning experiences

 3. inadequate role of instructional material

 4. evaluation of pupils' participation

5. development of creativity

6. co-curricular activities from Biology teaching

7. development of Multiple Intelligences in classroom.

 The difficulties in the development of desirable values, difficulties in enacting the role of teacher in the present strategy, difficulties in the development of scientific attitude and in learning through cooperative learning are not considered as major difficulties because the percentages of occurrence of these difficulties are below 50. It is the same as in the total sample.

 In the case of the subsample based on locale of school, the most serious difficulty faced by above 80 percentage of the subsample of teachers of Biology from secondary schools, of rural areas in implementing the instructional strategies are those with respect to

 1. overload of work

 2. lack of time.

 The difficulties faced by 70-80 percentage of the subsample of teacher of Biology from secondary schools in rural areas in implementing the instructional strategies are those with respect to

 1. unavailability of services of resource persons

 2. difficulties with respect to pre-requisites of group work.

 The difficulties faced by 60-70 percentage of the subsample of secondary school Biology teachers from rural areas in implementing the instructional strategies are those with respect to

 1. lack of infrastructural facilities

 2. inadequacy and lack of quality of inservice training programme

 3. provision for vivid learning experiences

4. evaluation of pupil's participation.

The difficulties faced by 50-60 percentage of teachers Biology from secondary schools in rural areas in implementing the instructional strategies are those with respect to

1. handling the problem of individual difference

2. development of process skills

3. strategy in Biology teaching

4. planning and specifying objectives for learning

5. co-curricular activities in learning Biology

6. development of creativity

7. class control and group management

8. difficulties in guiding the group

9. inadequate role of instructional materials

10. development of scientific attitude.

In the case of the subsample of teachers of Biology from secondary school in rural areas, the difficulties faced in implementing the instructional strategies with respect to the development of scientific attitude a major one while in all other subsamples and in the total samples it is not a major difficulty. For this rural sample, development of Multiple Intelligences in classroom is not a major difficulty but scientific attitude.

The difficulties faced by the secondary school teachers of Biology from rural areas in implementing the instructional strategies with respect to the development of desirable values, difficulties in learning through cooperative learning and difficulties in enacting the role of teacher in the present strategy are not considered as major difficulties as the percentages of their occurrence are below 50.

In the case of the subsample based on type of school, the most serious difficulty faced by above 80 percentage of the teachers of Biology from government secondary schools in implementing the instructional strategies are those with respect to

1. overload of work

2. lack of time.

The difficulties faced by 70-80 percentage of teachers of Biology from government secondary schools in implementing the instructional strategies are those with respect to

1. unavailability of services of resource persons.

2. pre-requisites of group work

3. lack of infrastructural facilities.

The difficulties faced by 60-70 percentage of the teachers of Biology from government secondary schools in implementing the instructional strategies are those with respect to

1. lack of clarify of attributes to be evaluated

2. inadequacy and lack of quality of inservice training programmes.

3. handling the problem of individual difference

4. adopting a strategy in Biology teaching

5. development of process skills

6. planning and specifying objectives for learning.

The difficulties which 50-60 percentage of the subsample of teacher of Biology from government secondary schools in implementing the instructional strategies are those with respect to

1. evaluation of pupils' participation

2. difficulties in guiding the group

3. in adequacy of the role of infrastructural materials

4. provision for vivid learning experience

5. co-curricular activities in Biology teaching

6. development of creativity

7. class control and group management

8. development of Multiple intelligences in classroom

9. development of scientific attitude.

Those difficulties with respect to the development of desirable values, learning through cooperative learning and enacting the role of teacher in the present strategy are not considered as major difficulties in the case of the subsample of aided secondary school teachers of Biology and total sample taken, the development of scientific attitude is not a major difficulty but in the case of government secondary school teachers it is a major difficulty.

In the case of subsamples based on type of school, the difficulties faced by more than 80 percentage of the subsample of teachers of Biology from aided secondary schools in implementing the instructional strategies are those with respect to

1. overload of work

2. lack of time

3. unavailability of services of resource persons

The difficulties faced by 70-80 percentage of teachers of Biology form aided secondary school are those with respect to

1. lack of clarity of attributes to be evaluated

2. lack of infrastructrual facilities

The difficulties faced by 60-70 percentage of teachers of Biology from aided secondary schools are those with respect to

1. difficulties with respect to pre-requisites of group work

2. provision for vivid learning experience

3. handling the problem of individual difference

4. inadequacy and lack of quality of training programmes.

The difficulties faced by 50-60 percentage the subsample of aided secondary school teachers of Biology in implementing the instructional strategies are those with respect to

1. development of process skills

2. planning and specifying objectives for learning

3. evaluation of pupils' participation

4. class control and group management

5. adopting a strategy in Biology teaching

6. development of creativity

7. difficulties in guiding the group

8. co-curricular activities in learning Biology

9. inadequate role of instructional materials

10. development of Multiple Intelligences in classroom.

The difficulties with respect to development of desirable values, development of scientific attitude, enacting the role of teacher in the present strategy and learning through cooperative learning are not considered as major difficulties by the subsamples of aided secondary school teachers of Biology because the percentage of occurrence of these difficulties are below 50. This is similar in the case of the total sample.

Most of the suggestions obtained were regarding the following which demands:

- need for more resourceful inservice training programmes

- maintaining of correct teacher-pupil ratio and reducing the present class size

- more effective supervision

- more attractive and spacious classrooms

- more periods per class for teaching Biology especially in standards IX and X

- more freedom to take decisions regarding teaching

- more consultancy services

- more community support

- more support from administrators

There was no significant difference in most of the suggestions given by subsamples of Biology teachers based on sex, locale of school and type of school except in a few items. In the case of sex, the suggestions given by teachers differ in only in two areas.

They are:- need for reducing the number of non teaching duties and need for more support from colleagues.

 In the case of locale of school there exists no significant difference in the suggestions given by teachers of Biology from urban and rural schools.

 In the case of type of school, the suggestions given by teachers differ in six areas. They are need for attractive classrooms, more periods available per class, more promotions, more freedom to take decisions regarding teaching, more support from percents and administrators.

**TENABILITY OF HYPOTHESES**

 The hypotheses set for the study were

1. The secondary school teachers of Biology face significant difficulties in implementing the instructional strategies.

2. There exists significant difficulties faced by secondary school teachers in implementing the instructional strategies based on the following subsamples.

 (i) Sex

 (ii) Locale of school

 (iii) Type of school.

3. There exists no significant differences in the suggestions given by secondary school teachers of Biology in implementing the instructional strategies based on the following subsample.

 (i) Sex

 (ii) Locale of school

 (iii) Type of school.

 In view of the major findings, the hypothesis number (1) was substantiated because the results of the analysis reveals that there exists nineteen difficulties which more than 50 percentage of the secondary school teachers of Biology face in implementing the instructional strategies.

 The hypothesis number (2) was also substantiated because the results of the analysis reveals that there exists more or less similar number of difficulties which more than 50 percentage of the secondary school teachers of Biology face in implementing the instructional strategies based on the subsamples of sex, local of school and type of school.

The hypothesis number (3) set for the study is only partially substantiated in the case of subsamples based on sex the third hypothesis is partially substantiated because they differed only on two suggestions. They were for the need of more support from colleagues and less non-teaching duties.

In the case of subsamples based on locale of schools, the third hypothesis is fully substantiated because there exists no difference in the suggestions given by urban and rural subsamples.

In the case of the subsamples based on type of school because there exists significant differences in the suggestions regarding the need for attractive classroom, more periods available for class, more promotions, more freedom to take decisions regarding teaching, more support from parents and administrators.

**Suggestions for Remediation**

 From the different suggestions obtained for the open ended item at the end of the questionnaire, it is clear that most of the secondary school Biology teachers are not satisfied with the text books, evaluation duties, and the training they received.

 In the case of text books, they complained it to be highly process oriented. The difficulty is that the poor socio-economic status of most of the children studying in rural and urban government schools do not give them access for current issues and recent changes in the field of research. There are children who doesn't have proper houses, dwelling in slums in Government schools in Palakkad district, where teachers provide the students money for buying necessary things. They won't get access to newspapers, television channels or internet.

 Teachers complained that many of the units in the text book lack clarity. The text books, they said were so process oriented and vast demanding more infrastructural facilities and resourceful teachers. In addition to this the poor library facility in many of these schools does not allow the pupils to know more about the open ended enquiry model questions in the text books. The follow up activities and learning experiences given in the handbooks for teachers of standard IX and X were said to be not in coordination with the available resources in different schools

 In the case of continuous and comprehensive evaluation, teachers complained that due to the over emphasis given to continuous evaluation works, the students are getting low marks in terminal evaluation containing written test.

 In the case of projects and assignments, there is a regular tendency for copying the leader of each group. Hence the conjoint efforts of group work is not obtained. Many sessions of group discussions are becoming loop hole sessions for free riders, social loafers and hitch hikers.

 Though many aspects of the curriculum demands individual attention for the learner, the teachers are unable to provide it because of overcrowded classrooms and inadequate infrastructural facilities. They demanded that the teacher-pupil ratio must be made at least 1:30 in government schools where 50 or 60 students study in congested classrooms. Class management becomes a burden. Moreover, teachers complain that the sessional system, in many large schools in Palakkad and Malappuram districts, hinders the study programmes and follow up activities. Teachers have to club other teacher's periods to complete group activities sincerely.

 Biology teachers had an extra duty of English teachers in many schools. This must be taken away so as to help them concentrate more on what they teach.

 Some teachers demanded more community support and parental support while some other teachers demanded co-operation of colleagues and administrators. They were of the opinion that teachers should themself prepare unit plans and conduct team teaching. Thus resources must be shared and utilized in the school.

**CONCLUSION**

 The present study was intended to find out the difficulties faced by secondary school teachers of Biology in implementing the instructional strategies in Kerala.

 The results of the analysis of the study shows that out of the twenty three areas listed in by the investigator, the major difficulty areas identified were nineteen. They were in the following areas: overload of work, lack of time, unavailability of the services of resource persons, difficulties with respect to pre-requisites of group work, lack of clarity of attributes to be evaluated, lack of infrastructural facilities, inservice training programmes, handling the problem of individual difference, development of process skills, provision for providing vivid learning experiences, planning and specifying objectives for learning, strategy in Biology teaching, evaluation of pupil's participation, difficulties in guiding the group, class control and group management, development of creativity, co-curricular activities in learning Biology, role of instructional materials, development of Multiple Intelligence in classroom.

 In the case of the subsample based on Sex, the difficulties faced by female teachers were exactly the same as those experienced by the total sample while the male teachers of Biology faced one more difficulty in addition to the nineteen areas identified for the total sample. This difficulty was in the area of development of scientific attitude.

 The same nineteen difficulties were identified for the urban subsample.

 In the case of the subsample of secondary school teachers of rural areas the nineteenth difficulty identified for them is in the areas of development of scientific attitude. The first eighteen difficulties are similar to the difficulty areas identified for the total sample.

In the case of the subsample based on type of school, the difficulties faced by aided secondary school teachers of Biology are exactly the same as those nineteen difficulties identified for the total sample.

 In the case of the government schools, one more area of difficulty was identified. This difficulty was in the area of the development of scientific attitude.

 In the case of the thirteen areas of suggestions listed in the questionnaire, the subsamples of secondary school teachers of Biology based on sex differed significantly in only two suggestions for improving their role as an effective teacher. They were for reducing non teaching duties and getting support from colleagues.

 In the case of the subsamples for locale of school, they did not differ significantly in any of the suggestions for improving their role as an effective teacher.

 In the case of the subsamples based on type of school, secondary school teachers of Biology differed significantly in six areas improving their role as an effective teacher. They were for getting attractive classroom, for more periods available for class, for more promotions, for more freedom to take decisions, for support of parents and administrators.

 Hence it can be concluded that the present study reveals a number of different areas of difficulty faced by the secondary school teachers of Biology in implementing the instructional strategies.

**EDUCATIONAL IMPLICATIONS OF THE STUDY**

 The major findings of the study and the conclusions drawn helped the investigator to put forward the following suggestions for the improvement of Biology teaching at secondary level.

 In the present study it was found that the revised curricular strategy in Biology put forth by SCERT in 2003 was not implemented in schools in a proper, organised manner. Hence works should be done in this direction inorder to make its implementation more effective. Well planned and prepared activities and programmes should be implemented inorder to reduce the work load of teachers. Either the supplementary works of continuous evaluation should be reduced or the number of periods available per class should be increased inorder to overcome the problem of lack of time.

 The services of resource persons must be made available to each school and this must be given in the form of schedules during an academic year so that they will not miss any of their help. The teachers must be given correct orientation classes and resourceful inservice training programmes inorder to make them well equipped in the new strategies of instruction and evaluation. Effective supervision along with proper support from administrators must be given. Every school should be provided with *Sastraposhini* laboratories inorder to make experimenting in Science riskless for teachers and students. This will let the administrators to allow teachers to use laboratories whenever necessary. Proper funds should be given by the government to schools in rural areas and urban areas where students from poor socio-economic status study.

 Teachers should be given full freedom by the administrators to take decision regarding teaching. The science club must be recognised and rejuvenated to carry out activities in school and society that are environmentally and socially acceptable. Thus vivid learning experiences should be provided to students for learning a live subject like Biology. Audio visual facilities and science museums should be properly managed and utilized in every schools. For the development of process skills in pupils, they must be given opportunities to laboratory activities and other enquiry projects. The science kits provided by UNESCO must be available for every student. This mobile laboratory may instill in them an innate desire to explore.

The teachers must prepare resource units and unit plans in Biology to make planning and specifying objectives for learning Biology easier.More and more pupil participation must be aimed for. The problem of handling individual differences can be overcome to some extend if the number of students is reduced. Group management and class control along with proper guidance can be achieved only if the number of students in the class is less. So immediate measures should be taken to increase the number of divisions of classes. Steps are to be taken to minimise the difficulty in teaching for developing creativity in children.

 The textbooks, source book and handbooks must be reorganised to remove areas lacking clarity. This must be in view of the recent developments and the availability of resources in our schools. So the role of instructional materials must be made worthwhile and real.

 The study reveals that the subsamples of male and government teachers of Biology face an extra difficulty in the area of development of scientific attitude. The rural subsample also faces this difficulty but in their case, this is not an additional difficulty. So measures are to be taken to minimise this difficulty because development of scientific attitude is a cardinal aim of Biology teaching.

 Immediate measures are to be taken to reduce the difficulties faced by secondary school Biology teachers by identifying the sources of difficulty. The male and government teachers of Biology must be specially taken into consideration as they face the more difficulties than other subsamples. Improvements in the sphere of Biology recommended above can be generally taken to minimise the difficulties of the present system of Science education in secondary schools of Kerala.

**SUGGESTIONS FOR FURTHER RESEARCH**

 The results obtained for the present study namely DIFFICULTIES FACED BY SECONDARY SCHOOL TEACHERS OF BIOLOGY IN IMPLEMENTING THE INSTRUCTIONAL STRATEGIES has brought into the vicinity of the investigator, the different areas which can be further researched into. The following were the unopened sockets and loop holes which can be studied.

1. Studies can be conducted to find out the difficulties faced by secondary school teachers due to each of the major difficulty areas identified in the present study separately.

2. Studies can be conducted by taking samples from three populations namely, heads of schools, secondary school teachers and students to get a more accurate view of the difficulties faced by secondary school teachers of each subject separately.

3. Studies can be conducted to find out the difficulties faced by secondary school teachers of different subjects in implementing the instructional strategies.

4. Studies can be conducted among secondary school pupils to know the difficulties faced by them in following the present instructional strategies.

5. Studies can be conducted to find out the difficulties faced by secondary school teachers in Physics and Chemistry inorder to get an overview of the present status of Science teaching in our secondary schools. So that proper remedial measures can be suggested to improve their condition of Science education in Kerala.

6. The present study can be extended over the whole population of secondary school teachers of Biology in Kerala for getting more generalisable results. The same thing can be done for other Science and Non-Science subjects.

7. A comparative study of the difficulties faced by secondary school teachers for Science and Language subjects can be done. This will be helpful to know whether the new instructional strategies fosters Science learning or Humanities learning.

**BIBLIOGRAPHY**

Alexander, P. (1989). A study of classroom interaction in teaching science at higher secondary level. In M.B. Buch (Ed.), *Fifth survey of research in education*. New Delhi : NCERT.

Alters, B.J. (1997). Whose nature of science. *Journal Research in Science Teaching*. *34(1).* 39-55.

Amstrong, T. (2000). *Multiple Intelligences in the classrom* (2nd ed.). USA : ASCD.

Anderson, L.W. (1994). Allocated and Instructional time. In : T. Husen & T.N. Postlethwaite (Eds.). *The International encyclopedia of education (2nd ed.)* Vol. III.Oxford : Pergamon. 6388 - 6389.

Aruna, P.K. (2004). Process outcomes in science and classroom climate. *International Educator 167(1)*, 14-17.

Bandura, A. (1986). *The social foundations of thought and action: A social cognition theory.* New Jersy: Prentice Hall.

Beegum, Khatija, H. (1990). Problems of teaching new science syllabus for standard VII in Andhra Pradesh and then impact on pupil's achievement. In M.B. Buch (Ed.), *Fifth survey of research in education*. New Delhi: NCERT.

Berkemeier, G.Y. (2002). *Exploring multiple intelligences theory at a community college level*. Minnesota: University of Capella (ERIC Document Reproduction Service No. ED 469466).

Best, J.W & Kahn, J.V. (2002). *Research in education*. (7th ed.). New Delhi: Prentice-Hall.

Brook, J.G & Brooks, M.G. (1999). *In search of understanding: The case of constructivist classrooms (Rev. ed).* Alexandria, VA: Association for supervision and Curriculum Development.

C, Backer., (2005). 'Varumthalamuraye A+ gradelethikkan'. *Janapatham, Vol. 37(3)*  22-23.

Capel, S., Leask, Marilyn., & Turner, T. (1997). *Learning to teach in the secondary school*. London : Routledge.

Chadha, Anupriya. (2002). Inclusive education in DPEP. *Journal of Indian Education*.  *27(4),* 71-76.

Cherian, A. (1965). *A critical study of the aids used in the teaching of physical science in the secondary schools of Kottayam district*. Unpublished M.Ed. theses, University of Kerala, Trivandrum.

Cherian, Molley. (1988). Facilitations and hindrances to the modernisation of chemistry teaching in the schools of Kerala. In M.B.Buch (Ed.), *Fifth survey of research in education*. New Delhi : NCERT.

Cobb, P. (1994). Constructivism and learning. In T.Husen & T.N. Postlethwaite (Eds.). *The International encyclopedia of education (2nd ed.* Vol. II. Oxford: Pergamon. 1049-1051.

Daniels, E. & Mike, G. (1996). *The cooperative comparison digest (No 1-4). Thinking about the nature and power of cooperative learning*. (ERIC Document Reproduction Service No. ED. 402038.

Dash, Neena. (2002). Promoting inclusive education *Edutracks*. 2(2), 18-20.

Desai, B.V. (1981). A study of the outstanding problems of teachers of standards V to VII of the Marathi language side of Municipal primary schools of Bombay. In M.B. Buch (Ed.), *Fifth survey of research in education*. New Delhi : NCERT.

E, Glasersfeld, Von. (1994). Construction and Learninmg. In: T. Husen & T,N. Postlethwaite (Eds.). *The International encyclopaedia of education (2nd ed.)* Vol. I Oxford: Pergamon 1049 - 1051.

Ediger, Marlow (2003). Ten major problems in reading instruction. *Experiments in Education XXXI(4)*. 3.

Eysenck, W.M. (2000). *Psychology a student's handbook*. UK: Psychology Press Limited.

Fosnot, C.T (1989) *Enquiring teachers and enquiring learners: A constructivist approach for teaching.* New York: Teachers College Press.

Ganga Rao, P. (2004). A study on the relation between physical facitlities, teacher facility and the academic attainment in municipal secondary schools. *Quest in Education. XXVIII (3),* 17 - 22.

Gardner, H. (1983). *Frames of mind : theory of multiple intelligences*. New York : Basic Books.

Gardner, H. (1983). *Multiple intelligences : theory and practice in adult ESL*. National clearing house for ESL Literacy Education Washington DC. (ERIC Document Reproduction Service, No ED 441350).

Gardner, H. (1993). *Multiple intelligences : the theory and practice*. New York : Basic Books.

Gardner, H. (1997). *Multiple intelligences as a partner in school improvement*. New York : Basic Books.

Grewal, Avinash. (1988). Developing, validating and testing the efficacy of self learning process based materials for the development of some integrated process skills in science. In M.B. Buch (Ed.), *Fifth survey of research in education*. New Delhi : NCERT.

Helms, Jenifer. V. (1998). Science-and me: Subject matter identify in secondary school science teachers. *Journal of Research in Science Teaching*.  *35(7)*, 811-834.

Husen, T. & Postlethwaite, T.N (1994) (Eds.) The International encyclopedia of education (2nd ed.) Vol. V. Oxford: Pergamon.

*Indian vidyabyasathinte marunna mukham* (2003) Trivandrum: Kerala Sasthra Sahithya Parishad.

Joan, S. (1971). Motivating underachieving students in a biology class. In M.G. Mc Closky (Ed.), *Teaching strategies and Classroom realities*. New Jersy : Prentice Hall, Inc.

Johnson, D.W. & Johnson, R.T. (1995). *Teaching students to be peacemakers*. (3rd ed.). Edina, MN : Interaction Book Company.

Jonassen, D. (1994, April). Thinking technology: Toward a Constructivist view of instructional design. *Educational technology* *30(9),* 34-37.

Joseph, N.J. (1976). *A study of potentials and practicals using out of school resources in conducting science club*. Unpublished M.Ed. thesis, University of Kerala, Trivandrum.

Kenneth, T. Henson, & Ben, F. Eller. (1999). *Educational psychology for effective teaching*. USA : Wadsworth Publishing Company.

Khader, M.A. (1998). DPEP Provides basic for judging school quality. In Digumarti Bhaskara Rao (Ed.) *District Primary Education Programme.* New Delhi: Discovery Publishing House.

Khera, Shiv. (2002). *You can win.* New Delhi : Mac Milan India Ltd.

Kumar, S.P.K. & Bindhu, C.M. (2002). *Instructional learning strategies and cognitive entry behaviour. An experimental analysis*. New Delhi: Kanishka Publishers.

Kumaraswamy, T. & Venkateswarlu, N. (2004). Attitude of teachers towards DPEP in Cuddapah district. *International Educator 16(1),* 23.

Lacey, Archie. L (1968). *Guide to science teaching*. Belmont, California : Wadsworth Publishing Company, Inc.

Linn, M.C & Eylon, B.S (1994). Learning and Instruction of Science. In: T.Husen & T.N Postlethwaite (Eds). *The International encyclopedia of education (2nd ed.)* Vol. IX. Oxford: Pergamon. 5338-5342.

Malhotra, Rita. (2002). School reform strategies for inclusion. *Journal of Indian Education*. 27(4). 21-31.

Malhotra, V.k. (1988). A critical study of the existing facilities of science teaching and construction of evaluation instruments for its supervision in different types of secondary schools in Delhi. In M.B. Buch (Ed.), *Fifth survey of research in education*. New Delhi : NCERT.

Mangal, S.K. (2002). *Statistics in psychology and education*. New Delhi : Prentice Hall.

Mishra, S. and Pal, N.K. (2000). Modalities of teacher empowerment for organising creative activities for development of various abilities in primary school children. *Journal of Education Research and extension*. *Vol. 37(3).* 46-54.

Mohanty, S. (1988). An appraisal of teaching science in high schools of Cuttack city. In M.B. Buch (Ed.) *Fifth survey of research in education*. New Delhi : NCERT.

Mohapatra, T. (1991). Problems of secondary school teachers: A comparative study of Government and private school teachers. In M.B. Buch (Ed.),  *Fifth survey of research in education.* New Delhi: NCERT.

Moon, B., Brown, Sally., & Peretz, Mirian. Ben. (2002). *Routledge international companion to education*. London : Routledge - Taylor and Francis group.

Muddu, V. (1978). A study of the problems of secondary school teachers of Nalgonda district in teaching in teaching biological science. In M.B. Buch (Ed.), *Third survey of research in education*. New Delhi : NCERT.

Norton, P. & Wiburg, K.M. (2003). *Teaching with technology. Designing opportunities to learn*. (2nd Ed.) USA : Wadsworth/Thomson Learning, Inc.

Polin, L. (1992). Subvert the dominant paradigm. *Research windows, the computing Teacher*, *19(8)*, 6-7.

Prasad, E.P. (1964). *An investigation into the common difficulties experienced by the teachers in teaching the physical science portions of general science curriculum in the high schools of Kerala*. Unpublished M.Ed thesis, University of Kerala, Trivandrum.

Rao, Shardamba. (1988). Explorations in optimising learning science in schools. In M.B. Buch (Ed.), *Fifth survey of research in education*. New Delhi : NCERT.

*Report of the Secondary Education Commission* (1953). (1st ed.). New Delhi : Government of India Press.

Resnick, L.B & Collins, A. (1994). Cognition and learning. In T. Husen & T.N. Postlethwaite (Eds.). *The International encyclopedia of education (2nd ed.)* Vol II. Oxford: Pergamon 835-838.

Satheesan, T.K. (1981). *An investigation in to the common difficulties experienced by science teachers in teaching physical science in the secondary schools of Trichur educational district*. Unpublished M.Ed. dissertation, University of Calicut, Calicut.

Saurino, D.R., Saurino, P.L. & See, D. (2002). *Utilizing visual.spatial techniques and strategies to develop an integrated curriculum : a collaborative group action research approach*. United state : Oregon. (ERIC Document Reproduction Service, No. ED 4675471).

Shah, B.b. (1981). *An experimental investigation of the effect of selected teaching strategies on the development of creative thiniing and achievement in science*. Unpublished doctoral dissertation, Maharaja Sayajirao, University of Baroda, Baroda.

Sharma, R.C. (1975). *Modern science teaching*. New Delhi : Dhanpat Rai & Sons.

Singh, B. (1988). *Teaching learning strategies and mathematical creativity*. New Delhi: Mittal Publications.

Singh, U. K. & Nayak, A.K. (1997). *Teaching of science*. New Delhi : Common wealth publishers.

Slavin, R.E (1994) Cooperative learning. In T.Husen & T.N Postlethwaite (Eds.) *The International encyclopedia of education (2nd ed.)* Oxford: Pergamon. 1095-1099.

Sudararajan, S. (1988). An evaluation of the teaching of biology at higher secondary stage in Tamil Nadu. In M.B. Buch (Ed.), *Fifth survey of research in education*. New Delhi : NCERT.

Vaidya, N. (1970). *Some aspects of Piaget's work and science teaching*. New Delhi : S. Chand and Co. (Pvt.) Ltd.

Veerappa, N.S. (1958). *Trends in science education*. Unpublished doctoral dissertation, Mysore University, Mysore.

Von Glasersfeld , E. (1995). A constructivist approach to teaching. In L. Steffe & J. Gale (Eds.). *Constructivism in education.* New Jersey: Lawrence Erlbaum Associates.

Vygotsky, L.S. (1978). *Mind in Society : The development of higher psychological processes*. Cambridge MA : Harvard University Press.

Webster. (1996). *Encyclopedic unabridged dictionary of the English language*. New Rev. ed. New York : Gramercy Books.

Weinstein, C.E & Stone, G.V.M (1994) Learning strategies and learning to learn. In T. Husen & T.N Postlethwaite (Eds.) *The International encyclopedia of education (2nd ed.)* Vol. VI. Oxford: Pergamon.

Woodward, A. (1994). Text books. In: T. Husen & T.N. Postethwaite (Eds.). *The International encyclopaedia of education (2nd ed.).* Vol. II. Oxford : Pergamon. 6366.

**APPENDIX I**

**Details of Schools Selected for Data Collection**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sl. No. | Name of School | Type | Locality | Sex | Total |
| Male | Female |
| 1. | BEM H.S.S Palakkad | Aided | Urban | 1 | 2 | 3 |
| 2. | Karnakiyamman H.S.Moothankara | Aided | Urban | 0 | 2 | 2 |
| 3. | N.S.S.K.P.T.V.H.S.S Ottappalam | Aided | Urban | 0 | 3 | 3 |
| 4. | L.S.N.G.H.S.S Ottappalam | Aided | Urban | 0 | 2 | 2 |
| 5. | K.V.R.H.S. Shornur | Aided | Urban | 1 | 1 | 2 |
| 6. | M.I.G.H.S.S Puduponnani  | Aided | Urban | 1 | 5 | 6 |
| 7. | A.V.H.S Ponnani | Aided | Urban | 1 | 3 | 4 |
| 8. | M.I.B.H.S.S Ponnani | Aided | Urban | 1 | 5 | 6 |
| 9. | M.E.S.H.S.S. Ponnani | Aided | Urban | 0 | 1 | 1 |
| 10. | Ponnani Girls H.S.S Ponnani | Aided | Urban | 0 | 4 | 4 |
| 11. | B.E.M. H.S. Vadakara | Aided | Urban | 0 | 2 | 2 |
| 12. | Savio H.S. Devagiri | Aided | Urban | 2 | 0 | 2 |
| 13. | Calicut Girls H.S.S Calicut | Aided | Urban | 0 | 1 | 1 |
| 14. | M.C.C.H.S.S Calicut | Aided | Urban | 1 | 0 | 1 |
| 15. | Calicut Girls V.H.S.S Calicut | Aided | Urban | 0 | 1 | 1 |
| 16. | Calicut Girls H.S. Calicut | Aided | Urban | 0 | 2 | 2 |
| 17. | Providence Girls H.S.S Calicut | Aided | Urban | 0 | 2 | 2 |
| 18. | Himayathul Islam H.S.S Calicut | Aided | Urban | 1 | 1 | 2 |
| 19. | Vallappuzha H.S.S Vallappuzha | Aided | Rural | 1 | 2 | 3 |
| 20. | Tritala H.S Trithala | Aided | Rural | 2 | 2 | 4 |
| 21. | H.S.S Chalavara | Aided | Rural | 1 | 3 | 4 |
| 22. | H.S Mundur | Aided | Rural | 0 | 2 | 2 |
| 23. | K.P.R.P Kongad | Aided | Rural | 0 | 3 | 3 |
| 24. | H.S. Katampazhippuram | Aided | Rural | 0 | 3 | 3 |
| 25. | S.S.M.H.S.S Theyyalingal | Aided | Rural | 0 | 3 | 3 |
| 26. | M.M.M.H.S.S Kuttayi | Aided | Rural | 2 | 2 | 4 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sl. No. | Name of School | Type | Locality | Sex | Total |
| Male | Female |
| 27. | A.K.M.H.S Kottoor | Aided | Rural | 1 | 2 | 3 |
| 28. | M.S.M.H.S.S. Kallingapparamba | Aided | Rural | 2 | 0 | 2 |
| 29. | V.V.M.H.S Marakkara | Aided | Rural | 2 | 0 | 2 |
| 30. | V.H.S.S Girls, Valanchery | Aided | Rural | 0 | 4 | 4 |
| 31. | V.H.S.S Boys, Valanchery | Aided | Rural | 2 | 2 | 4 |
| 32. | Farook H.S.S, Farook College | Aided | Rural | 0 | 4 | 4 |
| 33. | Memunda H.S, Memunda | Aided | Rural | 0 | 2 | 2 |
| 34. | M.H.S Mooniyur | Aided | Rural | 1 | 1 | 2 |
| 35. | Nanminda H.S.S, Nanminda | Aided | Rural | 0 | 1 | 1 |
| 36. | A.K.R.B.H.S.S Chelannur | Aided | Rural | 0 | 1 | 1 |
| 37. | K.H.S.S Kunnamangalam | Aided | Rural | 1 | 0 | 1 |
| 38. | M.J.H.S.S Elethil | Aided | Rural | 1 | 0 | 1 |
| 39. | Markaz H.S.S Karanthur | Aided | Rural | 1 | 0 | 1 |
| 40. | Markaz Girls H.S Karanthur | Aided | Rural | 0 | 2 | 2 |
| 41. | Nochat H.S.S, Nochatt | Aided | Rural | 1 | 3 | 4 |
| 42. | Cresent H.S Vanimel | Aided | Rural | 1 | 0 | 1 |
| 43. | P.M.G.H.S.S Palakkad | Govt.  | Urban | 0 | 3 | 3 |
| 44. | G.H.S.S Big Bazar, Palakkad | Govt.  | Urban | 0 | 2 | 2 |
| 45. | G.M.M.H.S.S Palakkad | Govt.  | Urban | 0 | 7 | 7 |
| 46. | G.H.S.S Ottappalam East | Govt.  | Urban | 1 | 0 | 1 |
| 47. | Govt. Victoria G.H.S.S, Palakkad | Govt.  | Urban | 0 | 2 | 2 |
| 48. | G.V.H.S.S Kinassery | Govt.  | Urban | 0 | 5 | 5 |
| 49. | Govt. Girls V.H.S.S Nadakkavu | Govt.  | Urban | 1 | 0 | 1 |
| 50. | Azhchavattom G.H.S Mankavu | Govt.  | Urban | 0 | 2 | 2 |
| 51. | Govt.Ganapat Girls H.S.Chalappuram | Govt.  | Urban | 2 | 0 | 2 |
| 52. | Achuthan Girls H.S. Chalappuram | Govt.  | Urban | 2 | 0 | 2 |
| 53. | Govt. Ganapat Boys H.S. Chalappuram | Govt.  | Urban | 3 | 0 | 3 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sl. No. | Name of School | Type | Locality | Sex | Total |
| Male | Female |
| 54. | G.G.H.S.S Koyilandy | Govt.  | Urban | 1 | 2 | 3 |
| 55. | G.V.H.S.S RFTHS Beypore | Govt.  | Urban | 1 | 0 | 1 |
| 56. | G.B.H.S.S Malappuram | Govt. | Urban | 0 | 3 | 3 |
| 57. | G.G.H.S.S Malappuram | Govt. | Urban | 1 | 0 | 1 |
| 58. | G.B.H.S.S Tirur | Govt. | Urban | 2 | 0 | 2 |
| 59. | G.V.H.S.S Vattenad | Govt. | Rural | 0 | 5 | 5 |
| 60. | G.H.S.S Pattambi | Govt. | Rural | 3 | 1 | 4 |
| 61. | G.V.H.S.S Cherpalcherry | Govt. | Rural | 0 | 2 | 2 |
| 62. | Gokhale G.H.S.S Kumaranellur | Govt. | Rural | 0 | 2 | 2 |
| 63. | Govt. Janatha H.S.S Naduvattam | Govt. | Rural | 2 | 1 | 3 |
| 64. | G.V.H.S.S Koppam | Govt. | Rural | 1 | 3 | 4 |
| 65. | G.H.S.S Kumaranellur | Govt. | Rural | 0 | 4 | 4 |
| 66. | G.H.S.S Anakkara | Govt. | Rural | 1 | 1 | 2 |
| 67. | G.R.H.S.S Kottakkal | Govt. | Rural | 1 | 0 | 1 |
| 68. | G.H.S.S Edappal | Govt. | Rural | 2 | 4 | 6 |
| 69. | G.H.S.S Edappal | Govt. | Rural | 1 | 2 | 3 |
| 70. | G.H.S.S Irimbiliyum | Govt. | Rural | 1 | 2 | 3 |
| 71. | K.M.G.V.H.S.S Tavanur | Govt. | Rural | 2 | 1 | 3 |
| 72. | G.H.S.S Kokkur | Govt. | Rural | 0 | 3 | 3 |
| 73. | Govt. Ganapath V.H.S.S Feroke | Govt. | Rural | 1 | 3 | 4 |
| 74. | G.V.H.S.S Cheruvannur | Govt. | Rural | 1 | 3 | 4 |
| 75. | G.V.H.S.S Thamarassery | Govt. | Rural | 0 | 1 | 1 |
| 76. | G.V.H.S.S Kuttichira | Govt. | Rural | 0 | 1 | 1 |
| 77. | G.H.S Narikkuni | Govt. | Rural | 1 | 0 | 1 |
| 78. | G.H.S.S Mavoor | Govt. | Rural | 2 | 0 | 2 |
| 79. | G.H.S.S Kuttiadi | Govt. | Rural | 2 | 0 | 2 |
| 80. | G.H.S Marayamangalam | Govt. | Rural | 0 | 2 | 2 |