**INFLUENCE OF PRIVATE TUITION ON ACHIEVEMENT IN SCIENCE AMONG SECONDARY SCHOOL**

**PUPILS OF KERALA**

**MUHAMMAD SUNNUMMEL**

**Dissertation**

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

 I, **Muhammad Sunnummel,** do hereby declare that this dissertation, **INFLUENCE OF PRIVATE TUITION ON ACHIEVEMENT IN SCIENCE AMONG SECONDARY SCHOOL PUPILS OF 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, **Abdul Gafoor, K.**, do hereby certify that this dissertation, **INFLUENCE OF PRIVATE TUITION ON ACHIEVEMENT IN SCIENCE AMONG SECONDARY SCHOOL PUPILS OF KERALA** is a record of bonafide study and research carried out by **Muhammad Sunnummel** under my supervision and guidance.

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**INTRODUCTION**

 It is education that determines the level of prosperity, welfare and security of the people. In India, the social inequalities, to a large extent, can be traced back to the educational standard of the individuals living in that society. Education is the life blood from which the individuals constituting the society and the nation comprising the societies, derive its strength to go up in the ladder of the progress. If the life blood can be provided to all in the same and equal degree it will bring about a uniform progress to the society and nation too. It is the responsibility of the educational system to bring the different social classes and groups together and thus promote the emergence of an egalitarian and integrated society. But at present instead of doing so education itself is tending to increase social segregation and perpetuate and widen class distinctions. Instead of trying to provide good education to all children, or at least to the able children from every stratum of society, it is available to small minority which is usually selected not on the basis of talent, but on the basis of its capacity to pay fees. (Kothari Commission). One of the disparity existing in the field of education is the availability of Private Tuition.

 The system of private tuition has been in existence in India for a fairly long time. During the pre-independent period and early years of post-independent period, the system by large was meant for the students who could not enroll themselves in regular schools and colleges either because of their non-availability within a reasonable distance from their place of living or because of financial constraints or social taboos. In the case of regular students, private tuition was a rare phenomenon as there was a general impression that only academically weak or dull students received tuition to make up their deficiencies. Apprehencing negative publicity about their calibre, the students receiving tuition preferred to hide the fact from their classmates and teachers (Arora, 2002).

 During the last three decades, the private tuition scenario has undergone a see-change in tune with changing composition and character of society. Earlier the students of 'board' classes only thought of receiving tuition but now a days children started tuition from early classes onwards. Earlier it was an urban phenomenon but now a days it is being accepted as a necessity even in small towns and villages. Instead of being perceived as an indicator of 'dullness' it is now perceived not only a matter of necessity but also as a symbol of pride and social prestige. The necessity of weak students has now become the universal necessity of all students-weak, average, bright because every student is keen to further improve his score.

 We have not succeeded in universalising elementary education but private tuition has become near universal, particularly among the middle class in urban and semi-urban areas. The journey of the system from a social and academic taboo to a widely practised and accepted reality has been guided by the market forces drawing their sustenance from the competitive ethos of the present day society. The spirit of competition has been exacerbated by the mismatch between the number of aspirants and the limited spaces available at the academic ladder. The parents incur extra expenditure on the private tuition of their wards in the hope that it shall bring them high returns in the future. In some of the cases tuition is not needed but it is still arranged because of the satisfaction it provides to the students and their parents that they are doing their utmost to meet the challenge of examination. It is often alleged that students are left with no other alternative but to arrange private tuition because they are not properly taught by their teachers in the school. It may be true in some cases but it cannot be generalised to all situations (Arora, 2002).

 Also instances were observed where schools claimed to allow private tuition. Though schools did not overtly commit to the practice of private tuition but students shared that majority of them were taking private tuition. This causes another issue whether all the quality schools were performing better because of private tuition. Middle class families and even economically weak families with high educational aspirations are spending money on tuition. School-based extra coaching, at times, have this hidden element.

 It is seen that pupils of government, government aided and often unaided school pupils take tuition. The result of various schools are considerably varying with tuition. Selection of tuition by pupils is due to different reasons. Schools may not have adequate staff, the staff may not be competent. Also it is renowned that tuition is a symbol of pride and social prestige. It has become a shadow of educational system in most of the societies.

**1.1 NEED AND SIGNIFICANCE**

 The Private Tuition is a phenomenon that is yet to receive proper attention of researchers, educational planners and decision makers (NIEPA, 2002). It has become a part of the educational environment, to such an extent that nobody readily question its existence. In recent years, there has been a phenomenal increase in number of private teaching places in India. They operate outside the system of formal education, i.e., the education given in government owned or non-government schools and colleges. These teaching places exist parallel to the regular schools and colleges and individual teachers giving tuition at home. Private Tuition is the product of changing socio economic complex. Various factors combine to push students to the coaching institution. Examination oriented teaching, affective security, gregariousness, escape from monotony and distractions at home etc. are the some factors (Singh, 1996).

 The implication of coaching for educational practice are significant. First, if tutoring is effective, failure to provide tutoring to students who cannot afford the fee for Private Tuition creates social inequalities in educational opportunities because those who receive tutoring will more likely gain academic achievement. Second, the hours spent in after school tutoring may prevent students from engaging in other developmental activities such as play, socialising with peers, sports and extra curricular activities necessary for development of well adjusted and creative adults. Third, pupils who attended tutoring centres that taught the school curriculum ahead of the school were in attentive and uninvolved in class because they perceived that they had already covered the material at the tutoring place. Also they will become nuisance to other classmates and often for teachers in the school (Kenny and Faunce, 2004).

 A study report on quality profiles of secondary schools conducted by NIEPA, 2002 observed that, an area of future exploration is to review the position of private tuition. Is tuition bad in itself or is it the examination orientation that is leading to make private tuition a common practice rather than need based support in special circumstances. If this parallel system with poor facilities and less cost can deliver good education, then why do we need schools? Hence time has come to seriously review policy position on private tuition. It also has implication for financing secondary education. Should it be free or parents be made to pay for 'quality'? These issues cannot be resolved by a single study as private tuition is a deliberate choice of parents as well as a process emerging out of social and economic pressures (NIEPA, 2002).

 In connection with the new paradigm change in school education which is being brought about in Kerala, there is a shift in the traditional system of exam oriented, information gathering, memory testing educational practice. The new system is said to be activity based, developing the meta- cognition, critical thinking and such higher order abilities. Irrespective of those changes, there is no evident shift from time and resources spent on Private Tuition by students and parents. Also the present system of private tuition pulls the pupils to the traditional learning process.

 At this time we want to know how private tuition is influencing achievement in various subjects. As it is a common phenomenon in secondary school in all over Kerala, the study confines there. Researcher being a science student, he is interested in science achievement. So the study explores whether the students who received and not received tuition are differing in their achievement in science. In other words, whether private tuition makes a significant impact on science achievement of those spending time and resource on it.

 Yet another justification often made is that the students who receive private tuition are academically or intelligently backward than those who have made any special arrangement for extra learning. So the private tuition help to compensate their comparative 'backwardness'. Those who are not in favour of private tuition views the problem differently. High achievers of schools are highly motivated to learn. The pupils who have high achievement motivation need not get any arrangement of tutoring. They shall learn their maximum with class room assistance at school and in accordance to their pace. So the researcher intends to know the influence of private tuition on science achievement in 'intelligence and achievement motivation equated groups' of pupils.

 Adoption of tuition by pupils is due to different reasons. Schools may not have adequate staff, exam oriented teaching, gregariousness, escape from monotony etc. are some known reasons. So the researcher intends to know what in the special situation in Kerala are the reasons attributed by pupils for which they are receiving tuition.

 Hence the study is an attempt to find the influence of private tuition on science achievement among secondary school pupils.

**1.2 STATEMENT OF THE PROBLEM**

 The problem of the present investigation is entitled as "INFLUENCE OF PRIVATE TUITION ON ACHIEVEMENT IN SCIENCE AMONG SECONDARY SCHOOL PUPILS OF KERALA".

**1.3 DEFINITION OF KEY TERMS**

**1.3.1 Private Tuition**

 For the present study, Private Tuition is defined as the tutoring, coaching or study help on science subjects during other than school time, but excluding the special classes arranged by the school teachers and parental assistance for the study. The time spent for the tutoring is taken as the index of Private Tuition. It may vary from having no tuition to various durations in any or all the three subjects viz., Physics, Chemistry, Biology.

**1.3.2 Achievement in Science**

 It is the accomplishment or proficiency of performance in science which includes Physics, Chemistry and Biology as measured by a standardised test in science.

**1.3.3 Secondary School Pupils**

Secondary school pupils are the pupils studying in standard VIII, IX and X in the Kerala syllabus. In this study only pupils studying in IX standard are taken as the accessible population of the study.

**1.4 VARIABLES OF THE STUDY**

 The present investigation has the following dependent, independent and control variables.

**1.4.1 Dependent Variable**

 The Dependent Variable of the study is Achievement in Science.

**1.4.2 Independent Variable**

The Independent Variables of the study is Private Tuition

**1.4.3 Control Variables**

 In the present study, Intelligence and Achievement Motivation are considered as control variables.

**1.5 OBJECTIVES OF THE STUDY**

 The objectives of the present study are the following.

1. To find out whether there exists significant difference between the mean scores of Achievement in Science of the pupils belonging to Tuition and Non-tuition groups.

2. To find out whether there exists significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups equated in terms of Intelligence and Achievement Motivation.

3. To find out whether there exists significant difference between the mean scores of Achievement in Science of Tuition and Non-tuition groups of pupils belonging to:

 a) High Intelligence category

 b) Average Intelligence category

 c) Low Intelligence category

 d) High Achievement Motivation category

 e) Average Achievement Motivation category

 f) Low Achievement Motivation category.

4. To find out the extent of relationship between Achievement in Science and extent of tuition in the Tuition group.

5. To identify pupils attributed reasons for availing Private Tuition.

**1.6 HYPOTHESES OF THE STUDY**

1. There is significant difference between the mean scores of Achievement in Science of the pupils belonging to Tuition and Non-tuition groups.

2. There is no significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups equated in terms of Intelligence and Achievement Motivation.

3. There is no significant difference between the mean scores of Achievement in Science of Tuition and Non-tuition groups of pupils belonging to:

 a) High Intelligence category

 b) Average Intelligence category

 c) Low Intelligence category

 d) High Achievement Motivation category

 e) Average Achievement Motivation category

 f) Low Achievement Motivation category.

4. There is significant relationship between the Achievement in science and extent of Private Tuition in the Tuition group.

**1.7 METHODOLOGY**

 The present investigation is designed as a non-experimental comparative study. The Methodology of the study is described under the following headings.

**1.7.1 Sample**

 The sample for the present study includes 664 pupils of standard IX of Kozhikode District. Stratified random sampling with optimum allocation technique was used for the selection of the sample. This technique was chosen because the population selected is composed of subgroups or strata based on sex, locale, type of management of schools, so that representative sample must contain individuals from each strata in accordance with the size of the sub groups. Also, the investigator had to obtain adequate number of elements in Tuition and Non-uition groups

**1.7.2 Tools**

 The following are the tools used for the purpose of the study.

1. Verbal Group Test of Intelligence (Sudheesh Kumar, P.K., Hameed, A., and Prasanna, A.,1997)

2. Scale of Achievement Motivation (Pillai & Salim, 1992)

3. Test of Achievement in Science (Developed for the study)

4. A Questionnaire on Tutoring (Developed for the study)

**1.7.3 Statistical Techniques used for Analysis**

The major statistical techniques used for the analysis are:

1. Preliminary statistics.

2. Two tailed test of significance of difference between means (for independent samples)

3. Pearson's product moment coefficient of correlation 'r'.

**1.8 SCOPE AND LIMITATIONS OF THE STUDY**

 The present study is an attempt to find out the influence of Private Tuition on Achievement in Science among secondary school pupils of Kerala.

 The study will reveal whether there is significant difference in the achievement in Science of IXth standard pupils receiving and not receiving tuition in the Science subjects. Apart from comparing the Tuition and Non-tuition groups for their total science achievement, the study analyses whether the influence of having tuition is making significant difference separately in Physics, Chemistry and Biology achievements. The present study will also find out the strength of relationship between the extent of tuition availed and the achievement in science.

 The study examines whether the impact of tuition on achievement in science, if any, exists when the intelligence and achievement motivation level of Tuition and Non-tuition groups are matched. Besides these, the present study investigates the dynamics of tuition in science subjects. i.e., why the pupils opt for tuition.

 The study was conducted on a stratified random sample with optimum allocation of 664 IXth standard pupils of Kozhikode Revenue District. The sample includes sufficient number of pupils belonging to tuition and non-tuition groups. Though the sample of the study is restricted to a particular grade and district, the investigator hopes that the findings can be generalized to other grades, districts and even subjects other than science.

 The tools used in the study are having satisfactory validity and reliability to measure the variables.

 Even though every attempt was made to make the study as precise and objective as possible, the following limitation were identified by the investigator for the present study.

1. Though the problem is stated as Influence of Private Tuition on Achievement in Science among Secondary School Pupils of Kerala, it uses a non-experimental comparative design. The independent variable is not manipulated by the investigator.

2. The sample for the present study is chosen from Kozhikode Revenue district only. The limited time and inconveniences held back the investigator from conducting the study on a wider sample.

3. The sample for the present study was limited to one educational level, i.e., standard IX only due to practical reasons. This was done with the notion that standard IX will reasonably represents Standard VIII, IX and X of secondary school.

4. Only multiple choice test items based on Bloom's taxonomy of educational objectives were included in the test of Achievement in science.

5. It is rarely possible for one to randomly assign pupils to conditions such as Private Tuition because of the insurmountable logistical problems associated with such an endeavour. Although we could ascertain with considerable accuracy the type of, reason for, and amount of intensity of Private Tuition received by the participating pupils, it was not possible to control for the quality of the tuition received.

**1.9. ORGANISATION OF THE REPORT**

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

 Chapter II comprises studies related to Private Tuition or Coaching and conclusion of review.

 In Chapter III, methodology of study is described in detail consisting of the variables, objectives, hypotheses of the study, tools used for the study, selection of sample, data collection procedure, scoring procedure and statistical techniques used for analysis of data.

 Statistical analysis of data and discussion of results, findings of the study as per the objectives of the study are given in Chapter IV.

 Chapter V gives the summary of the study, major findings, tenability of hypotheses, conclusions, educational implications and some suggestions for further research in this area.

**REVIEW OF RELATED LITERATURE**

 Review of related literature is an aspect of any research. The summary of related literature provides better understanding of the problem which helps the investigator in evolving insights to build new approaches to the problem that is selected.

 According to Mouly, "The survey of related literature is a crucial aspect of planning of the study and the time spend in such as survey invariably is a wise investment". It is a valuable guide line in defining the problem, recognizing its significance, suggesting appropriate study design and source of data.

 The present is a study about the Influence of Private Tuition on Achievement in Science of Secondary School pupils of Kerala. Review of related studies to the Private Tuition are presented under the following headings viz.,

2.1 Studies related to Private Tuition or Coaching.

2.2 Conclusion

**2.1 Studies Related to Private Tuition or Coaching**

 Kenny & Faunce (2004) studied the effect of academic coaching on elementary and secondary school students. The author assessed the effects of out-of-school hours academic coaching on students' (a) academic performance on end of year examination in English, Mathematics and Science (b) attainment of academic scholarships. Participants were 1724 elementary and secondary school students. Results of the study, with IQ as covariate indicated that coached and uncoached students performed equally in most subjects of the academic school years. Analysis indicates that IQ was the best predictor of outcome for all tests. However coaching had significant effects on success of entrance examinations and no impact on scholarship examination.

 Kenny & Stone (2000) examined the coaching and scholarship attainment histories and academic achievement of a group of students who were awarded either full or half academic scholarships to an independent girls school in 1999. Results of the study indicated that coaching did not predict the type of scholarship awarded. Coached students did no better than uncoached students in English, Mathematics, Science or over all aggregate on end of year examination. Study also suggests that coaching may not provide any added advantage to highly able students.

 Power & Rock (1999) reported difference between coached and control students in a study in which coaching outcomes on the SAT were assessed. Coached students were more likely to (a) be Asian (b) high achievers (c) have tertiary educational aspiration (d) place high importance on doing well, and (e) report that their previous performance on the SAT was a serious under estimate of their true ability.

 Sumangala (1998) studied about the effect of tutoring at home on Achievement in Mathematics of Secondary School pupils. The study suggests that home factors such as socio-economic status comprising of parental income along with parental care play a vital role in academic achievement.

 Allalouf & Ben-Shakhar (1998) reported that, the small increments could be attributed to coaching for the Israeli Psychometric Entrance Test did not effect predictive validity.

 Scholes & Lain (1997) reported no effect of test preparation coaching on the performance of students (N=126253) who reported the American College Test beyond the effects of re-taking it.

 Witt, Al-Abdulla, & Ross (1994) concluded from their meta-analysis that 'high stakes' admissions test were minimally amenable to the impact of coaching.

 Powers (1993) reported that test-scores gains from the first to second attempt cannot be considered a measure of the effectiveness of coaching. Simply repeating a test has been shown to improve test performance.

 In a study conducted by Shajila (1992) on a sample of 700 pupils obtained that (i) there exists significant difference in the science achievement between students attending and not-attending tuition classes, (ii) there exists significant difference between boys and girls attending and not-attending tuition classes, (iii) there exists significant difference between urban and rural pupils attending and not attending tuition classes.

 Egan & Bunting (1991) studied 373 children in year 7 of primary school on the effects of coaching on the outcome of the 11+ examination. The study reported the significant difference favouring students who had been intensively coached for 1 year prior to the examination compared with those who had not been coached. Also they concluded that, coaching for 11+ has a much more dramatic effect on results than ability, although brighter students appeared to show greater benefit from this type of coaching.

 Becker (1990) found that Scholastic Aptitude Test scores improved by an average 0.09 standard deviation units following coaching in SAT-V (Verbal component) and 0.16 standard deviation unites following coaching in SAT-M (Mathematical component). Coached and uncoached students were equally likely to show either no improvement or deterioration in performance on the SAT.

 Smyth (1989) focussed a study on coaching for the SAT have shown that mathematics components are more susceptible to coaching than are the verbal components.

 Snedecor (1989) revealed that coaching services for the Scholastic Aptitude Test are not worth college bound students' time or money.

 Reynolds, Oberman, & Perlman, (1988) reports that 64 hour coaching programme for gifted and talented students studying for the pre-scholastic Aptitude Test, shows an increase of 47 equivalent point for mathematics but no effect for verbal components.

 Achuff & Lila (1988) conducted a study in order to investigate whether scholastic performance of urban primary grade students could be improved if they were joined by their parents in a structured tutorial programme of limited duration. The result is that there exists no significant finding in terms of the achievement measures undertaken, participating parents overwhelmingly favoured the programme and found to be beneficial to then and their children.

 In a large (N=925) study of the effects of a commercially prepared coaching package for improving test scores on the California Achievement Test, Deaston, Halpin & Alford (1987) found that there were modest effect for mathematics, but reading comprehension and language expression showed no change as a result of coaching.

 Jone (1986) reporting on the results of two studies related to the effects of commercial coaching on the Medical College Admission Test, found that the coaching effect would increase a student's probability of acceptance into a medical school by 5%. The conclusion of the findings are (a) coaching has a very modest impact on improving the chances of entry to medical school and (b) the integrity of the admission test was not compromised by coaching.

 Benson (1986) found that test-wise training improved mathematics learning, but not reading performance, in fifth-grade students.

 Kulik, Bangert-Downs & Kulik (1984) found that lower ability students demonstrated larger gains from coaching than did higher ability students.

 Gastright (1983) reported that a 20 hours of intensive test-wise coaching showed no improvement from pre- to post-test administration of the California Achievement Test (N = 800).

 Messick and Jungeblut (1981) illustrated the diminishing returns of intensity of hours of coaching with logarithmic functional analysis. From their model, they estimated that a gain of 10 points on the SAT-verbal would require 12 hours of coaching and a gain of 20 points would require 57 hours of coaching. For the SAT-mathematics, an improvement of 20 points would require 19 hours of coaching, but a gain of 40 points would require 107 hour of coaching.

**2.2. CONCLUSION**

 A survey of literature revealed that a number of studies have been conducted on effect of coaching or tutoring on Scholastic Aptitude Test, Academic subjects and Entrance Tests. A few studies are reported on home tutoring, parental assistance. The results of these studies can be summarised as follows.

 The effect of out-of-school hours academic coaching on students indicated that coached and uncoached students perform equally in most of the school subjects (Kenny & Faunce, 2004; Kenny & Stone, 2000; Achuff & Lila, 1988; Gastright, 1983). The coaching do not provide any added advantage to highly abled students (Kenny & Stone, 2000; Kulik, Bangert-Drowns & Kulik, 1984) while lower ability students demonstrated larger gains from coaching (Kulik, Bangert-Drowns & Kulik, 1984). Some studies reported that coaching has significant influence on result of the Tests (Egan & Bunting, 1991; Shajila, 1992). Home factors such as socio-economic status comprising of parental income along with parental care play a vital role in academic achievement (Sumangala, 1998).

 It was found that the Scholastic Aptitude Test (SAT) scores is improved by coaching in Mathematical components but not in Verbal components (Becker, 1990; Messick & Jungeblut, 1981; Benson, 1986l Deaton, Halpin & Alford, 1987; Reynolds, Oberman & Perlman, 1988; Smyth, 1989). Also review reveals that the coaching has no effect on SAT or Academic tests (Gastright, 1983; Snedecor, 1989; Becker, 1990; Witt, Al-Abdulla and Ross, 1994; Scholes and Lain, 1997; Kenny & Faunce, 2004) but coaching has a moderate effect on Entrance Examination (Jone, 1986; Allalouf and Ben-Shakhar, 1998).

 From the highlights of these findings, the investigator made an attempt to study about the Influence of Private Tuition on Achievement in Science in the present teaching-learning process.

**METHODOLOGY**

 The Methodology of the present study is described under the following headings viz.,

1. Variables of the Study

2. Objectives of the Study

3. Hypotheses of the Study

4. Tools used for the Study

5. Sample used for the Study

6. Data Collection Procedure

7. Scoring and consolidation of data and

8. Statistical techniques used for analysis of data.

**3.1. VARIABLES OF THE STUDY**

 The present investigation is designed as a non-experimental comparative study having the following dependent, independent and control variables.

**Dependent Variable**

The Dependent variable of the study is Achievement in Science.

**Independent Variable**

 Private Tuition has been selected as the independent variable.

**Control Variables**

Intelligence and Achievement Motivation have been selected as the control variable.

**3.2 OBJECTIVES OF THE STUDY**

 The objectives of the present study are the following.

1. To find out whether there exists significant difference between the mean scores of Achievement in Science of the pupils belonging to Tuition and Non-tuition groups.

2. To find out whether there exists significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups equated in terms of Intelligence and Achievement Motivation.

3. To find out whether there exists significant difference between the mean scores of Achievement in Science of Tuition and Non-tuition groups of pupils belonging to:

 a) High Intelligence category

 b) Average Intelligence category

 c) Low Intelligence category

 d) High Achievement Motivation category

 e) Average Achievement Motivation category

 f) Low Achievement Motivation category.

4. To find out the extent of relationship between Achievement in Science and extent of tuition in the Tuition group.

5. To identify pupils attributed reasons for availing Private Tuition.

**3.3 HYPOTHESES OF THE STUDY**

1. There is significant difference between the mean scores of Achievement in Science of the pupils belonging to Tuition and Non-tuition groups.

2. There is no significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups equated in terms of Intelligence and Achievement Motivation.

3. There is no significant difference between the mean scores of Achievement in Science of Tuition and Non-tuition groups of pupils belonging to:

 a) High Intelligence category

 b) Average Intelligence category

 c) Low Intelligence category

 d) High Achievement Motivation category

 e) Average Achievement Motivation category

 f) Low Achievement Motivation category.

4. There is significant relationship between the Achievement in science and extent of Private Tuition in the Tuition group.

**3.4 TOOLS USED FOR THE STUDY**

 The following are the tools used for the purpose of the study.

1. Verbal Group Test of Intelligence (Sudheesh Kumar, P.K., Hameed, A. and Prasanna, A., 1997).

2. Scale of Achievement Motivation (Pillai & Salim, 1992).

3. Test of Achievement in Science (developed for the study).

4. A Questionnaire on Tutoring (developed for the study).

**3.4.1 Verbal Group Test of Intelligence (Sudheesh Kumar, P.K., Hameed, A. and Prasanna, A., 1997)**

 The Verbal Group Test of Intelligence consists of the following five tests.

i) Verbal Analogy

ii) Verbal classification

iii) Numerical Reasoning

iv) Verbal Reasoning

v) Comprehension

 Each test consists of twenty items and each item carries one score. Hence the total score of the test is 100.

**Reliability and Validity**

 Reliability of the test is established by split half method. Reliability of the test is 0.83 and validity of the test is 0.66.

 This suggests that the test possesses acceptable psychometric qualities to measure verbal Intelligence of the sample.

**3.4.2 Scale of Achievement Motivation (Pillai & Salim, 1992)**

 The scale modelled after the Cassidy-Lynn Achievement Motivation Questionnaire (1989) consists of 7 items - Work ethic, Acquisitiveness, Dominance, Excellence, Competitiveness, Status aspiration and Mastery. There are 50 items in all. Out of which 8 items belong to work ethic, 6 items to pursuit of excellence, 10 items to status approach, 6 items to competitiveness, 6 items to Acquisitiveness, 4 items to mastery and 10 items to Dominance. The sum of the obtained scores for individual item indicates the Achievement Motivation of the subject. The maximum score is 100 and minimum score is zero. The subjects have to respond to each of the fifty items by choosing any one of the alternatives 'Yes', 'Undecided', 'No' respectively. The order is reversed for the negative items.

 One example of the items from each factor is given below.

**(i) Work Ethic**

 I like to avoid those lessons which I find difficult to study.

**(ii) Pursuit of Excellence**

 I find satisfaction in doing a work better than my earlier work, even if I do not out perform others.

**(iii) Status Aspiration**

 I want others to come to me for clearing their doubts.

**(iv) Acquisitiveness**

 There is a continuous effort behind success of my accomplishment in studies.

**(v) Competitiveness**

If there is competition my performance will be better.

**(vi) Mastery**

 I find satisfaction in studying materials which require high intellectual ability and skill.

**(viii) Dominance**

 When we plan an activity, I would like to direct myself rather than some one else taking the lead.

 Test developers report that the test possesses desirable reliability as evidenced by Cronbach's reliability coefficient of Alpha for N=100.

 The criterion validity obtained by correlating the scores with external criterion, the Kerala scale of Achievement Motivation (Nair, 1980) was, r= 0.68 (N = 80).

**3.4.3 Test of Achievement in Science**

 A Test of Achievement in Science was developed by the investigator in collaboration with the supervising teacher to measure the independent variable, Achievement in Science.

 The procedure followed in the development of the test of Achievement in Science are discussed below.

**Planning of the Test**

 Contents of the IXth standard school syllabus in science were carefully studied. It was decided that the content of the achievement test should include the basic concepts of Physics, Chemistry and Biology which the pupils study in IXth standard. It was also decided to prepare a test of 48 items which the pupils can take within a duration of 45 minutes. Only objective type items of multiple choice category were included in the test. Scientific procedure for preparing an achievement test suggested by Ebel in 1972 was followed.

**Weightage to Objectives**

 The test include objectives relating to cognitive domain of Bloom's (1979) taxonomy of instructional objectives. The weightage assigned to the objectives under Physics, Chemistry and Biology are given below:

**TABLE -1**

**Weightage to Objectives in the Test of Achievement in Science**

|  |  |  |  |
| --- | --- | --- | --- |
| Objectives | Physics | Chemistry | Biology |
|  | Marks | Percentage | Marks | Percentage | Marks | Percentage |
| Knowledge | 2 | 12 | 3 | 18 | 3 | 18 |
| Comprehension | 4 | 25 | 5 | 31 | 6 | 38 |
| Application | 6 | 31 | 4 | 25 | 3 | 18 |
| Analysis | 2 | 18 | 2 | 12 | 2 | 12 |
| Synthesis | 1 | 7 | 1 | 7 | 1 | 7 |
| Evaluation | 1 | 7 | 1 | 7 | 1 | 7 |
| Total | 16 | 100 | 16 | 100 | 16 | 100 |

**Knowledge**

According to Bloom (1979) knowledge includes those behaviour and test situation which emphasize remembering, either by recognition or recall of ideas, material or phenomena. An illustrative item is given below.

Example:

1. Which is the unit of power?

 (a) Joule (b) kilogram (c) Watt (d) Newton

**Comprehension**

 According to Bloom (1979) comprehension refers to a type of understanding or apprehension such that the individual knows what is being communicated and make use of the material or idea being communicated without necessarily relating to it other material or seeing its fullest implications. An illustrative example is given below.

Example:

1. Which among the following is having shortest wavelength?

 (a) Blue (b) Infra red (c) Red (d) Ultraviolet

**Application**

 According to Bloom, Application refers to the use of abstractions in particular and concrete situations. The abstractions may be in the form of general ideas, rules of procedure, generalised methods, technical principles or theories. An illustrative example is given below.

Example:

1. Starting with a velocity 10m/s, a train travel with uniform acceleration of 5m/s2. What distance it travels in 10 seconds?

 (a) 350 m (b) 35 m (c) 60 m (d) 600 m

**Analysis**

 According to Bloom, Analysis involves the breakdown of a communication into its constituent elements or parts such that relative hierarchy of ideas is made clear and or the relations between the ideas expressed are made explicit. An illustrative example is given below.

Example:

1. A stone is tied on the rope and it rotates. In this case, which of the following is not true in the movement of the stone?

 (a) Stone is in circular motion (b) direction of the stone always changes (c) There is no acceleration for the stone (d) The force acted on the stone is from the centre of the circle.

**Synthesis**

 According to Bloom, Synthesis refers to putting together of elements and parts so as to form a whole. An illustrative item is shown below.

Example:

1. The scientific name of lion is Panthera Leo and that of a tiger is Panthera Tigris. What could be inferred from this?

 a. Both belong to same species

 b. Both belong to same family

 c. Both belong to same genus

 d. Both belong to same order

**Evaluation**

 Bloom defined evaluation as the making of judgement about the value for some purposes, of ideas, works, solutions, methods, materials, etc. An illustrative example is given below.

Example:

1. If curly hair is a dominant character and straight hair is a recessive character, then what will be the nature of hair of the four children having straight haired father and curly haired mother?

 a. All the four have straight hair

 b. All the four have curly hair

 c. Two of them have curly hair and two of them have straight hair

 d. Three of them have curly hair and one have straight hair.

**Weightage to content**

 Weightage given to each content area are given in Table 2.

**TABLE - 2**

**Weightage to content in the Test of Achievement in Science**

|  |  |  |  |
| --- | --- | --- | --- |
| Subject | Unit | Marks | Percentage |
| PHYSICS | Colours of Light | 3 | 18.7 |
| Motion | 2 | 12.5 |
| Force | 1 | 6.3 |
| Gravitation | 4 | 25 |
| Work, Energy, Power | 4 | 25 |
| Fluids | 2 | 12.5 |
| TOTAL | 16 | 100 |
| CHEMISTRY | Periodic Table | 3 | 18.7 |
| Chemical Bond | 4 | 25 |
| Chemistry in Daily life | 2 | 12.5 |
| Chemical Kinetics | 2 | 12.5 |
| Carbon | 3 | 18.7 |
| Organic Chemistry | 2 | 12.5 |
| TOTAL | 16 | 100 |
| BIOLOGY | Agriculture | 2 | 12.5 |
| Nutrition in Plants | 3 | 18.7 |
| Nutrition in Animals | 4 | 25 |
| Respiration in Living beings | 2 | 12.5 |
| Skeletal system | 2 | 12.5 |
| Genetics | 3 | 18.7 |
| TOTAL | 16 | 100 |

 A two-way grid specifying weightage to objectives and weightage to content was prepared as a blue-print for the final test of Achievement in science. The blue print is given in Table 3.

**TABLE - 3**

**Blue Print - Test of Achievement in Science (for standard IX)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  ObjectiveContent | Know-ledge | Understanding | Applica-tion | Analysis | Synthesis | Evalua-tion | TOTAL |
| PHYSICS | Colours of Light |  | 1 | 2 |  |  |  | 3 |
| Motion |  |  | 1 | 1 |  |  | 2 |
| Force |  |  | 1 |  |  |  | 1 |
| Gravitation | 1 | 1 |  | 1 |  | 1 | 4 |
| Work, Energy, Power | 1 | 1 | 1 |  | 1 |  | 4 |
| Fluid |  | 1 | 1 |  |  |  | 2 |
|  **TOTAL** | **2** | **4** | **6** | **2** | **1** | **1** | **16** |
| CHEMISTRY | Period Table |  |  | 2 | 1 |  |  | 3 |
| Chemical Bond | 1 | 1 | 1 |  |  | 1 | 4 |
| Chemistry in daily life | 1 | 1 |  |  |  |  | 2 |
| Chemical Kinetics |  | 1 |  | 1 |  |  | 2 |
| Carbon |  | 1 | 1 |  | 1 |  | 3 |
| Organic Chemistry | 1 | 1 |  |  |  |  | 2 |
|  **TOTAL** | **3** | **5** | **4** | **2** | **1** | **1** | **16** |
| BIOLOGY | Agriculture | 2 |  |  |  |  |  | 2 |
| Nutrition in Plants |  | 2 |  | 1 |  |  | 3 |
| Nutrition in Animals | 1 | 2 | 1 |  |  |  | 4 |
| Respiration in Living Beings |  | 2 |  |  |  |  | 2 |
| Skeletal system |  |  | 2 |  |  |  | 2 |
| Genetics |  |  |  | 1 | 1 | 1 | 3 |
|  **TOTAL** | **3** | **6** | **3** | **2** | **1** | **1** | **16** |

 **Item Writing**

In order to get enough number of items with intended properties in the final test, 100 multiple choice items (with four distracters) were pooled initially by referring to text books, reference books and question banks. The items were subjected to scrutiny by experienced teacher educators and teachers. On the basis of their suggestions some items were deleted, some others were modified. Finally 90 items were included in the draft test. A copy of the draft test is given as Appendix-I.

**Try out of the Draft Test**

 Tryout of the draft test was conducted to select suitable items for the final test by empirically estimating the difficulty index and discriminating power of each item in the draft test.

 For try out, the test was administered to a sample of 370 pupils studying in standard IX of four schools in Kozhikode district. Proper instructions were given regarding the method of answering which was prepared earlier. One score was given for each correct response and no score for incorrect response.

**Item Analysis**

 Item analysis was done, using the method suggested by Ebel in 1972. For the item analysis, 370 response sheets were used.

 The answer sheets were arranged in the descending order of their total scores. The top 100 (27 percent) and bottom 100 (27 percent) answer sheets were separated which form the upper group (H) and the lower group (L) respectively. The number of correct responses for each item in the upper and lower groups were recorded separately. The difficulty index (D.I) and discriminating power (D.P) were calculated using the formulae.

 D.P =  and D.I = respectively where

 U - number of right responses in upper group

 L - number of right responses in lower group

 N - size of the sample

 The item analysis data is presented in Table - 4

**TABLE - 4**

**Test of Achievement in Science Item Analysis Data**

|  |  |  |
| --- | --- | --- |
| Physics | Chemistry | Biology |
| Qn. No. | D.P | D.I | Qn. No. | D.P. | D.I | Qn.No. | D.P | D.I |
| 1 | 0.31 | 0.08 | 1 | 0.13 | 0.45 | 1\* | 0.45 | 0.50 |
| 2\* | 0.55 | 0.42 | 2 | -0.26 | 0.42 | 2 | 0.26 | 0.12 |
| 3\* | 0.56 | 0.67 | 3\* | 0.43 | 0.51 | 3 | 0.20 | 0.39 |
| 4 | 0.26 | 0.24 | 4\* | 0.52 | 0.42 | 4\* | 0.49 | 0.39 |
| 5 | 0.05 | 0.42 | 5\* | 0.35 | 0.47 | 5 | 0.19 | 0.60 |
| 6\* | 0.54 | .37 | 6 | 0.25 | 0.32 | 6\* | 0.53 | 0.45 |
| 7 | 0.60 | 0.27 | 7 | 0.30 | 0.52 | 7 | 0.13 | 0.63 |
| 8\* | 0.60 | 0.48 | 8 | 0.54 | 0.58 | 8 | 0.29 | -0.04 |
| 9 | 0.15 | 0.17 | 9\* | 0.55 | 0.48 | 9\* | 0.48 | 0.54 |
| 10 | 0.25 | 0.42 | 10\* | 0.65 | 0.47 | 10\* | 0.52 | 0.53 |
| 11\* | 0.40 | 0.37 | 11\* | 0.5 | 0.37 | 11\* | 0.41 | 0.43 |
| 12 | 0.32 | 0.37 | 12 | 0.18 | 0.55 | 12 | 0.17 | 0.43 |
| 13\* | 0.41 | 0.45 | 13\* | 0.45 | 0.48 | 13\* | 0.49 | 0.40 |
| 14. | 0.25 | 0.25 | 14\* | 0.54 | 0.56 | 14 | 0.24 | 0.38 |
| 15 | 0.35 | 0.31 | 15 | 0.05 | 0.42 | 15\* | 0.54 | 0.68 |
| 16\* | 0.68 | 0.41 | 16 | 0.15 | 0.57 | 16\* | 0.58 | 0.43 |
| 17\* | 0.55 | 0.51 | 17\* | 0.45 | 0.32 | 17 | 0.18 | 0.40 |
| 18\* | 0.62 | 0.48 | 18 | 0.21 | 0.58 | 18 | 0.20 | 0.38 |
| 19\* | 0.54 | 0.43 | 19 | 0.25 | 0.47 | 19 | 0.17 | 0.43 |
| 20\* | 0.48 | 0.51 | 20\* | 0.53 | 0.35 | 20 | 0.11 | 0.17 |
| 21\* | 0.51 | 0.47 | 21 | 0.25 | 0.37 | 21\* | 0.47 | 0.39 |
| 22 | 0.38 | 0.17 | 22 | 0.05 | 0.52 | 22\* | 0.53 | 0.38 |
| 23\* | 0.45 | 0.43 | 23\* | 0.40 | 0.40 | 23 | 0.12 | -0.13 |
| 24\* | 0.41 | 0.53 | 14\* | 0.38 | 0.47 | 24\* | 0.48 | 0.54 |
| 25 | 0.15 | -0.17 | 25\* | 0.54 | 0.47 | 25 | 0.14 | 0.05 |
| 26\* | 0.48 | 0.54 | 26\* | 0.47 | 0.32 | 26\* | 0.49 | 0.38 |
| 27. | 0.05 | 0.17 | 27 | 0.31 | 0.40 | 27\* | 0.60 | 0.44 |
| 28 | 0.22 | 0.31 | 28\* | 0.35 | 0.38 | 28 | 0.23 | 0.28 |
| 29 | 0.40 | 0.30 | 29 | 0.25 | 0.17 | 29\* | 0.39 | 0.48 |
| 30\* | 0.55 | 0.41 | 30 | 0.31 | 0.18 | 30\* | 0.47 | 0.39 |

Note: \* Indicates the items that are selected for final test

 Items having difficulty index around 0.5 and discriminating power around 0.4 were selected. Thus 16 items each were selected in Physics, Chemistry and Biology for the final test. Together there are 48 items in the final test.

**Preparation of Final Test**

 The 16 items in each, selected were arranged in the order of difficulty. The test was printed with necessary instructions. The time limit was fixed as 15 minutes for each part. A response sheet is prepared. Copy of the final test, English translation, response sheet and scoring key are given as Appendices - II, III, IV & V respectively.

**Reliability and Validity of the Test**

 Content and construct validity of the test was ensured by preparing the following scientific procedure of construction of an achievement test. It was ensured by giving proper weightage to content of each lesson. Concurrent validity of the achievement test was estimated by correlating the scores of the test with marks obtained in the second terminal examination in science using Pearson's 'r'. It was found to be 0.59 (N=40).

 Reliability of the test was found out by split-half method using odd-even technique. From the reliability of the half test, the reliability of the test was estimated using Spearman-Brown prophecy formula,

 r11 = 2r½ 1/11  1+r ½ 1/11 (Garrett, 1981)

 Where r11 - the reliability coefficient of the whole test and r1/2 1/11 - the reliability coefficient of the half test found experimentally.

 The reliability coefficient of the half test was 0.77 and the whole test was 0.87.

 The psychometric properties of the test suggest that the test is an adequate instrument for measuring the variable, Achievement in Science of standard IX.

**3.4.4 Questionnaire on Tutoring**

 The questionnaire is prepared by the investigator in collaboration with the supervising teacher in order to collect sufficient informations about Private Tuition in Science subjects. It has two parts. The first part of the questionnaire is intended to get informations about the availability and extent of Private Tuition in Science subjects, viz., Physics, Chemistry, Biology separately. The second part is intended to know the reasons attributed by pupils for availing Private Tuition. The construction of this tool is detailed under the headings, viz., planning and construction of the questionnaire and finalisation of the questionnaire.

**Planning and Construction of the Questionnaire**

As the first step in planning for the questionnaire, the investigator reviewed the literature on tutoring and discussed with teachers. Based on the information got from different sources, the investigator decided to include items for getting the extent of time spent on tuition in hours in science subjects. This time spent for receiving Private Tuition in school working days, holidays, week end days, vacation time are considered. Investigator enquired to teachers, peers and pupils about the reasons for the arrangement of Private Tuition and they are listed in the questionnaire. The questionnaire is to be administered in face to face contact with the group, so that any doubt regarding any of the item could be explained.

**Finalisation of Questionnaire**

 Many revisions of the constructed questionnaire were conducted before finalisation. It was given to friends, teachers and experts in the areas of questionnaire construction. Then it was administered to the target group. Necessary instructions were given in the questionnaire to make questions clear. The investigator has assured the respondent about the confidentiality of the response. The questions and instructions were stated in clear, direct, simple language. The investigator ensured that the question are related to the topic. Draft of the questionnaire in Malayalam and its English version is appended as appendices - VII & VIII respectively.

**3.5 Sample Used for the study**

The sample used for the present study is described under the following headings.

**3.5.1 Population of the study**

 The target population for the study is the secondary school pupils. However, the accessible population was the pupils of standard IX.

**3.5.2 Size of the sample**

 The sample for the present study was to be about 680 assuring that the strength of the pupils in each class division in standard IX will approximately be 40.

**3.5.3 Technique of Sampling**

 Various techniques have been designed for obtaining a sample which will be representative for its population. Stratified random sampling with optimum allocation technique was used for the selection of the sample for the present study. This technique was chosen because the population selected for the study namely secondary school pupils is known to be composed of sub groups or strata of different sizes, so that representative sample must contain individuals drawn from each strata in accordance with the sub groups. Also the investigator had to obtain adequate number of elements in Tuition and Non-tuition groups.

**3.5.4 Rationale for the different strata considered**

 The most representative sample of the secondary school pupils could be obtained by considering the following factors.

i) Sex of the subjects (Boys/Girls)

ii) Locale of the schools (Rural/Urban)

iii) Type of Management of School (Government/Private)

**3.5.4.1 Sex of the Subjects**

 Sex of the subjects is one of the important factors that influences various traits of the children. Roughly equal number of boys and girls were included in the sample as boys and girls have equal opportunities to school education in Kerala.

**3.5.4.2 Locale of the Schools**

 Many studies have reported that locale of the school is related with pupils performance. Moreover percentage of success in Secondary School Leaving Certificate Examination shows that rural-urban differences still exist in academic achievement of secondary school pupils. The proportion decided for rural-urban subjects was 5:3. Schools which are situated within the Panchayat limits were grouped under Rural category and those situated within Municipal and Corporation limits were grouped under Urban category.

**3.5.4.3 Type of Management of Schools**

 Based on the agencies which manage the schools in Kerala, there are two major categories of schools,

i) Government Schools which are directly managed by government through Director of Public Instruction and

ii) Aided schools which are managed by private agencies.

 Investigator included sample from Government schools and private aided schools in the proportion 2:3. Private unaided recognized schools were not included in the study.

 Details of school wise distribution of 664 pupils obtained for analysis are presented in Table-5.

**TABLE - 5**

**List of Schools Selected for the study**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sl. No. | Name of School | LocaleRural/Urban | Manage-mentPrivate/Govt. | No. of pupils |
| Boys | Girls | Total |
| 1 | Ramakrishna Mission H.S.S, Meenchanda | Urban | Aided | 15 | 33 | 48 |
| 2 | Farook H.S.S., Farook College | Rural | Aided | 48 | 49 | 97 |
| 3 | M.M.V.H.S.S. Parappil, Calicut | Urban | Aided | 37 | - | 37 |
| 4 | C.M.C.H.S. for Boys, Elathur | Rural | Aided | 30 | - | 30 |
| 5 | C.M.C.H.S. for Girls, Elathur | Rural | Aided | - | 37 | 37 |
| 6 | G.G.H.S.S. Feroke | Rural | Govt. | 19 | 20 | 39 |
| 7 | Crescent H.S. Vanimal | Rural | Aided | 23 | 24 | 47 |
| 8 | G.V.H.S.S. Meppayur | Rural | Govt. | 36 | 37 | 73 |
| 9 | M.I.M H.S.S. Perode | Rural | Aided | 19 | 21 | 40 |
| 10 | Govt.V.H.S.S. Meechanda | Urban | Govt. | 24 | 23 | 47 |
| 11 | JDT Islam V.H.S.S. Calicut | Urban | Aided | 22 | 26 | 48 |
| 12 | Govt. Model H.S.S. Calicut | Urban | Govt. | 21 | 24 | 45 |
| 13 | U.H.S.S. Chaliyam | Rural | Aided | 20 | 23 | 43 |
| 14 | G.H.S.S. Beypore | Rural | Govt. | 16 | 17 | 33 |

**3.6 DATA COLLECTION PROCEDURE**

 Three tools used for the study are in the form of re-usable booklets. Test booklets and separate response sheets were prepared. After deciding the number of sample, the investigator fixed the schools for data collection. The Head teachers of the schools were contacted well in advance, through the Principal of Farook Training College, Calicut. A schedule for data collection was prepared. The tests were administered in proper order with the help of the school teachers. The pupils were informed that the tests were conducted for the research purpose and have nothing to do with their class room examination or others. The investigator was able to secure full support of the pupils for the successful completion of data collection. The investigator also collected the marks scored by the pupils in various science subjects for second terminal examination. The administration of the test was commenced on the month January 2005.

**3.7 SCORING AND CONSOLIDATION OF DATA**

 Response sheets of Achievement in Science and Verbal Group Test of Intelligence were scored by using punched scoring keys. One marks is given for each correct response.

 Response for questionnaire on tutoring was scored separately with necessary precautions and as per scoring procedures. From the questionnaire, the science subjects which are availed Private Tuition can be detected easily. The availability of tutoring on school days, week-end days, holidays and vacation were considered. The investigator gave logical weightage to each of them. A weightage of 9 score is given for having one hour tutoring in school days and week-end days, a weightage of 1 score is given for having one hour tutoring in holidays and a weightage of 2 score is given for having one hour tutoring on vacation days. The total score obtained is calculated for each subjects separately. The total of them is taken as the tuition score in Science.

 The scores of 664 pupils of the tests were tabulated on a consolidated data sheet. Each subject was given a specific serial number and against this number, data concerned were entered in the same line. The consolidated data were subjected to different analysis using appropriate statistical techniques. Break up of the final sample is presented in Table - 6.

**TABLE - 6**

**Break up of the Final sample**

|  |  |  |  |
| --- | --- | --- | --- |
| Sample | Rural | Urban | Total |
| Boys | 206 | 122 | 328 |
| Girls | 204 | 132 | 336 |
| Total | 410 | 254 | 664 |

**Categorisation into Tuition group and Non-tuition group**

 The total sample includes the categories of Non-tuition and Tuition groups.

 a) Non-tuition group: It includes the pupil who have not received Private Tuition at all in science subjects viz., Physics, Chemistry, Biology and hence have tuition score of zero.

 b) Tuition group: This group consists of pupils who have received Private Tuition in science subjects. Their tuition score lies above zero and it varies within a limit.

**Formation of Intelligence and Achievement Motivation equated groups**

 For the analysis, Tuition group and Non-tuition group were equated for their Intelligence and Achievement Motivation. This is done by selecting a pupil of given Intelligence score and Achievement Motivation score from Non-tuition group and a pupil of the same Intelligence score and Achievement Motivation score from Tuition group. Thus individual matching was done. The investigator got 81 pupils from both Tuition group and Non-tuition group, equated for their Intelligence and Achievement Motivation. Both the groups include pupils of high, average and low Intelligence and Achievement Motivation.

**Categorisation into High, Average and Low Intelligence and Achievement Motivation groups**

 For categorising the variable Intelligence into three groups, the conventional procedure of 'σ' of distance from mean 'M' was used. By this procedure, pupils having scores above the rounded score (M+σ) were treated as high group in that variable. Pupils who obtained score below the rounded score (M-σ) were treated as low group and those getting scores between M+σ and M-σ are treated as average group in that variable. It is done in the Intelligence equated groups of pupils in the Tuition and Non-tuition groups.

 The same steps are followed in the categorisation of Achievement Motivation also.

**3.8 PROCEDURE FOR DATA ANALYSIS**

 The following statistical techniques were used for the analysis of data.

**3.8.1 Preliminary Statistics**

 Preliminary statistics like arithmetic mean, median, mode, standard deviation, skewness and kurtosis were calculated in order to arrive at conclusion about the nature of the distribution of dependent variable.

**3.8.2 Two-tailed test of significance of difference between means**

 The difference in mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups in the sample was tested for significance using the formulae.

 t =  for large independent sample (Garrett,1979)

 and t = for small independent sample (Garrett, 1979)

 Where and  are the means of the different groups to be computed, σ­1 and σ2 are the standard deviations of these groups. N1 and N2 are the number of observations in each group.

**3.3.3 Pearson's Product Moment Coefficient of Correlation**

 Pearson's Product Moment Coefficient of Correlation was calculated using the formula.

 r =  (Ferguson, 1976)

Where, ΣX = Sum of the X scores

 ΣY = Sum of the Y scores

 ΣX2 = Sum of the squared X - scores

 ΣY2 = Sum of the squared Y-scores

 ΣXY = Sum of the products of paired X and Y scores

 N = Number of paired scores.

 The correlation obtained were interpreted using the following procedures.

a) Testing the significance of the obtained correlation against the null hypothesis, r =0 (Ferguson, 1976)

 For this Fisher's 't' was computed.

 Testing the significance of Fishers 't'.

 Fisher has described that the appropriate procedure for determining whether or not an 'r' obtained from the random sample is significant, was to compute the value of t = r  where 'r' is the obtained correlation from the sample, N-2 is the degree of freedom. The values exceeding 2.58 were significant at 0.01 level and values exceeding 1.96 were treated as significant at 0.05 level.

(b) Working at the 0.01 confidence interval for 'r' (Garrett, 1981)

 The 0.01 confidence interval for 'r' was worked out using the formula suggested by (Garrett, 1981)

 C.I = r ± 2.58xSEr

 Where SEr = 

 r = The value of correlation and

 N = Size of the sample.

 The values give an indication of the interval with which equivalent population would lie at the 0.01 level of probability or the chances are 0.99 that the population 'r' lies between the two values.

(c) Verbally interpreting the correlation coefficient 'r'

 Verbal interpretation of the significance of 'r' is done using the following classification suggested by Garrett (1961)

i) 'r' from 0.00 to 0.20 denotes -indifferent or 'negligible' relationship.

ii) 'r' from ±0.20 to ±0.40 denotes 'low' correlation.

iii) 'r' from ± 0.40 to ± 0.80 denotes 'substantial' correlation.

iv) 'r' from ±0.80 to ±1.00 denoted 'very high' relationship.

 d) Determining the shared variance (percentage overlap) of variable

 In determining the shared variance, the formula suggested by Fox (1984) was used. The square of 'r' was expressed as percentage (r2x100).

 This gives an idea of the percentage of the variance that is common for the two correlated variables.

**ANALYSIS**

 Analysis of the data of the present study has been taken up to throw light on the objectives set for the study. The analysis of data and discussion of results are presented under the following headings.

4.1. Preliminary Analysis of the Test Scores

4.2. Comparison of Mean Scores of Achievement in Science of Pupils belonging to Tuition and Non tuition groups.

4.3. Comparison of Mean Scores of Achievement in Science of Intelligence and Achievement Motivation equated groups of pupils belonging to Tuition and Non tuition groups

4.4. Relationship between Achievement in Science and Extent of Private Tuition in the Tuition group

4.5. Pupils Attributed Reasons for availing Private Tuition

**4.1. PRELIMINARY ANALYSIS OF TEST SCORES**

The important statistical constants of the dependent variable 'Achievement in Science' for the total sample is calculated. They are presented in the table-7.

TABLE - 7

**Statistical Constants of Distribution of 'Achievement in Science'**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| N | Mean | Median | Mode | S.D | Skewness | Kurtosis |
| 664 | 25.64 | 24.8 | 26.0 | 6.70 | -0.83 | 0.28 |

 Table 7 reveals that the measures of central tendency viz., mean, median and mode are almost equal. The extend of skewness is –0.83 i.e., the distribution is negatively skewed. The measure of kurtosis is 0.288 which is almost mesokurtic.

 Graphical representation of the scores of the variable Achievement in Science of the total sample is presented in the figure 1.

 Statistical constants about the variables Achievement in Science, Intelligence and Achievement Motivation of the Tuition and Non-tuition groups are given in the table-8.

TABLE -8

**Statistical Constants of the
Variables Achievement in Science, Intelligence,
Achievement Motivation of the Tuition and Non-tuition groups**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Sub sample | N | Achievement in Science | Intelligence | Achievement Motivation |
| Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Total | Non-tuition group | 254 | 24.67 | 6.63 | 55.85 | 13.86 | 67.42 | 12.19 |
| Tuition group | 410 | 26.30 | 6.73 | 59.60 | 12.57 | 68.12 | 12.23 |
| Match-ed group | Non-tuition group | 81 | 24.71 | 5.96 | 57.64 | 11.90 | 67.2 | 10.21 |
| Tuition group | 81 | 25.30 | 6.31 |

From the table it is clear that the mean scores of the variable, Intelligence of the tuition group is greater than that of non-tuition group. i.e., the pupils received Private Tuition have comparatively high Intelligence. Also the mean scores of Achievement Motivation of the Tuition and Non tuition groups are almost same.

**4.2. COMPARISON OF MEAN SCORES OF ACHIEVEMENT IN SCIENCE OF PUPILS BELONGING TO TUITION AND NON TUITION GROUPS**

 The mean scores of Achievement in Science of Tuition and Non-tuition groups were compared to examine whether there exists any significant difference in their Achievement in Science. Two tailed test of significance of difference between mean scores of Achievement in Science was used for this. Details of the test of significance are given in Table - 9.

TABLE - 9

**Data and Result of the Test of
Significance of Mean Difference in Achievement in
Science of pupils belonging to Tuition and Non tuition groups**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | N | Mean | S.D | C.R. |
| Tuition group | 410 | 26.24 | 6.73 | 2.95\*\* |
| Non-tuition group | 254 | 24.67 | 6.63 |

Note-\*\* indicates p<0.01.

 Table 9 shows that critical ratio is 2.95 which is greater than the critical value 2.58 required to have significant at 0.01 level. From this it can be concluded that pupils belonging to Tuition group have significant difference in their Achievement in Science from the pupils those who are belonging to non-tuition group. That is, there is significant difference between the mean scores of Achievement in Science of the pupils belonging to Tuition and Non tuition groups.

**4.2.1. COMPARISON OF MEAN SCORES OF ACHIEVEMENT IN PHYSICS, CHEMISTRY AND BIOLOGY OF PUPILS BELONGING TO TUITION AND NON-TUITION GROUPS**

 As the investigator found that there exists significant difference in the mean scores of Achievement in Science between pupils belonging to Tuition and Non-tuition groups, the investigator further analysed the data to test whether there exists significant difference between the mean scores of pupils belonging to Tuition and Non-tuition groups in their achievement at particular science subjects viz., Physics, Chemistry and Biology. The result of subject wise analysis is tabulated below in table-10.

TABLE - 10

**Data and Result of
the Test of Significance of Mean Difference in Subject wise
Achievement of Pupils belonging to Tuition and Non tuition groups**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | N | Mean | SD | CR |
| Physics | Tuition group | 410 | 9.15 | 4.34 | 2.76\*\* |
| Non-tuition group | 254 | 8.42 | 2.49 |
| Chemistry | Tuition group | 410 | 8.59 | 2.61 | 2.10\* |
| Non-tuition group | 254 | 8.12 | 2.57 |
| Biology | Tuition group | 410 | 8.74 | 2.74 | 3.06\*\* |
| Non-tuition group | 254 | 8.10 | 2.61 |

Note - \*\* indicate P<0.01

 \* indicate P<0.05.

 Table 10 shows that, in Physics, the critical ratio is 2.76 which is greater than the critical value 2.58 required to have significance at 0.01 level. From this, it can be concluded that there is significant difference between the mean scores of Physics Achievement of pupils belonging to Tuition and Non tuition groups at 0.01 level.

 For the subject chemistry, critical ratio is 2.10 which is greater than the critical value 1.96 required to have significance at 0.05 level. From this it can be concluded that pupils who belonging to Tuition group in Chemistry have significant difference in their Chemistry Achievement from the pupils those who belonging to Non-tuition group. That is, there is significant difference between the mean scores of Achievement in Chemistry of pupils belonging to Tuition and Non tuition groups at 0.05 level.

 For the subject Biology, critical ratio is 3.06, which is greater than the critical value 2.58 required to have significance at 0.01 level. From this it can be concluded that pupils who belonging to Tuition group in Biology have significant difference in their Achievement in Biology from the pupils who belonging to Non-tuition group. That is, there is significant difference between the mean scores of Achievement in Biology of pupils belonging to Tuition and Non tuition groups.

**4.3. COMPARISON OF MEAN SCORES OF ACHIEVEMENT IN SCIENCE OF INTELLIGENCE AND ACHIEVEMENT MOTIVATION EQUATED GROUPS OF PUPILS BELONGING TO TUITION AND NON-TUITION GROUPS**

 The mean scores of Achievement in Science of the pupils belonging to Tuition and Non tuition groups were compared to examine whether there exist significant difference in their Achievement in Science. The two groups were equated for their Intelligence and Achievement Motivation as described in Chapter III. Two tailed test of significance of difference between mean scores of Achievement in Science was used for this. Details of the test of significance are given in Table - 11.

TABLE - 11

**Data and Result of the Test of Significance of Mean Difference
 in Achievement in Science of Intelligence and Achievement Motivation equated groups of pupils belonging to Tuition and Non-tuition groups**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | N | Mean | SD | CR |
| Tuition group | 81 | 25.36 | 6.31 | 0.67 |
| Non-tuition group | 81 | 24.71 | 5.96 |

 Table 11 shows that critical ratio is 0.67 which is lower than 1.96, the tabled value for significance of difference between mean scores at 0.05 level. Hence the Achievement in Science obtained for pupils belonging to Tuition and Non-tuition groups do not differ if Intelligence and Achievement Motivation are equated.

**Discussion**

The analysis of the data reveals that there is significant difference between mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups. Then the investigator analysed the Achievement of particular Science subjects separately among tuition and non-tuition groups. The comparison of mean scores of Achievement in Physics, Chemistry and Biology of pupils belonging to Tuition and Non- tuition groups reveals that, there is significant difference between the achievement of pupils belonging to Tuition and Non-tuition groups in the subjects Physics, Chemistry and Biology. From the preliminary statistical analysis, it was found that the pupils availed Private Tuition have comparatively high Intelligence than that of pupils not availed Private Tuition. The mean score of Achievement Motivation of the pupils of Tuition group is a little bit greater than that of pupils of Non-tuition group. i.e., the mean scores of Intelligence and Achievement Motivation of the pupils who availed Private Tuition is comparatively higher than that of pupils not availed Private Tuition . So the investigator further analysed whether there exists significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups equated for their Intelligence and Achievement Motivation. The analysis of data reveals that there is no significant difference between the mean scores of Achievements in Science of pupils belonging to Tuition and Non tuition groups equated for Intelligence and Achievement Motivation. Thus it was found that there is any impact of Private Tuition on Achievement in Science when the effect of Intelligence and Achievement Motivation is removed.

**4.3.1 Comparison of Achievement in Science of pupils belonging to Tuition and Non-tuition groups for High, Average and Low Intelligence categories**

 As the investigator found that there is no significant difference in the mean scores of Achievement in Science between pupils belonging to Tuition and Non-tuition groups for Intelligence equated group, the investigator further analysed the data to test whether there exists significant difference between the Tuition and Non-tuition groups in their Achievement in Science at particular levels of Intelligence. For that the sample is divided into three groups according to the level of Intelligence. For this classification, the conventional procedure of σ distance from mean was used it is described in Chapter III. Details of the tests of significance are given in the table - 12.

TABLE -12

**Results of the Test of Significance of difference between
the Mean scores of Achievement in Science of pupils belonging to Tuition
 and Non-tuition groups for High, Average, Low Intelligence category**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Intelligence |  | N | Mean | SD | CR |
| High | Tuition Group | 21 | 30.40 | 5.0 | 1.68 |
| Non-tuition Group | 21 | 29.9 | 3.79 |
| Average | Tuition Group | 40 | 26.42 | 3.94 | 1.43 |
| Non-tuition Group | 40 | 25.3 | 2.97 |
| Low | Tuition Group | 20 | 18.6 | 6.25 | 1.76 |
| Non-tuition Group | 20 | 17.95 | 3.47 |

 For high Intelligence group, the obtained critical ratio 1.68 is less than 1.96, the tabled value for significance of difference between mean scores at 0.05 level. Hence in high Intelligence group, the mean scores of Achievement in Science obtained for pupils belonging to Tuition and Non-tuition groups do not differ significantly at 0.05 level. So it can be concluded that Achievement in Science of pupils belonging to Tuition and Non-tuition groups do not differs in High Intelligence category.

 For average Intelligence group, the obtained critical ratio 1.43 is lower than 1.96, the tabled value for significance of difference between mean scores at 0.05 level. So it can be concluded that Achievement in Science of pupils belonging to Tuition and Non-tuition groups do not differ significantly in Average Intelligence category.

 For low Intelligence group, the obtained critical ratio 1.76 is less than 1.96, the tabled value for significance of difference between mean scores at 0.05 level. i.e., the mean scores of Achievement in Science obtained for pupils belonging to Tuition and Non tuition groups do not differ significantly in Low Intelligence category.

**4.3.2. Comparison of Achievement in Science of pupils belonging to Tuition and Non-tuition groups in High, Average and Low Achievement Motivation categories**

 As the investigator found that there exists no significant difference in the mean scores of Achievement in Science between pupils belonging to Tuition and Non-tuition groups, when Achievement Motivation is equated for the groups, the investigator further analysed the data to test whether there exists significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups at particular levels of Achievement Motivation. For this classification, the conventional procedure of 'σ' distance from mean was used. Details of the tests of significance for each particular levels are given in Table-13.

TABLE - 13

**Data and Results of the Test of
Significance of Mean Difference in Achievement in
Science of pupils belonging to Tuition group and Non-tuition
group in High, Low, Average Achievement Motivation category**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Intelligence |  | N | Mean | SD | CR |
| High | Tuition Group | 17 | 29.70 | 6.60 | 0.33 |
| Non-tuition Group | 17 | 29.90 | 6.41 |
| Average | Tuition Group | 46 | 26.22 | 5.45 | 0.64 |
| Non-tuition Group | 46 | 25.58 | 5.45 |
| Low | Tuition Group | 18 | 23.50 | 7.60 | 2.04\* |
| Non-tuition Group | 18 | 22.28 | 7.18 |

Note - \* indicates P<0.05 level.

 For High Achievement Motivation group, the obtained critical ratio 0.325 is less than 1.96, the tabled value for significance of difference between mean scores at 0.05 level. Hence in high Achievement Motivation group, the mean scores of Achievement in Science obtained for pupils belonging to Tuition and Non-tuition groups do not differ significantly at 0.05 level. So it can be concluded that Achievement in Science of pupils belonging to Tuition and Non-tuition groups do not differ in High Achievement Motivation category.

 For average Achievement Motivation group, the obtained critical value 0.64 is less than 1.96, the tabled value for significance of difference between mean scores at 0.05 level. Hence in average Achievement Motivation group, the mean scores of Achievement in Science obtained for pupils belonging to Tuition and Non-tuition groups do not differ at 0.05 level of significance. So it can be concluded that Achievement in Science of pupils belonging to Tuition and Non-tuition groups do not differs significantly in average Achievement Motivation category.

 For low Achievement Motivation group, the obtained critical ratio 2.04 is greater than 1.96, the tabled value for significance of difference between mean scores at 0.05 level. Hence in low Achievement Motivation category, the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups differs significantly at 0.05 level.

**Discussion**

The analysis of the data reveals that there is no significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to (a) High Intelligence category (b) Average Intelligence category (c) Low Intelligence category (d) High Achievement Motivation category and (e) Average Achievement Motivation category. It shows that the pupils belonging to Tuition group and Non-tuition group of a particular Intelligence level will not have significant difference in their Achievement in Science. i.e., there is no significant improvement in the Achievement in Science of pupils availed than not availed Private Tuition for particular levels of Intelligence. The same is found in the categories of High and Average Achievement Motivation categories also. That is the Achievement in Science of high and average Achievement Motivation categories will not be influenced by Private Tuition . From the analysis, it is found that, there is significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to low Achievement Motivation category. So we predict that the pupils belonging to low Achievement Motivation category improves their Achievement in Science by receiving Private Tuition.

**4.4 RELATION BETWEEN ACHIEVEMENT IN SCIENCE AND EXTENT OF PRIVATE TUITION IN THE TUITION GROUP**

 The data collected have been analysed to examine the extent of relationships between the dependent variable 'Achievement in Science' and the independent variable 'Private Tuition ' in the tuition group. These were estimated using Pearson's Product Moment Coefficient of Correlation.

 The details of the correlation coefficient obtained between Achievement in Science and extent of Private Tuition in the tuition group is given in the Table - 14.

TABLE -14

**Correlation of Achievement in Science
and extent of Private Tuition in the tuition group**

|  |  |  |
| --- | --- | --- |
| N | r | t =  |
| 410 | 0.051 | 1.03 |

The coefficient of correlation between the variables Achievement in Science and extent of Private Tuition for the tuition group is 0.051. This shows negligible correlation between the variables.

 The correlation coefficient obtained (r = 0.05) suggest that the relation between the variables is not significant at 0.05 level as the t-value for r is less than the required (1.96) for significance at 0.05 level.

**4.5. PUPILS' ATTRIBUTED REASONS FOR AVAILING PRIVATE TUITION**

 Pupils availing Private Tuition is found to be due to different reasons. The result of the estimation of percentage of students attributing various reasons for availing Private Tuition in the rank order of percentage of incidence is summarised in Table-15.

TABLE 15

**The percentage of pupils attributed reasons for
availing Private Tuition in the rank order of percentage of incidence**

|  |  |  |
| --- | --- | --- |
| **Sl.No.** | **Reasons attributed by pupils for availing Private Tuition**  | **Percentage** |
| 1. | Because of the difficulty of the subjects | 82.48 |
| 2. | To seek help in content of the lessons | 81.20 |
| 3. | Because the pupil cannot understand the school class | 56.30 |
| 4. | To become first rank holder of the class | 46.23 |
| 5. | To attain 'notes' of the subjects | 40.40 |
| 6. | Due to the deficiency of the contents in the text books | 34.79 |
| 7. | To study lessons before teaching them in the school class | 35.30 |
| 8. | To complete school home works | 31.87 |
| 9. | To spend free times | 18.74 |
| 10. | To complete school home works there by to get appreciation from the school teachers | 18.0 |
| 11. | Due to the compulsion of the elder people in the home | 10.95 |
| 12. | To satisfy the parents | 9.90 |
| 13. | To move away from homely surrounding  | 7.79 |
| 14. | For dignity | 7.79 |
| 15. | As the friends are going for tuition | 5.35 |

 The results shows that a vast majority (82%) of pupils are received Private Tuition to seek help in the content of the lesson because of the difficulty of the subjects. About 56 percentage of the pupils receive Private Tuition because they cannot understand the school class. Other reasons attributed by pupils in the order of their percentage of incidence are, to become first rank holder of the class (46.2%), to attain notes of the subjects (40.4), due to the deficiency of the contents in the text books (34.8%), to study lessons before teaching them in the school class (35.3) to complete school home works (31.8%), to spend free times (18.7%), to complete school home works there by get appreciation from the school teachers (18.0) due to the compulsion of the elder people in the home (10.9%), to satisfy the parents (9.9%), to move away from homely surrounding (7.8%), for dignity (7.8%), as the friends are going for tuition (5.3%).

**MAJOR FINDINGS**

 Important findings of the study are presented below.

**Comparison of Mean Scores of Achievement in Science in the Relevant categories**

1. There is significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups (C.R = 2.95) at 0.01 level

2. There is significant difference between the pupils belonging to Tuition and Non-tuition groups in their mean scores of:

 a. Achievement in Physics at 0.01 level (C.R. = 2.76)

 b. Achievement in Chemistry at 0.05 level (C.R. = 2.10)

 c. Achievement in Biology at 0.01 level (C.R. = 3.06)

3. There is no significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups when their Intelligence and Achievement Motivation are equated at 0.05 level (C.R. = 0.67).

4. There is no significant difference between the mean scores of the Achievement in Science of pupils belonging to Tuition and Non-tuition groups in :

 a. High Intelligence category (C.R = 1.68)

 b. Average Intelligence category (C.R = 1.43)

 c. Low Intelligence category (C.R. = 1.76)

5. There is no significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to:

 a. High Achievement Motivation category ( C.R. = 0.33)

 b. Average Achievement Motivation category (C.R. = 0.64)

6. There is significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to Low Achievement Motivation category at 0.05 level (C.R. = 2.04).

**Estimation of the extent of relationship between Achievement in Science and extent of Private Tuition in the Tuition group**

 There is no significant relation between Achievement in Science and extent of Private Tuition (r = 0.05, t = 1.03) even at 0.05 level.

**Reasons attributed by pupils for the availability of Private Tuition**

 The reason attributed by pupils for availing Private Tuition in the rank order of percentage of incidence is, need for help in the content of the lesson due to the difficulty of the subject (82%) the pupils cannot understand school class (56.3%) hope of first rank in the class (46.2%) need for 'notes' of the subjects (40.%), due to the deficiency of the content in the text books (34.8%) desire to study lesson before teaching them in school class (35.3%) and completion of school home works (31.8%).

**TENABILITY OF THE HYPOTHESES**

 The tenability of the hypotheses set for the study were examined in the light of the above findings.

 Hypothesis (1) states that "there is significant difference between Achievement in Science of pupils belonging to Tuition and Non-tuition groups" The findings of the study shows that there is significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups. Thus the first hypothesis is fully substantiated.

 Hypothesis (2) states that "there is no significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups equated in terms of Intelligence and Achievement Motivation". The finding of the study shows that there is no significant difference between the mean scores Achievement in Science of Intelligence and Achievement Motivation equated groups of pupils belonging to Tuition and Non-tuition groups. Thus the second hypothesis is fully substantiated.

 Hypothesis (3) states that there "is no significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to : (a) High Intelligence category (b) Average Intelligence category (c) Low Intelligence category (d) High Achievement Motivation category (e) Average Achievement Motivation category and (f) Low Achievement Motivation category." The findings of the study shows that there is no significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to (a) High Intelligence category (b) Average Intelligence category (c) Low Intelligence category (d) High Achievement Motivation category and (e) Average Achievement Motivation category. So the Hypotheses (3) - (a), (b), (c), (d) and (e) are fully substantiated. But the study found that there is significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to Low Achievement Motivation category. So the hypothesis (3-f) is rejected.

 Hypothesis (4) states that "there is significant relationship between the Achievement in Science and extent of Private Tuition in the Tuition group". The finding reveals that there is no significant relation between Achievement in Science and extent of Private Tuition . The correlation coefficient obtained for these variables are not significant at 0.05 level. Hence the hypothesis is rejected.

**SUMMARY, FINDINGS, CONCLUSIONS
AND SUGGESTIONS**

 This chapter deals with the summary of the various phases in the process of the present investigation, major findings of the study, conclusion educational implications and suggestions for further study.

**5.1 STUDY IN RETROSPECT**

 The present investigation was entitled as "INFLUENCE OF PRIVATE TUITION ON ACHIEVEMENT IN SCIENCE AMONG SECONDARY SCHOOL PUPILS OF KERALA".

**5.1.1 Variables**

 The study was designed as non-experimental comparative study using Achievement in Science as the dependent variable, Private Tuition as the independent variable and Intelligence and Achievement Motivation as control variables.

**5.1.2 Objectives**

 The objectives of the present study are the following.

1. To find out whether there exists significant difference between the mean scores of Achievement in Science of the pupils belonging to Tuition and Non-tuition groups.

2. To find out whether there exists significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups equated in terms of Intelligence and Achievement Motivation.

3. To find out whether there exists significant difference between the mean scores of Achievement in Science of Tuition and Non-tuition groups of pupils belonging to:

 a) High Intelligence category

 b) Average Intelligence category

 c) Low Intelligence category

 d) High Achievement Motivation category

 e) Average Achievement Motivation category

 f) Low Achievement Motivation category.

4. To find out the extent of relationship between Achievement in Science and extent of tuition in the Tuition group.

5. To identify pupils attributed reasons for availing Private Tuition .

**5.1.3 Hypotheses**

1. There is significant difference between the mean scores of Achievement in Science of the pupils belonging to Tuition and Non-tuition groups.

2. There is no significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups equated in terms of Intelligence and Achievement Motivation.

3. There is no significant difference between the mean scores of Achievement in Science of Tuition and Non-tuition groups of pupils belonging to:

 a) High Intelligence category

 b) Average Intelligence category

 c) Low Intelligence category

 d) High Achievement Motivation category

 e) Average Achievement Motivation category

 f) Low Achievement Motivation category.

4. There is significant relationship between the Achievement in science and extent of Private Tuition in the Tuition group.

**Sample**

 The sample for the study includes 664 pupils of standard IX of Kozhikode Revenue District. Using the stratified random sampling method with optimum allocation to ensure the variability of Private Tuition score, the sample is drawn. Appropriate representations are given to factors like sex of the pupil, locale of the school and type of management of the schools. Boys and girls have equal weightage in the sample.

**5.1.5 Tools**

The following are the tools used for the purpose of the study.

1) Verbal Group Test of Intelligence (Sudeesh Kumar, P.K., Hammed, A. and Prasanna, A., 1997).

2) Scale of Achievement Motivation (Pillai & Salim, 1992)

3) Test of Achievement in Science (developed for the study)

4) A questionnaire on Tutoring (developed for the study)

**5.1.6 Statistical techniques used**

 The major statistical techniques used for analysis are:

1. Preliminary statistics

2. Two-tailed test of significance of difference between means (for independent sample)

3. Pearson's Product Moment Coefficient of Correlation.

**5.2 MAJOR FINDINGS**

 Important findings of the study are presented below.

**5.2.1 Comparison of Mean Scores of Achievement in Science in the Relevant categories**

1. There is significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups (C.R = 2.95) at 0.01 level

2. There is significant difference between the pupils belonging to Tuition and Non-tuition groups in their mean scores of:

 a. Achievement in Physics at 0.01 level (C.R. = 2.76)

 b. Achievement in Chemistry at 0.05 level (C.R. = 2.10)

 c. Achievement in Biology at 0.01 level (C.R. = 3.06)

3. There is no significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups when their Intelligence and Achievement Motivation are equated at 0.05 level (C.R. = 0.67).

4. There is no significant difference between the mean scores of the Achievement in Science of pupils belonging to Tuition and Non-tuition groups in :

 a. High Intelligence category (C.R = 1.68)

 b. Average Intelligence category (C.R = 1.43)

 c. Low Intelligence category (C.R. = 1.76)

5. There is no significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to:

 a. High Achievement Motivation category ( C.R. = 0.33)

 b. Average Achievement Motivation category (C.R. = 0.64)

6. There is significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to Low Achievement Motivation category at 0.05 level (C.R. = 2.04).

**5.2.2 Estimation of the extent of relationship between Achievement in Science and extent of Private Tuition in the Tuition group**

 There is no significant relation between Achievement in Science and extent of Private Tuition (r = 0.05, t = 1.03) even at 0.05 level.

**5.2.3. Reasons attributed by pupils for the availability of Private Tuition**

 The reason attributed by pupils for availing Private Tuition in the rank order of percentage of incidence is, need for help in the content of the lesson due to the difficulty of the subject (82%) the pupils cannot understand school class (56.3%) hope of first rank in the class (46.2%) need for 'notes' of the subjects (40.%), due to the deficiency of the content in the text books (34.8%) desire to study lesson before teaching them in school class (35.3%) and completion of school home works (31.8%).

**5.3 TENABILITY OF THE HYPOTHESES**

 The tenability of the hypotheses set for the study were examined in the light of the above findings.

 Hypothesis (1) states that "there is significant difference between Achievement in Science of pupils belonging to Tuition and Non-tuition groups" The findings of the study shows that there is significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups. Thus the first hypothesis is fully substantiated.

 Hypothesis (2) states that "there is no significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups equated in terms of Intelligence and Achievement Motivation". The finding of the study shows that there is no significant difference between the mean scores Achievement in Science of Intelligence and Achievement Motivation equated groups of pupils belonging to Tuition and Non-tuition groups. Thus the second hypothesis is fully substantiated.

 Hypothesis (3) states that there "is no significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to : (a) High Intelligence category (b) Average Intelligence category (c) Low Intelligence category (d) High Achievement Motivation category (e) Average Achievement Motivation category and (f) Low Achievement Motivation category." The findings of the study shows that there is no significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to (a) High Intelligence category (b) Average Intelligence category (c) Low Intelligence category (d) High Achievement Motivation category and (e) Average Achievement Motivation category. So the Hypotheses (3) - (a), (b), (c), (d) and (e) are fully substantiated. But the study found that there is significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to Low Achievement Motivation category. So the hypothesis (3-f) is rejected.

 Hypothesis (4) states that "there is significant relationship between the Achievement in Science and extent of Private Tuition in the Tuition group". The finding reveals that there is no significant relation between Achievement in Science and extent of Private Tuition . The correlation coefficient obtained for these variables are not significant at 0.05 level. Hence the hypothesis is rejected.

**5.4. CONCLUSION**

 The present study was analysed on the basis of set objectives. The findings of the analysis can be concluded as follows.

 The investigator found that there is significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups. The significance difference between the means scores of Achievement of pupils belonging to Tuition and Non-tuition groups were found in the subjects - Physics, Chemistry and Biology also. But it is notable that the Intelligence and Achievement Motivation of the pupils who availed Private Tuition is comparatively higher than that of Non-tuition group. When the Intelligence and Achievement Motivation of the Tuition and Non-tuition groups are equated, the studies revealed that the Achievement in Science, does not differ in the two groups. It means that the Private Tuition will not improve the Achievement in Science of the pupils of a given Intelligence and Achievement Motivation. The analysis of mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to particular levels of Intelligence and Achievement Motivation, helps to predict that there is no significant difference between the Achievement in Science of pupils of Tuition and Non-tuition groups belonging to any particular levels of Intelligence and Achievement Motivation. But in low Achievement Motivation category, there is significant difference between the Achievement in Science of pupils of Tuition and Non-tuition groups. It means that the pupils belonging to Low Achievement Motivation category improve their Achievement in Science by receiving Private Tuition. The findings of the study conforms with that of Kenny & Stone (2000) and Kulik, Bengert-Drown & Kulik (1984) that coaching do not provide any added advantage to highly able students. The observation of the present study that there is no advantage even for low ability students due to Private Tuition in their achievement, is against the results reported by Kulik, Bergert-Drown & Kulik (1984). But here it was found that pupils with low Achievement Motivation, not low ability students, gain more.

 The analysis showed that there is no relation between the extent of Private Tuition and Achievement in Science. That is the intensity of Private Tuition availed will not influence the Achievement in Science.

 Generally, the obtained results indicate that pupils received and not received Private Tuition perform equally in Science Achievement. This conclusion goes along with the observation that coached and uncoached students perform equally in most of the subjects (Kenny & Faunce, 2004; Kenny & Stone, 2000; Achuff & Lila, 1988; Gastright, 1983; Snedecor, 1989; Bekcer, 1990; Witt, Al-Abdulla & Ross, 1994).

 The main reasons attributed by pupils for availing Private Tuition in the rank order of percentage of incidence is, need for help in content of the lesson because of difficulty of the subjects (82%) the pupils cannot understand school class (56.3%) hope of first rank in the class (46.2%) need for 'notes' of the subjects (40.4%), the deficiency of the content in the text books (34.8%) desire to study lesson before teaching them in school class (35.3%) and completion of school home works (31.8%).

**5.5 EDUCATIONAL IMPLICATIONS OF THE STUDY**

 This study examined the influence of Private Tuition on Achievement in Science among secondary school pupils of Kerala. The general conclusion of this study is that the Private Tuition intended for improvement of performance or achievement is generally not so effective. Results indicate that the pupils who received Private Tuition in Science, perform a little more the pupils who did not receive it. After keeping the Intelligence and Achievement Motivation of the pupils constant, the Achievement in Science of the pupils who received Private Tuition and those who did not receive shows no significant difference. That is, the pupils who received Private Tuition did not perform better than pupils who had not received it, if they are of same Intelligence and Achievement Motivation. It was noted that pupils who received Private Tuition generally had high Intelligence than the pupils who were not availed it.

 Pupils belonging to Tuition and Non-tuition groups of the same Intelligence category and Achievement Motivation category did not show significant difference in their Achievement in Science. i.e., Private Tuition will not improve the Achievement in Science of pupils of the same Intelligence category and same Achievement Motivation category. But the pupils of low Achievement Motivation category show significant improvement in their Achievement in Science by receiving Private Tuition. So it can be interpreted that the pupils of low Achievement Motivation should get enough care in school classes, thereby they can improve their Achievement in Science. Thus the need of Private Tuition in the present teaching-learning process is not significant. So one can really question the system of Private Tuition .

 Also the study reveals that the intensity of Private Tuition availed will not improve Achievement in Science. So the time spent for Private Tuition is in vain. The people should be aware of the impact of tuition and its discrepancy in the society. The main reasons attributed by pupils for availing Private Tuition are, need of help in content of the lesson due to difficulty in subjects, the pupils cannot understand the school class, hope of first rank in the class and desire to study lessons before teaching them in school class. Based on these reasons, the investigator predicts that the school classes should be interesting, motivating, explaining, corrective for the satisfaction of the learners.

**5.6 SUGGESTIONS FOR FURTHER RESEARCH**

 The present study throws light on a number of new areas to be covered by future researchers. Such studies will give complete picture of the area under investigation. Subsequent studies will need to define, address and control for the adequacy of the Private Tuition received by pupils. Some future study topics are suggested below.

1. Influence of Private Tuition on Achievement in Social Science among secondary school pupils.

2. An experimental study on the effect of Private Tuition .

3. Effects of coaching on test taking skills.

4. Influence of Private Tuition on Academic Achievement of secondary school pupils.

5. A study on the attitude of parents and teachers on Private Tutoring.

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**S U M M A R Y**

 It is education that determines the level of prosperity, welfare and security of the people. In India, the social inequalities, to a large extent, can be traced back to the educational standard of the individuals living in that society. Education is the life blood from which the individuals constituting the society and the nation comprising the societies, derive its strength to go up in the ladder of the progress. If the life blood can be provided to all in the same and equal degree it will bring about a uniform progress to the society and nation too. It is the responsibility of the educational system to bring the different social classes and groups together and thus promote the emergence of an egalitarian and integrated society. But at present instead of doing so education itself is tending to increase social segregation and perpetuate and widen class distinctions. Instead of trying to provide good education to all children, or at least to the able children from every stratum of society, it is available to small minority which is usually selected not on the basis of talent, but on the basis of its capacity to pay fees. (Kothari Commission). One of the disparity existing in the field of education is the availability of Private Tuition.

 The system of private tuition has been in existence in India for a fairly long time. During the pre-independent period and early years of post-independent period, the system by large was meant for the students who could not enroll themselves in regular schools and colleges either because of their non-availability within a reasonable distance from their place of living or because of financial constraints or social taboos. In the case of regular students, private tuition was a rare phenomenon as there was a general impression that only academically weak or dull students received tuition to make up their deficiencies. Apprehencing negative publicity about their calibre, the students receiving tuition preferred to hide the fact from their classmates and teachers (Arora, 2002).

 During the last three decades, the private tuition scenario has undergone a see-change in tune with changing composition and character of society. Earlier the students of 'board' classes only thought of receiving tuition but now a days children started tuition from early classes onwards. Earlier it was an urban phenomenon but now a days it is being accepted as a necessity even in small towns and villages. Instead of being perceived as an indicator of 'dullness' it is now perceived not only a matter of necessity but also as a symbol of pride and social prestige. The necessity of weak students has now become the universal necessity of all students-weak, average, bright because every student is keen to further improve his score.

 We have not succeeded in universalising elementary education but private tuition has become near universal, particularly among the middle class in urban and semi-urban areas. The journey of the system from a social and academic taboo to a widely practised and accepted reality has been guided by the market forces drawing their sustenance from the competitive ethos of the present day society. The spirit of competition has been exacerbated by the mismatch between the number of aspirants and the limited spaces available at the academic ladder. The parents incur extra expenditure on the private tuition of their wards in the hope that it shall bring them high returns in the future. In some of the cases tuition is not needed but it is still arranged because of the satisfaction it provides to the students and their parents that they are doing their utmost to meet the challenge of examination. It is often alleged that students are left with no other alternative but to arrange private tuition because they are not properly taught by their teachers in the school. It may be true in some cases but it cannot be generalised to all situations (Arora, 2002).

 Also instances were observed where schools claimed to allow private tuition. Though schools did not overtly commit to the practice of private tuition but students shared that majority of them were taking private tuition. This causes another issue whether all the quality schools were performing better because of private tuition. Middle class families and even economically weak families with high educational aspirations are spending money on tuition. School-based extra coaching, at times, have this hidden element.

 It is seen that pupils of government, government aided and often unaided school pupils take tuition. The result of various schools are considerably varying with tuition. Selection of tuition by pupils is due to different reasons. Schools may not have adequate staff, the staff may not be competent. Also it is renowned that tuition is a symbol of pride and social prestige. It has become a shadow of educational system in most of the societies.

**NEED AND SIGNIFICANCE**

 The Private Tuition is a phenomenon that is yet to receive proper attention of researchers, educational planners and decision makers (NIEPA, 2002). It has become a part of the educational environment, to such an extent that nobody readily question its existence. In recent years, there has been a phenomenal increase in number of private teaching places in India. They operate outside the system of formal education, i.e., the education given in government owned or non-government schools and colleges. These teaching places exist parallel to the regular schools and colleges and individual teachers giving tuition at home. Private Tuition is the product of changing socio economic complex. Various factors combine to push students to the coaching institution. Examination oriented teaching, affective security, gregariousness, escape from monotony and distractions at home etc. are the some factors (Singh, 1996).

 The implication of coaching for educational practice are significant. First, if tutoring is effective, failure to provide tutoring to students who cannot afford the fee for Private Tuition creates social inequalities in educational opportunities because those who receive tutoring will more likely gain academic achievement. Second, the hours spent in after school tutoring may prevent students from engaging in other developmental activities such as play, socialising with peers, sports and extra curricular activities necessary for development of well adjusted and creative adults. Third, pupils who attended tutoring centres that taught the school curriculum ahead of the school were in attentive and uninvolved in class because they perceived that they had already covered the material at the tutoring place. Also they will become nuisance to other classmates and often for teachers in the school (Kenny and Faunce, 2004).

 A study report on quality profiles of secondary schools conducted by NIEPA, 2002 observed that, an area of future exploration is to review the position of private tuition. Is tuition bad in itself or is it the examination orientation that is leading to make private tuition a common practice rather than need based support in special circumstances. If this parallel system with poor facilities and less cost can deliver good education, then why do we need schools? Hence time has come to seriously review policy position on private tuition. It also has implication for financing secondary education. Should it be free or parents be made to pay for 'quality'? These issues cannot be resolved by a single study as private tuition is a deliberate choice of parents as well as a process emerging out of social and economic pressures (NIEPA, 2002).

 In connection with the new paradigm change in school education which is being brought about in Kerala, there is a shift in the traditional system of exam oriented, information gathering, memory testing educational practice. The new system is said to be activity based, developing the meta- cognition, critical thinking and such higher order abilities. Irrespective of those changes, there is no evident shift from time and resources spent on Private Tuition by students and parents. Also the present system of private tuition pulls the pupils to the traditional learning process.

 At this time we want to know how private tuition is influencing achievement in various subjects. As it is a common phenomenon in secondary school in all over Kerala, the study confines there. Researcher being a science student, he is interested in science achievement. So the study explores whether the students who received and not received tuition are differing in their achievement in science. In other words, whether private tuition makes a significant impact on science achievement of those spending time and resource on it.

 Yet another justification often made is that the students who receive private tuition are academically or intelligently backward than those who have made any special arrangement for extra learning. So the private tuition help to compensate their comparative 'backwardness'. Those who are not in favour of private tuition views the problem differently. High achievers of schools are highly motivated to learn. The pupils who have high achievement motivation need not get any arrangement of tutoring. They shall learn their maximum with class room assistance at school and in accordance to their pace. So the researcher intends to know the influence of private tuition on science achievement in 'intelligence and achievement motivation equated groups' of pupils.

 Adoption of tuition by pupils is due to different reasons. Schools may not have adequate staff, exam oriented teaching, gregariousness, escape from monotony etc. are some known reasons. So the researcher intends to know what in the special situation in Kerala are the reasons attributed by pupils for which they are receiving tuition.

 Hence the study is an attempt to find the influence of private tuition on science achievement among secondary school pupils.

**STATEMENT OF THE PROBLEM**

 The problem of the present investigation is entitled as "INFLUENCE OF PRIVATE TUITION ON ACHIEVEMENT IN SCIENCE AMONG SECONDARY SCHOOL PUPILS OF KERALA".

**DEFINITION OF KEY TERMS**

**Private Tuition**

 For the present study, Private Tuition is defined as the tutoring, coaching or study help on science subjects during other than school time, but excluding the special classes arranged by the school teachers and parental assistance for the study. The time spent for the tutoring is taken as the index of Private Tuition. It may vary from having no tuition to various durations in any or all the three subjects viz., Physics, Chemistry, Biology.

**Achievement in Science**

 It is the accomplishment or proficiency of performance in science which includes Physics, Chemistry and Biology as measured by a standardised test in science.

**Secondary School Pupils**

Secondary school pupils are the pupils studying in standard VIII, IX and X in the Kerala syllabus. In this study only pupils studying in IX standard are taken as the accessible population of the study.

**VARIABLES OF THE STUDY**

 The present investigation has the following dependent, independent and control variables.

**Dependent Variable**

 The Dependent Variable of the study is Achievement in Science.

**Independent Variable**

The Independent Variables of the study is Private Tuition

**Control Variables**

 In the present study, Intelligence and Achievement Motivation are considered as control variables.

**OBJECTIVES OF THE STUDY**

 The objectives of the present study are the following.

1. To find out whether there exists significant difference between the mean scores of Achievement in Science of the pupils belonging to Tuition and Non-tuition groups.

2. To find out whether there exists significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups equated in terms of Intelligence and Achievement Motivation.

3. To find out whether there exists significant difference between the mean scores of Achievement in Science of Tuition and Non-tuition groups of pupils belonging to:

 a) High Intelligence category

 b) Average Intelligence category

 c) Low Intelligence category

 d) High Achievement Motivation category

 e) Average Achievement Motivation category

 f) Low Achievement Motivation category.

4. To find out the extent of relationship between Achievement in Science and extent of tuition in the Tuition group.

5. To identify pupils attributed reasons for availing Private Tuition.

**HYPOTHESES OF THE STUDY**

1. There is significant difference between the mean scores of Achievement in Science of the pupils belonging to Tuition and Non-tuition groups.

2. There is no significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups equated in terms of Intelligence and Achievement Motivation.

3. There is no significant difference between the mean scores of Achievement in Science of Tuition and Non-tuition groups of pupils belonging to:

 a) High Intelligence category

 b) Average Intelligence category

 c) Low Intelligence category

 d) High Achievement Motivation category

 e) Average Achievement Motivation category

 f) Low Achievement Motivation category.

4. There is significant relationship between the Achievement in science and extent of Private Tuition in the Tuition group.

**METHODOLOGY**

 The present investigation is designed as a non-experimental comparative study. The Methodology of the study is described under the following headings.

**Sample**

 The sample for the present study includes 664 pupils of standard IX of Kozhikode District. Stratified random sampling with optimum allocation technique was used for the selection of the sample. This technique was chosen because the population selected is composed of subgroups or strata based on sex, locale, type of management of schools, so that representative sample must contain individuals from each strata in accordance with the size of the sub groups. Also, the investigator had to obtain adequate number of elements in Tuition and Non-uition groups

**Tools**

 The following are the tools used for the purpose of the study.

1. Verbal Group Test of Intelligence (Sudheesh Kumar, P.K., Hameed, A., and Prasanna, A.,1997)

2. Scale of Achievement Motivation (Pillai & Salim, 1992)

3. Test of Achievement in Science (Developed for the study)

4. A Questionnaire on Tutoring (Developed for the study)

**Statistical Techniques used for Analysis**

The major statistical techniques used for the analysis are:

1. Preliminary statistics.

2. Two tailed test of significance of difference between means (for independent samples)

3. Pearson's product moment coefficient of correlation 'r'.

**SCOPE AND LIMITATIONS OF THE STUDY**

 The present study is an attempt to find out the influence of Private Tuition on Achievement in Science among secondary school pupils of Kerala.

 The study will reveal whether there is significant difference in the achievement in Science of IXth standard pupils receiving and not receiving tuition in the Science subjects. Apart from comparing the Tuition and Non-tuition groups for their total science achievement, the study analyses whether the influence of having tuition is making significant difference separately in Physics, Chemistry and Biology achievements. The present study will also find out the strength of relationship between the extent of tuition availed and the achievement in science.

 The study examines whether the impact of tuition on achievement in science, if any, exists when the intelligence and achievement motivation level of Tuition and Non-tuition groups are matched. Besides these, the present study investigates the dynamics of tuition in science subjects. i.e., why the pupils opt for tuition.

 The study was conducted on a stratified random sample with optimum allocation of 664 IXth standard pupils of Kozhikode Revenue District. The sample includes sufficient number of pupils belonging to tuition and non-tuition groups. Though the sample of the study is restricted to a particular grade and district, the investigator hopes that the findings can be generalized to other grades, districts and even subjects other than science.

 The tools used in the study are having satisfactory validity and reliability to measure the variables.

 Even though every attempt was made to make the study as precise and objective as possible, the following limitation were identified by the investigator for the present study.

1. Though the problem is stated as Influence of Private Tuition on Achievement in Science among Secondary School Pupils of Kerala, it uses a non-experimental comparative design. The independent variable is not manipulated by the investigator.

2. The sample for the present study is chosen from Kozhikode Revenue district only. The limited time and inconveniences held back the investigator from conducting the study on a wider sample.

3. The sample for the present study was limited to one educational level, i.e., standard IX only due to practical reasons. This was done with the notion that standard IX will reasonably represents Standard VIII, IX and X of secondary school.

4. Only multiple choice test items based on Bloom's taxonomy of educational objectives were included in the test of Achievement in science.

5. It is rarely possible for one to randomly assign pupils to conditions such as Private Tuition because of the insurmountable logistical problems associated with such an endeavour. Although we could ascertain with considerable accuracy the type of, reason for, and amount of intensity of Private Tuition received by the participating pupils, it was not possible to control for the quality of the tuition received.

**ORGANISATION OF THE REPORT**

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

 Chapter II comprises studies related to Private Tuition or Coaching and conclusion of review.

 In Chapter III, methodology of study is described in detail consisting of the variables, objectives, hypotheses of the study, tools used for the study, selection of sample, data collection procedure, scoring procedure and statistical techniques used for analysis of data.

 Statistical analysis of data and discussion of results, findings of the study as per the objectives of the study are given in Chapter IV.

 Chapter V gives the summary of the study, major findings, tenability of hypotheses, conclusions, educational implications and some suggestions for further research in this area.

**MAJOR FINDINGS**

 Important findings of the study are presented below.

**Comparison of Mean Scores of Achievement in Science in the Relevant categories**

1. There is significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups (C.R = 2.95) at 0.01 level

2. There is significant difference between the pupils belonging to Tuition and Non-tuition groups in their mean scores of:

 a. Achievement in Physics at 0.01 level (C.R. = 2.76)

 b. Achievement in Chemistry at 0.05 level (C.R. = 2.10)

 c. Achievement in Biology at 0.01 level (C.R. = 3.06)

3. There is no significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups when their Intelligence and Achievement Motivation are equated at 0.05 level (C.R. = 0.67).

4. There is no significant difference between the mean scores of the Achievement in Science of pupils belonging to Tuition and Non-tuition groups in :

 a. High Intelligence category (C.R = 1.68)

 b. Average Intelligence category (C.R = 1.43)

 c. Low Intelligence category (C.R. = 1.76)

5. There is no significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to:

 a. High Achievement Motivation category ( C.R. = 0.33)

 b. Average Achievement Motivation category (C.R. = 0.64)

6. There is significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to Low Achievement Motivation category at 0.05 level (C.R. = 2.04).

**Estimation of the extent of relationship between Achievement in Science and extent of Private Tuition in the Tuition group**

 There is no significant relation between Achievement in Science and extent of Private Tuition (r = 0.05, t = 1.03) even at 0.05 level.

**Reasons attributed by pupils for the availability of Private Tuition**

 The reason attributed by pupils for availing Private Tuition in the rank order of percentage of incidence is, need for help in the content of the lesson due to the difficulty of the subject (82%) the pupils cannot understand school class (56.3%) hope of first rank in the class (46.2%) need for 'notes' of the subjects (40.%), due to the deficiency of the content in the text books (34.8%) desire to study lesson before teaching them in school class (35.3%) and completion of school home works (31.8%).

**TENABILITY OF THE HYPOTHESES**

 The tenability of the hypotheses set for the study were examined in the light of the above findings.

 Hypothesis (1) states that "there is significant difference between Achievement in Science of pupils belonging to Tuition and Non-tuition groups" The findings of the study shows that there is significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups. Thus the first hypothesis is fully substantiated.

 Hypothesis (2) states that "there is no significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups equated in terms of Intelligence and Achievement Motivation". The finding of the study shows that there is no significant difference between the mean scores Achievement in Science of Intelligence and Achievement Motivation equated groups of pupils belonging to Tuition and Non-tuition groups. Thus the second hypothesis is fully substantiated.

 Hypothesis (3) states that there "is no significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to : (a) High Intelligence category (b) Average Intelligence category (c) Low Intelligence category (d) High Achievement Motivation category (e) Average Achievement Motivation category and (f) Low Achievement Motivation category." The findings of the study shows that there is no significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to (a) High Intelligence category (b) Average Intelligence category (c) Low Intelligence category (d) High Achievement Motivation category and (e) Average Achievement Motivation category. So the Hypotheses (3) - (a), (b), (c), (d) and (e) are fully substantiated. But the study found that there is significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to Low Achievement Motivation category. So the hypothesis (3-f) is rejected.

 Hypothesis (4) states that "there is significant relationship between the Achievement in Science and extent of Private Tuition in the Tuition group". The finding reveals that there is no significant relation between Achievement in Science and extent of Private Tuition . The correlation coefficient obtained for these variables are not significant at 0.05 level. Hence the hypothesis is rejected.

**CONCLUSION**

 The present study was analysed on the basis of set objectives. The findings of the analysis can be concluded as follows.

 The investigator found that there is significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups. The significance difference between the means scores of Achievement of pupils belonging to Tuition and Non-tuition groups were found in the subjects - Physics, Chemistry and Biology also. But it is notable that the Intelligence and Achievement Motivation of the pupils who availed Private Tuition is comparatively higher than that of Non-tuition group. When the Intelligence and Achievement Motivation of the Tuition and Non-tuition groups are equated, the studies revealed that the Achievement in Science, does not differ in the two groups. It means that the Private Tuition will not improve the Achievement in Science of the pupils of a given Intelligence and Achievement Motivation. The analysis of mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to particular levels of Intelligence and Achievement Motivation, helps to predict that there is no significant difference between the Achievement in Science of pupils of Tuition and Non-tuition groups belonging to any particular levels of Intelligence and Achievement Motivation. But in low Achievement Motivation category, there is significant difference between the Achievement in Science of pupils of Tuition and Non-tuition groups. It means that the pupils belonging to Low Achievement Motivation category improve their Achievement in Science by receiving Private Tuition. The findings of the study conforms with that of Kenny & Stone (2000) and Kulik, Bengert-Drown & Kulik (1984) that coaching do not provide any added advantage to highly able students. The observation of the present study that there is no advantage even for low ability students due to Private Tuition in their achievement, is against the results reported by Kulik, Bergert-Drown & Kulik (1984). But here it was found that pupils with low Achievement Motivation, not low ability students, gain more.

 The analysis showed that there is no relation between the extent of Private Tuition and Achievement in Science. That is the intensity of Private Tuition availed will not influence the Achievement in Science.

 Generally, the obtained results indicate that pupils received and not received Private Tuition perform equally in Science Achievement. This conclusion goes along with the observation that coached and uncoached students perform equally in most of the subjects (Kenny & Faunce, 2004; Kenny & Stone, 2000; Achuff & Lila, 1988; Gastright, 1983; Snedecor, 1989; Bekcer, 1990; Witt, Al-Abdulla & Ross, 1994).

 The main reasons attributed by pupils for availing Private Tuition in the rank order of percentage of incidence is, need for help in content of the lesson because of difficulty of the subjects (82%) the pupils cannot understand school class (56.3%) hope of first rank in the class (46.2%) need for 'notes' of the subjects (40.4%), the deficiency of the content in the text books (34.8%) desire to study lesson before teaching them in school class (35.3%) and completion of school home works (31.8%).

**EDUCATIONAL IMPLICATIONS OF THE STUDY**

 This study examined the influence of Private Tuition on Achievement in Science among secondary school pupils of Kerala. The general conclusion of this study is that the Private Tuition intended for improvement of performance or achievement is generally not so effective. Results indicate that the pupils who received Private Tuition in Science, perform a little more the pupils who did not receive it. After keeping the Intelligence and Achievement Motivation of the pupils constant, the Achievement in Science of the pupils who received Private Tuition and those who did not receive shows no significant difference. That is, the pupils who received Private Tuition did not perform better than pupils who had not received it, if they are of same Intelligence and Achievement Motivation. It was noted that pupils who received Private Tuition generally had high Intelligence than the pupils who were not availed it.

 Pupils belonging to Tuition and Non-tuition groups of the same Intelligence category and Achievement Motivation category did not show significant difference in their Achievement in Science. i.e., Private Tuition will not improve the Achievement in Science of pupils of the same Intelligence category and same Achievement Motivation category. But the pupils of low Achievement Motivation category show significant improvement in their Achievement in Science by receiving Private Tuition. So it can be interpreted that the pupils of low Achievement Motivation should get enough care in school classes, thereby they can improve their Achievement in Science. Thus the need of Private Tuition in the present teaching-learning process is not significant. So one can really question the system of Private Tuition .

 Also the study reveals that the intensity of Private Tuition availed will not improve Achievement in Science. So the time spent for Private Tuition is in vain. The people should be aware of the impact of tuition and its discrepancy in the society. The main reasons attributed by pupils for availing Private Tuition are, need of help in content of the lesson due to difficulty in subjects, the pupils cannot understand the school class, hope of first rank in the class and desire to study lessons before teaching them in school class. Based on these reasons, the investigator predicts that the school classes should be interesting, motivating, explaining, corrective for the satisfaction of the learners.

**SUGGESTIONS FOR FURTHER RESEARCH**

 The present study throws light on a number of new areas to be covered by future researchers. Such studies will give complete picture of the area under investigation. Subsequent studies will need to define, address and control for the adequacy of the Private Tuition received by pupils. Some future study topics are suggested below.

1. Influence of Private Tuition on Achievement in Social Science among secondary school pupils.

2. An experimental study on the effect of Private Tuition .

3. Effects of coaching on test taking skills.

4. Influence of Private Tuition on Academic Achievement of secondary school pupils.

5. A study on the attitude of parents and teachers on Private Tutoring.

**SUMMARY, FINDINGS, CONCLUSIONS
AND SUGGESTIONS**

 This chapter deals with the summary of the various phases in the process of the present investigation, major findings of the study, conclusion educational implications and suggestions for further study.

**5.1 STUDY IN RETROSPECT**

 The present investigation was entitled as "INFLUENCE OF PRIVATE TUITION ON ACHIEVEMENT IN SCIENCE AMONG SECONDARY SCHOOL PUPILS OF KERALA".

**5.1.1 Variables**

 The study was designed as non-experimental comparative study using Achievement in Science as the dependent variable, Private Tuition as the independent variable and Intelligence and Achievement Motivation as control variables.

**5.1.2 Objectives**

 The objectives of the present study are the following.

1. To find out whether there exists significant difference between the mean scores of Achievement in Science of the pupils belonging to Tuition and Non-tuition groups.

2. To find out whether there exists significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups equated in terms of Intelligence and Achievement Motivation.

3. To find out whether there exists significant difference between the mean scores of Achievement in Science of Tuition and Non-tuition groups of pupils belonging to:

 a) High Intelligence category

 b) Average Intelligence category

 c) Low Intelligence category

 d) High Achievement Motivation category

 e) Average Achievement Motivation category

 f) Low Achievement Motivation category.

4. To find out the extent of relationship between Achievement in Science and extent of tuition in the Tuition group.

5. To identify pupils attributed reasons for availing Private Tuition .

**5.1.3 Hypotheses**

1. There is significant difference between the mean scores of Achievement in Science of the pupils belonging to Tuition and Non-tuition groups.

2. There is no significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups equated in terms of Intelligence and Achievement Motivation.

3. There is no significant difference between the mean scores of Achievement in Science of Tuition and Non-tuition groups of pupils belonging to:

 a) High Intelligence category

 b) Average Intelligence category

 c) Low Intelligence category

 d) High Achievement Motivation category

 e) Average Achievement Motivation category

 f) Low Achievement Motivation category.

4. There is significant relationship between the Achievement in science and extent of Private Tuition in the Tuition group.

**Sample**

 The sample for the study includes 664 pupils of standard IX of Kozhikode Revenue District. Using the stratified random sampling method with optimum allocation to ensure the variability of Private Tuition score, the sample is drawn. Appropriate representations are given to factors like sex of the pupil, locale of the school and type of management of the schools. Boys and girls have equal weightage in the sample.

**5.1.5 Tools**

The following are the tools used for the purpose of the study.

1) Verbal Group Test of Intelligence (Sudeesh Kumar, P.K., Hammed, A. and Prasanna, A., 1997).

2) Scale of Achievement Motivation (Pillai & Salim, 1992)

3) Test of Achievement in Science (developed for the study)

4) A questionnaire on Tutoring (developed for the study)

**5.1.6 Statistical techniques used**

 The major statistical techniques used for analysis are:

1. Preliminary statistics

2. Two-tailed test of significance of difference between means (for independent sample)

3. Pearson's Product Moment Coefficient of Correlation.

**5.2 MAJOR FINDINGS**

 Important findings of the study are presented below.

**5.2.1 Comparison of Mean Scores of Achievement in Science in the Relevant categories**

1. There is significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups (C.R = 2.95) at 0.01 level

2. There is significant difference between the pupils belonging to Tuition and Non-tuition groups in their mean scores of:

 a. Achievement in Physics at 0.01 level (C.R. = 2.76)

 b. Achievement in Chemistry at 0.05 level (C.R. = 2.10)

 c. Achievement in Biology at 0.01 level (C.R. = 3.06)

3. There is no significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups when their Intelligence and Achievement Motivation are equated at 0.05 level (C.R. = 0.67).

4. There is no significant difference between the mean scores of the Achievement in Science of pupils belonging to Tuition and Non-tuition groups in :

 a. High Intelligence category (C.R = 1.68)

 b. Average Intelligence category (C.R = 1.43)

 c. Low Intelligence category (C.R. = 1.76)

5. There is no significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to:

 a. High Achievement Motivation category ( C.R. = 0.33)

 b. Average Achievement Motivation category (C.R. = 0.64)

6. There is significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to Low Achievement Motivation category at 0.05 level (C.R. = 2.04).

**5.2.2 Estimation of the extent of relationship between Achievement in Science and extent of Private Tuition in the Tuition group**

 There is no significant relation between Achievement in Science and extent of Private Tuition (r = 0.05, t = 1.03) even at 0.05 level.

**5.2.3. Reasons attributed by pupils for the availability of Private Tuition**

 The reason attributed by pupils for availing Private Tuition in the rank order of percentage of incidence is, need for help in the content of the lesson due to the difficulty of the subject (82%) the pupils cannot understand school class (56.3%) hope of first rank in the class (46.2%) need for 'notes' of the subjects (40.%), due to the deficiency of the content in the text books (34.8%) desire to study lesson before teaching them in school class (35.3%) and completion of school home works (31.8%).

**5.3 TENABILITY OF THE HYPOTHESES**

 The tenability of the hypotheses set for the study were examined in the light of the above findings.

 Hypothesis (1) states that "there is significant difference between Achievement in Science of pupils belonging to Tuition and Non-tuition groups" The findings of the study shows that there is significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups. Thus the first hypothesis is fully substantiated.

 Hypothesis (2) states that "there is no significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups equated in terms of Intelligence and Achievement Motivation". The finding of the study shows that there is no significant difference between the mean scores Achievement in Science of Intelligence and Achievement Motivation equated groups of pupils belonging to Tuition and Non-tuition groups. Thus the second hypothesis is fully substantiated.

 Hypothesis (3) states that there "is no significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to : (a) High Intelligence category (b) Average Intelligence category (c) Low Intelligence category (d) High Achievement Motivation category (e) Average Achievement Motivation category and (f) Low Achievement Motivation category." The findings of the study shows that there is no significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to (a) High Intelligence category (b) Average Intelligence category (c) Low Intelligence category (d) High Achievement Motivation category and (e) Average Achievement Motivation category. So the Hypotheses (3) - (a), (b), (c), (d) and (e) are fully substantiated. But the study found that there is significant difference between the mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to Low Achievement Motivation category. So the hypothesis (3-f) is rejected.

 Hypothesis (4) states that "there is significant relationship between the Achievement in Science and extent of Private Tuition in the Tuition group". The finding reveals that there is no significant relation between Achievement in Science and extent of Private Tuition . The correlation coefficient obtained for these variables are not significant at 0.05 level. Hence the hypothesis is rejected.

**5.4. CONCLUSION**

 The present study was analysed on the basis of set objectives. The findings of the analysis can be concluded as follows.

 The investigator found that there is significant difference between the mean scores of Achievement in Science of pupils belonging to Tuition and Non-tuition groups. The significance difference between the means scores of Achievement of pupils belonging to Tuition and Non-tuition groups were found in the subjects - Physics, Chemistry and Biology also. But it is notable that the Intelligence and Achievement Motivation of the pupils who availed Private Tuition is comparatively higher than that of Non-tuition group. When the Intelligence and Achievement Motivation of the Tuition and Non-tuition groups are equated, the studies revealed that the Achievement in Science, does not differ in the two groups. It means that the Private Tuition will not improve the Achievement in Science of the pupils of a given Intelligence and Achievement Motivation. The analysis of mean scores of Achievement in Science of pupils of Tuition and Non-tuition groups belonging to particular levels of Intelligence and Achievement Motivation, helps to predict that there is no significant difference between the Achievement in Science of pupils of Tuition and Non-tuition groups belonging to any particular levels of Intelligence and Achievement Motivation. But in low Achievement Motivation category, there is significant difference between the Achievement in Science of pupils of Tuition and Non-tuition groups. It means that the pupils belonging to Low Achievement Motivation category improve their Achievement in Science by receiving Private Tuition. The findings of the study conforms with that of Kenny & Stone (2000) and Kulik, Bengert-Drown & Kulik (1984) that coaching do not provide any added advantage to highly able students. The observation of the present study that there is no advantage even for low ability students due to Private Tuition in their achievement, is against the results reported by Kulik, Bergert-Drown & Kulik (1984). But here it was found that pupils with low Achievement Motivation, not low ability students, gain more.

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**5.6 SUGGESTIONS FOR FURTHER RESEARCH**

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**APPENDIX III**

**Farook Training College, Calicut**

**ACHIEVEMENT TEST IN SCIENCE** (FINAL)

**Dr. Abdul Gafoor K. Muhammad S.**

***Sr. Lecturer in Education M.Ed. Student***

***Directions***:

*1. This is a test in Physics, Chemistry and Biology. Don't write anything on the question paper. You have given separate answer sheet. Numbers of questions are arranged in the answer sheet with four distracters, A, B, C and D for marking answers. Select the most appropriate answer from the choices. Then mark 'X' against the distracters which is given in answer sheet.*

*2. If the first 'X' marked is found incorrect, darken the same distracter and put 'X' mark against your answer.*

*3. You have given limited time for each part. Start to write, when the examiner allows.*

*4. Answer for all questions.*

Example:

1. Which among the following is a compound?

 (a) Hydrogen (b) Water (c) Nitrogen (d) Oxygen

*In the answer sheet:*

X

1. (A) (B) (C) (D)

 Correct answer is water. Follow the same rule for all questions.

**PART A**

**PHYSICS**

*Time: 15 minutes*

1. Which among the following is having shortest wavelength?

 (a) Blue (b) Infra red (c) Red (d) Ultraviolet

2. By which of the phenomena, Blue colour of ocean can be described?

 (a) Dispersion (b) Scattering (c) Refraction (d) Reflection

3. The atmosphere is warmly on cloudy days. Which of the following ray is the cause for this?

 (a) X-rays (b) Infrared rays (c) Ultraviolet rays (d) Gamma rays

4. Starting with a velocity 10 m/s, a train travels with uniform acceleration of 5 m/s2. What distance it travels in 10 seconds?

 (a) 350 m (b) 35 m (c) 60 m (d) 600 m

5. A stone is tied on the rope and it rotates. In this case, which of the following is not true in the movement of the stone?

(a) Stone is in circular motion

(b) Direction of stone always changes

(c) There is no acceleration for the stone

(d The force acted on the stone is from the centre of the circle.

6. If the mass of an object doubles, the frictional force

 (a) has no change (b) becomes doubles

 (c) becomes halves (d) becomes one fourth

7. Which among the following is not true?

 The acceleration due to gravity in moon is less than that in the earth. This is due to the

 (a) lower mass of moon (b) absence of air in the moon

 (c) radius of moon is shorter (d) diameter of moon is shorter.

8. The force of attraction exerted on a body by earth is called

 (a) mass (b) acceleration (c) velocity (d) weight

9. Falling of a body towards earth due to the attraction of earth is called

 (a) Gravitation (b) Free Falling (c) Momentum (d) Acceleration

10. The orbital velocity of a planet as compared to its escape velocity always will be

 (a) less (b) high (c) equal (d) double

11. What is the required work to raise a body of mass 'm' to a height 'h'?

 (a) mg (b) mh (c) mg/h (d) mgh

12. Which is the unit of power?

 (a) Joule (b) kilogram (c) Watt (d) Newton

13. Find the Kinetic Energy acquired by a body of mass 100 kg having a velocity of 5 m/s2.

 (a) 250 J (b) 2.5 J (c) 25 J (d) 1250 J

14. The Potential Energy can be attained to a body by its

 (a) position (b) strain (c) position or strain (d) motion

15. Which law is the basis of working of a hydraulic brake?

 (a) Newton's law (b) Archemedes principle

 (c) Pascal's law (d) Law of floatation

16. Which molecular force of attraction is the cause of surface tension?

 (a) Adhesion force (b) Cohesion force (c) Viscous force

 (d) Upthrust

**PART B**

**CHEMISTRY**

*Time : 15 minutes*

1. Which is the longest period in the modern periodic table?

 (a) Fourth period (b) Fifth period (c) Sixth period

 (d) Seventh period

2. In a periodic table, if we go from left to right in period, charge of nucleus

 (a) remain the same (b) increases (c) decreases

 (d) may increase or decrease

3. Pick out the element which has more electronegativity

 (a) Fluorin (b) Clorine (c) Bromine (d) Iodine

4. The covalent bond formed by sharing a pair of electron is called

 (a) Single bond (b) Double bond (c) Multiple bond (d) Ionic bond

5. What is the chemical formula of sodium oxide?

 (a) NaO (b) Na2O (c) NaO2 (b) NaOH

6. If the difference in electronegativity of constituent elements of a chemical reaction is greater than 1.7, what will be character of their compound?

 (a) Covalent character (b) Ionic character

 (c) Magnetic property (d) None of these

7. The size of the metallic atoms as compared to non-metallic atom is

 (a) greater (b) less (c) greater or less (d) equal

8. What is the chemical name of caustic soda?

 (a) NaCO3 (b) NaHCO3 (c) NaOH (d) CaO

9. Which of the following cleaning substance is made using petroleum products?

 (a) Soap (b) Toilet soap (c) Detergent (d) All of these

10. The intermediate compound formed when the reactants are transformed to product in a chemical reaction are:

 (a) Ctalyst (b) Activated complex (c) Ions (d) Products

11. Which among the following is to a factor which depends the rate of reaction.

 (a) Concentration of reactants (b) Pressure (c) Catalyst

 (d) None of these

12. Charcoal is used to remove foul gases from petroleum products. Which property of the charcoal is used here?

 (a) Adsorption (b) Catenation (c) Allotropy

 (d) Non-metallic property

13. Carbonic acid of soda water includes in the category of

 (a) monobasic (b) dibasic (c) tribasic (d) polybasic

14. Which among the following will not expel carbon dioxide on decomposition?

 (a) CaCO3 (b) MgCO3 (c) NaCO3 (d) NaHCO3

15. The ability of carbon to form interlinked chains or rings of different size is called

 (a) isomerism (b) lactation (c) catenation (d) paraffins

16. Which among the following is an example for saturated hydrocarbons?

 (a) alkanes (b) alkenes (c) alkynes (c) all of these

**PART C**

**BIOLOGY**

*Time: 15 minutes*

1. Which agricultural method efficiently makes use of variations in the availability of light?

 (a) group farming (b) crop rotation (c) mixed croping

 (d) all of these

2. Which enzyme converts carbohydrates to maltose in the food we eat?

 (a) Trypsin (b) Lipase (c) Maltase (d) Amylase

3. Which of the following is the most appropriate statement?

 (a) No animals without plants (b) No heterotrophs without plants

 (c) Man can live without plants (d) No other living being without man

4. Pick out the one, which is not the function of muscular system

 (a) To give beauty to the body (b) To help in body movement

 (c) To produce heat (d) To protect internal organs

5. Which of the following statement is correct regarding the Saprophytes?

 (a) They absorbs nutrients from substances

 (b) They absorbs nutrients from aquatic animals

 (c) They absorbs nutrients from dead cells

 (d) They absorbs nutrients from living and on-living cells.

6. How does essential water enter the plants?

 (a) By osmosis (b) By exosmosis (c) By diffusion

 (d) By osmosis and diffusion

7. Which movement in the oesophagus is in the form of waves?

 (a) Hepatitis (b) Dialysis (c) Paralysis (d) Peristalsis

8. Which among the following statement is incorrect?

 (a) Amoeba is an aquatic organism

 (b) Amoeba is an acellular organism

 (c) Amoeba is a heterotroph (d) Amoeba is a micro organism

9. Which is the most suitable explanation for shrinking of the mango when salted?

 (a) Exosmosis (b) Endosmosis (c) Plasmolysis (d) Glycolysis

10. Which is an example for anaerobic organism?

 (a) Amphibian (b) Yeast (c) Plants (d) Virus

11. If curly hair is a dominant character and straight hair is a recessive character, then what will be the nature of the hair of the four children having straight haired father and curly haired mother.

 (a) All the four have straight hair (b) All the four have curly hair

 (c) Two of them have straight hair and two of them have curly hair

 (d) Three of them have curly hair and one have straight hair.

12. What is the method used for the conservation of living species forever?

 (a) Prevention of de-forestation (b) protection of gene pool

 (c) Prohibition of hunting (d) Establishment of national park.

13. The scientific name of lion is *Panthera leo* and that of tiger is *Panthera tigris*. What could be inferred from this?

 (a) Both belong to the same species

 (b) Both belong to the same genus

 (c) Both belong to the same family

 (d) Both belong to the same order.

14. There is no bleeding while studding. Give reason

 (a) Blood gets clotted immediately in the cartilagenous region

(b) In peripheral region of the body, the blood capillary are less in number

 (c) There is no blood vessels in cartilage.

 (d) Blood vessels are comparatively less in cartilage.

15. Which disease causes yellowing of leaves of

 (a) Drooping (b) Mossaic

 (c) Wilting (d) Blight

16. The stomach has four divisions in ruminating animals. Which of the following is an exception from them?

 (a) Reticulum (b) Omasum

 (c) Abomasum (d) Sargasum

**APPENDIX V**

**Scoring Key of Test of Achievement in Science (Final)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Physics** |  | **Chemistry** |  | **Biology** |
| 1 | D |  | 1 | C |  | 1 | C |
| 2 | D |  | 2 | D |  | 2 | D |
| 3 | B |  | 3 | A |  | 3 | B |
| 4 | A |  | 4 | A |  | 4 | C |
| 5 | C |  | 5 | D |  | 5 | C |
| 6 | B |  | 6 | B |  | 6 | A |
| 7 | B |  | 7 | A |  | 7 | D |
| 8 | D |  | 8 | C |  | 8 | C |
| 9 | B |  | 9 | C |  | 9 | A |
| 10 | A |  | 10 | B |  | 10 | B |
| 11 | D |  | 11 | D |  | 11 | D |
| 12 | C |  | 12 | A |  | 12 | B |
| 13 | D |  | 13 | A |  | 13 | C |
| 14 | C |  | 14 | C |  | 14 | D |
| 15 | C |  | 15 | C |  | 15 | B |
| 16 | B |  | 16 | A |  | 16 | D |

**APPENDIX VII**

**Farook Training College, Calicut**

**QUESTIONNAIRE ON TUTORING**

**Dr. Abdul Gafoor.K Muhammad.S**

Sr. Lecturer in Education M.Ed. Student

 The following is a table prepared for gathering information about the tuition, coaching, training and learning guidance that you receive in the science subjects in out of school time. Separate columns have been given for Physics, chemistry & Biology. Mention individually how much learning facilities you are provided in each subjects. Record your personal details before doing it.

Name of the Pupil..............................................Class.................Class No.......... Name of the School.........................................................Boy/Girl...................... Occupation of Father.................................Occupation of Mother....................... Education of Father.....................................Education of Mother....................... Monthly Income of Family..........................................

|  |  |  |
| --- | --- | --- |
|  | Items | Subjects |
| Physics | Chemistry | Biology |
| 1. | Besides the school time table, in which subjects you are given help of tutor/teacher/guardian (Please put '✓' mark against the subjects) |  |  |  |
| 2. | Which Science subjects are you taught by the tutors (please put '✓' against the subjects) |  |  |  |
| 3. | Which Science subjects are you taught by School teachers out-of-school time (not the special classes arranged for completion of the school lessons) |  |  |  |
| 4. | How many hours in a week do you receive tuition for each Science subjects? |  |  |  |
| 5. | How many hours a day do you receive tuition from your tutor or your school teachers at out-of-school time. | Mon |  |  |  |
| Tue |  |  |  |
| Wed |  |  |  |
| Thu |  |  |  |
| Fri |  |  |  |
| Sat |  |  |  |
| Sun |  |  |  |
| 6 | In which science subjects you were given tuition/special class during summer vacation before starting the ninth standard (Please put '✓' mark against the subjects. |  |  |  |
| 7 | How many hours of tuition did you receive in each science subject during the summer vacation  |  |  |  |
| 8/ | Do you receive tuition in the holidays other than the weekly holidays? If yes, put a '✓' mark. |  |  |  |
| 9. | Apart from the tutor/school teacher, who else help you in each subject? | Father |  |  |  |
| Mother |  |  |  |
| Brother & Sisters |  |  |  |
| Relatives |  |  |  |
| Neighbours  |  |  |  |

Are you receiving tuition/study help? 🗖 Yes 🗖 No

If yes what are the reasons

(put '✓' marks against the given reason)

|  |  |  |
| --- | --- | --- |
| 1 | To seek help in content of the lessons |  |
| 2 | To complete school home works |  |
| 3 | To become 1st rank holder of the class |  |
| 4 | Because of the difficulty of the subjects  |  |
| 5 | To attain 'notes' of the subjects |  |
| 6 | Deficiency of the appropriate facts in the lessons. |  |
| 7 | To complete school homeworks there by to get appreciation from the teachers. |  |
| 8 | The students cannot understand the school class. |  |
| 9 | To satisfy the parents |  |
| 10 | As the friends are going for tuition |  |
| 11 | The compulsion of the elder people in the home  |  |
| 12 | For dignity |  |
| 13 | To study lessons before teaching them in the class |  |
| 14 | Just for pleasure |  |
| 15 | To move away from the homely surrounding |  |
| 16 | To spend free time. |  |

 If there any other reasons, write ...................................................................... .....................................................................

**APPENDIX I**

**Farook Training College, Calicut**

**ACHIEVEMENT TEST IN SCIENCE (Draft)**

**Dr. Abdul Gafoor.K Muhammad.S**

Sr. Lecturer in Education M.Ed. Student

*\nÀt±i§Ä:*

*1. CXv DuÀÖ-X-{´w, ck-X-{´w, Poh-imkv{Xw F¶o hnj-b-§-fn-epÅ Hcp sSÌm-Wv. tNmZy¡-S-em-knÂ \n§Ä H¶pwXs¶ Fgp-X-cp-Xv. D¯-c-§Ä AS-bm-f-s¸-Sp-¯p-¶-Xn\v thsd IS-emkv X¶n-«p-­v. D¯-c-¡-S-em-knÂ tNmZy§-fpsS \¼À, {Ia-¯nÂ Fgp-Xn-bn-«p-­v. Hmtcm tNmZy¯n\pw A, B, C, D F¶o 4 D¯-c-§Ä X¶n-cn-¡p-¶p. AXnÂ H¶p am{X-amWv icn. Hmtcm tNmZy¯n\pw icn-bmb D¯cw I­p-]n-Sn-¡p-I. F¶n«v D¯-c-¡-S-em-knÂ tNmZy \¼-dn-s\-Xnsc icn-bp-¯-cs¯ Ipdn-¡p¶ A£-c-¯nÂ 'X' ASbm-f-s¸-Sp-¯p-I.*

*2. \n§Ä BZyw AS-bm-f-s¸-Sp-¯nb 'X' NnÓw sXämb Øm\-¯m-sW¶v I­mÂ Øm\w amäp-¶-Xn\v 'X' ASbmf¯n-\p-taÂ Idp-¸n-¡p-Ibpw (●) icn-bmb Øm\¯v 'X' NnÓw CSp-Ibpw sN¿p-I.*

*3. Hmtcm `mK-¯n\pw D¯-c-sa-gp-Xm³ shsÆsd kabw ¢n]vX-s¸-Sp-¯n-bn-«p-­v. ]co-£-I³ \nÀt±iw Xcp-t¼mÄ am{Xw D¯-c-sa-gp-Xm³ Bcw-`n-¡p-I.*

*4. FÃm tNmZy§Ä¡pw D¯-c-sa-gp-tX-­-Xm-Wv.*

*amXrI:*

 *Xmsg sImSp¯-h-bnÂ kwbp-à-taXv?*

 *a) ssl{U-P³ b) Pew c) ss\{S-P³ d) HmIvkn-P³*

*D¯-c-¡-S-em-knÂ:*

*1. (A) (B) (C) (D)*

*icnbmb D¯cw Pew BWv. CtX coXn-bnÂ FÃm tNmZy§Ä¡pw D¯cw AS-bm-f-s¸-Sp-¯p-I.*

**DuÀÖ-X{´w**

1. \oe-{]-Imi¯nÂ ]¨-\n-d-¯n-epÅ Hcp hkvXp F§s\ ImW-s¸-Sp¶p?

 (a) shÅ-bmbn (b) Npa-¸mbn (c) Idp-¯-Xmbn (d) aª-bmbn

2. Xmsg sImSp¯-h-bnÂ XcwK ssZÀLyw Ipd-ªXv GXv?

 (a) \oe (b) C³{^m sdUv (c) Npa¸v (d) AÄ{Sm hb-eäv

3. Bg-¡-S-ensâ \oe-\ndw GXv {]Xn-`mkw aptJ\ hnh-cn¡mw?

 (a) {]IoÀ®\w (b) hnk-cWw (c) A]-hÀ¯\w (d) {]Xn-^-e\w

4. ka-\znX {]Imiw AXnsâ LS-I- hÀ®-§-fmbn ]ncn-bp-¶-XmWv

 (a) {]Imi {]IoÀ®\w (b) hnk-cWw (c) A]-hÀ¯\w (d) {]Xn-^-e\w

5. ag-hn-Ãnsâ ]pdw-h-¡nÂ ImW-s¸-Sp¶ \nd-taXv?

 (a) ]¨ (b) Npa-¸v (c) aª (d) hb-eäv

6. A´-co£w taLm-hr-X-amb Zn\-§-fnÂ NqSv A\p-`-h-s¸-Sp-¶-Xn\v Imc-W-amb Inc-W-§-tfXv?

 (a) X- IncW§Ä (b) C³{^m-sdUv Inc-W-§Ä (c) AÄ{Sm-h-b-eäv Inc-W-§Ä

 (d) Kmam Inc-W-§Ä

7. Xmsg-sImSp¯-h-bnÂ \yq«sâ Ne-\-k-a-hmIyw AÃm-¯Xv GXv?

 (a) v = u+at (b) s = ut + at2 (c) s = ut + ½ at2 (d) v2 =u2+2 as

8. 10 m/s {]th-K-¯nÂ XpS§n 5 m/s2 ka-Xz-c-W-¯nÂ k©-cn-¡p¶ Hcp Xoh­n 10 sk¡³UnÂ F{X Zqcw k©-cn-¡p-¶p.

 (a) 350 m (b) 35 m (c) 60 m (d) 600 m

9. Nen-¨p-sIm­ncn-¡p¶ Hcp ]´v s]s«¶v ]nSn-¨p-\nÀ¯n-bmÂ B¡-hy-Xym-k-¯nsâ \nc¡v

 (a) ]qPy-am-Ip¶p (b) Ipd-bp¶p (c) amdp-¶nÃ (d) IpSq¶p

10. t{]mPIvssS-ensâ ]mX F§-s\-bq-Å-XmWv?

 (a) t\ÀtcJ (b) ]cm-t\_mf (c) hf-ªp-]p-f-ªXv (d) hr¯m-IrXn

11. Hcp IÃnÂ NcSv sI«n Id-¡p-¶p. Xmsg-sImSp¯ {]kvXm-h-\-I-fnÂ IÃnsâ Ne-\-¯nÂ icn-b-Ãm-¯Xv GXv?

 (a) IÃv hÀ¯pf Ne-\-¯n-emWv (b) IÃnsâ Ne-\-Zni Ft¸mgpw amdn-s¡m­ncn-¡p¶p
(c) IÃn\v XzcWw kw`-hn-¡p-¶nÃ (d) IÃnÂ{]tbmKn¨ \_ew hr¯-tI-{µ-¯nÂ\n¶m-Wv.

12. Xmsg-sImSp¯-h-bnÂ LÀj-W-\_ew Ipd-hm-bXv GXv?

 (a) LÀjW ]cn[n (b) \nc-§Â LÀjWw

(c) LÀjW \_e-Kp-Wm¦w (d) Dcp-fÂ LÀjWw

13. hkvXp-hnsâ `mcw Cc-«n-bm-bmÂ LÀj-W-\_ew

 (a) amdp-¶nÃ (b) Cc-«n-bm-Ip¶p (c) ]Ip-Xn-bm-Ip¶p (d) \men-sem¶mIp¶p

14. Hcp hkvXp-hn\v A\p-`-h-s¸-Sp¶ Kqcp-Xzm-IÀjW \_ew B hkvXp-hnsâ amkn\v

 (a) t\À A\p-]m-X-¯n-emWv (b) hn]-coX A\p-]m-X-¯n-emWv

(c) \_Ô-anÃ (d) hÀ¤-¯nsâ hn]-co-X-A-\p-]m-X-¯n-em-Wv.

15. `qtI-{µ-¯nÂ Hcp hkvXp-hnsâ `mcw

 (a) IqSp-X-emWv (b) Ipd-hmWv (c) ]qPy-amWv (d) A\-´-amWv

16. Xmsg sImSp¯-h-bnÂ icn-b-Ãm-¯Xv GXv?

 N{µ\nÂ D­m-Ip¶ Kqcp-Xzm-IÀjWXzcWw `pan-bn-ep-­m-Ip¶ Kpcp-Xzm-IÀjWXzc-W-t¯-¡mÄ Ipd-bm³ Imc-Ww.

 (a) N{µsâ amÊv Ipd-hm-b-Xn-\mÂ (b) N{µ\nÂ hmbp CÃm¯-Xn-\mÂ

(c) N{µsâ Bcw Ipd-hm-b-Xn-\mÂ (d) N{µsâ hymkw Ipd-hm-b-Xn-\mÂ

17. `qan Hcp hkvXp-hnÂ {]tbmKn¡p¶ BIÀjW \_e-am-Wv.

 (a) amkv (b) XzcWw (c) {]thKw (d) `mcw

18. `pan-bpsS BIÀj-W-\_-e-¯n\v am{Xw hnt[-b-ambn Hcp hkvXp ]Xn-¡p-¶-Xn\v ]d-bp-¶-sX´v?

 (a) Kpcp-Xzm-IÀjWw (b) \nÀ\_m[ ]X\w (c) B¡w (d) XzcWw

19. Hcp {Kl-¯nsâ HmÀ\_n-äÂ {]thKw Ft¸mgpw ]mem-b-\-{]-th-K-¯n-t\-¡mÄ

 (a) Ipd-hm-bn-cn¡pw (b) IqSp-X-em-bn-cn¡pw (c) Xpey-am-bncn¡pw (d) Cc-«n-bm-bn-cn¡pw

20. M amÊpÅ Hcp hkvXp-hns\ h Db-c-¯nÂ DbÀ¯m-\m-h-iy-amb {]hr-¯n-bmWv

 (a) mg (b) mh (c) 60 mg/h (d) mgh

21. ]h-dnsâ bqWnäv GXmWv ?

 (a) PyqÄ (b) Intem{Kmw (c) hm«v (d) \yq«¬

22. Nen-¨p-sIm­ncn-¡p¶ hkvXp-hn\v Ne\w sIm­p­m-Ip¶ DuÀÖ-amWv

 (a) Øm\n-tImÀÖw (b) KXn-tImÀÖw (c) Xmt]mÀÖw (d) cmtkmÀÖw

23. 100 kg amÊpw 5 m/s2 {]thK-apÅ Hcp hkvXp-hnsâ KXn-tImÀÖw F{X?

 (a) 250 J (b) 2.5 J (c) 25 J (d) 1250 J

24. Hcp hkvXp-hn\v ØnXn-tImÀÖw e`y-am-Ip-¶Xv

 (a) Øm\w-sIm­v am{Xw (b) kvs{Sbn³sIm­v am{Xw

(c) Øm\w sImt­m kvs{Sbn³ sImt­m (d) Ne-\w-sIm­v

25. `q\n-c-¸nÂ ØnXn-sN-¿p¶ Hcp hkvXp-hnsâ ØnXn-tImÀÖw

 (a) ]qPyw (b) A\´w (c) Gähpw IqSp-XÂ (d) CsXm¶paÃ

26. sslt{UmfnIv t{\_¡nsâ {]hÀ¯\w GXp \nb-as¯ Bkv]-Z-am-¡n-bmWv?

 (a) \yq«¬ \nbaw (b) BÀ¡-an-Uokv XXzw (c) ]mkvIÂ \nbaw (d) ¹h\ XXzw

27. Hcp \_¡ä Pe-¯nÂ ap§n¡nS-¡p-t¼mÄ AXn\v `mc-¡p-dhv A\p-`-h-s¸-Sm³ Imc-W-amb \_e-taXv?

 (a) {]X-e-\_ew (b) ¹h-£a\_ew (c) hnkv¡kv\_ew (d) AUvlo-j³ \_ew

28. Hcp ]ZmÀ°-¯nsâ Bt]-£n-I-km-{µX Xmc-Xayw sN¿p-¶Xv GXnsâ km{µ-X-bp-am-bn-«mWv?

 (a) hmbp-hnsâ (b) ]ZmÀ°-¯nsâXs¶ (c) Pe-¯nsâ (d) HmIvknPsâ

29. Dujvamhv hÀ²n-¨mÂ Hcp {Zmh-I-¯nsâ hnkvtImknänIv F´p amäw kw`-hn-¡p¶p

 (a) IqSp¶p (b) Ipd-bp¶p (c) amäw hcp-¶nÃ (d) IqSp-I-tbm Ipd-bp-I-tbm sN¿p¶p

30. {]X-e-\_ew X³am-{X-IÄ X½n-epÅ GXp \_e-¯nsâ ^e-am-Wv.

 (a) AUvlo-jÀ \_ew (b) sImloj³ \_ew (c) hnkv¡kv \_ew (d) ¹h-£-a- \_ew

**ck-X{´w**

1. {Kp¸nÂs]Sm-¯Xv sXc-sª-Sp-s¯-gp-XpI

 (a) tkmUnbw (b) lneobw (c) eoYnbw (d) s]m«mkyw

2. aqe-I-§-fpsS AjvS-I-\n-baw Bhn-jvI-cn-¨Xv Bcv?

 (a) sUmss\_ssd-\À (b) emthmknb (c) sa³U-en-tb^v (d) \yqem³Uv

3. B[p-\nI BhÀ¯\ ]«n-I-bnse Gähpw ssZÀLy-apÅ ]ncn-bUv GXv?

 (a) \memw ]ncn-bUv (b) A©mw ]ncn-bUv (c) Bdmw ]ncn-bUv (d) Ggmw ]ncn-bUv

4. ]ncnbUnÂ CS-¯p-\n¶v he-t¯m«v t]mIpt´mdpw \yq¢n-b-Ênsâ NmÀÖv

 (a) amdp-¶nÃ (b) IqSp¶p (c) Ipd-bp¶p (d) IqSp-I-tbm Ipd-bp-I-tbm sN¿mw

5. Ce-Ivt{Sm s\K-än-hnän IqSnb aqeIw FSp-s¯-gp-XpI

 (a) ^vfqdn³ (b) t¢mdn³ (c) t{\_man³ (d) Ab-Un³

6. Xmsg-sIm-Sp-¯-hbnÂ H¶mw {Kp¸nÂs]-Sm¯ ape-I-taXv?

 (a) enYnbw (b) tkmUnbw (c) \_mcnbw (d) dp\_o-Unbw

7. DXvIrjvS hmX-I-§-fnÂs]Sm¯ ape-I-taXv?

 (a) loenbw (b) ssl{U-P³ (c) \ntbm¬ (d) dmU¬

8. Hcp tPmUn Ce-Ivt{SmWpIÄ ]¦p-h-¨p-­m-Ip¶ kl-kw-tbmPI-\_-Ô-\-amWv

 (a) GI \_Ô\w (b) Zzn \_Ô\w (c) \_lp \_Ô-\w (d) AtbmWnI \_Ô\w

9. tkmUnbw HmIvssk-Unsâ cmk-kq{Xw F´mWv?

 (a) NaO (b) Na2O (c) NaO2 (d) NaOH

10. Hcp cmk-{]-hÀ¯-\-¯nÂ LS-I-ap-e-I-§-fpsS Ce-Ivt{Sms\K-än-hnän X½n-epÅ hyXymkw 1.7 t\¡mÄ IqSp-X-em-sW-¦nÂ Ah tNÀ¶p-­m-Ip¶ kwbp-à-¯n\v GXv kz`m-h-am-Wp-­m-hpI?

 (a) kl kwtbmPI kz`mhw (b) AtbmWnI kz`mhw

(c) Im´nI kz`mhw (d) Ch-sbm¶pa-Ã.

11. teml Bä-§-fpsS hen¸w Ateml Bä-§sf kw\_-Ôn¨v

 (a) IqSp-X-emWv (b) Ipd-hmWv (c) Ipd-thm IqSp-X-tem BImw (d) Xpey-amWv

12. H¶mw t{KUv tSmbveäv tkm¸nsâ TFM F{X-bm-Wv.

 (a) 78% (b) 76 % (c) 74 % (d) 72 %

13. ImÌnIv tkmUbpsS cmk-\maw F´v?

 (a) NaCO3 (b) NaHCO3 (c) Na OH (d) CaO

14. s]t{Smfnbw DÂ¸-¶-§Ä D]-tbmKn¨v \nÀ½n¨ ipNo-I-cW ]ZmÀ°-taXv?

 (a) tkm¸v (b) tSmbveäv tkm¸v (c) UnäÀPâv (d) Ch-sbÃmw

15. `£-W-]-Zm-À°-§Ä¡v aWhpw cpNnbpw In«m-\p-]-tbm-Kn-¡p¶ 'APnt\m-tam-s«m-bpsS' cmk-\m-a-sa´ v?

 (a) tkmUnbw t¢m-ssdUv (b) Gdn-t{Xm-kn³ (c) tkmUnbw s\_³tkm-sbäv

(d) tam-tWm tkmUnbw K¢q-t«m-taäv

16. Hcp cmk-{]-hÀ¯-\-¯nsâ thKX Gt¸mgpw

 (a) Hcpt]m-se-bm-bn-cn¡pw (b) hyXy-kvX-am-bn-cn¡pw (c) amdn-s¡m-­n-cn¡pw

d) And-bm-hp-¶-XÃ

17. Hcp cmk-{]-hÀ¯-\-¯nÂ A`n-Im-c-I-§Ä DÂ¸-¶-§-fmbn amdp-¶Xn-\n-S-bnÂ D­m-hp¶ kwbp-à-§-fmWv

 (a) DÂt{]-c-I-§Ä (b) BIvSo-th-äUv tImw¹Ivkp-IÄ (c) Atbm-Wp-IÄ

(d) DÂ¸-¶-§Ä

18. Xm]-\ne IqSn-bmÂ cmk-{]-hÀ¯-\-th-K-X¡v G´p kw`-hn-¡p¶p ?

 (a) Ipd-bp¶p (b) amä-anÃ (c) IqSp¶p (d) \ne-bv¡p¶p

19. DÂt{]-c-I-§Ä cmk-{]-hÀ¯-\-¯nÂ BIvSn-th-j³ G\ÀPn

 (a) Iq«p¶p (b) Ipd-bv¡p¶p (c) amä-an-ÃmsX \ne-\n-À¯p¶p (a) Ipd-bp¶p

(d) Ch-sbm¶p-aÃ

20. cmk-{]-hÀ¯-\ \nc-¡ns\ kzm[o-\n-¡p¶ LS-I-§-fnÂ s]Sm¯Xv GXv ?

(a) A`n-Im-c-K-§-fpsS KmVX (b) aÀ±w (c) DÂt{]-cIw (d) Ch-sbm-¶p-aÃ

21. BhÀ¯-\-]-«n-I-bnÂ ImÀ\_¬ GXv {Kq¸nse AwK-amWv?

 (a) aq¶v (b) \mev (c) A©v (d) Bdv

22. ImÀ\_-Wnsâ cq]m-´-c-§-fnÂ s]Sm-¯Xv GXv ?

(a) {Kmss-^äv (b) ]©-km-c-¡cn (c) ac-¡cn (d) t]¸À

23. s]t{Sm-fnbw DÂ¸-¶-]-§-fnÂ\n¶pw ZÀK-Ô-apÅ hmX-I-§Ä \o¡w sN¿m³ NmÀt¡mÄ D]-tbm-Kn-¡m-dp-­v. NmÀ¡-tlm-fnsâ GXp kz`m-h-amWv Cu D]-tbm-K-¯n\v B[m-c-ambn {]hÀ¯n-¡p-¶-Xv.

(a) AXntim-jW {]hÀ¯\w (b) Imä-t\-j³ (c) cq]m-´-cXzw (d) Atem-l-kz-`mhw

24. tkmUm hm«-dnse ImÀt\_m-WnIv BknUv Xm**sg-¸dbp-¶-h-bnÂ GXv C\-¯nÂ s]«-h-bm-Wv.**

(a) tamtWm t\_knIv (b) ssU t\_knIv (c) ss{S t\_knIv (d) t]mfn t\_knIv

25. Xm**sg sImSp¯-h-bnÂ hnL-S-\-k-a-b¯v** CO2 ]pd¯phn-Sm¯ kwbp-às¯ FSp-s¯-gp-Xp-I.

(a) CaCO2 (a) MgCO2 (a) NaCO2 (a) NaHCO2

26. ]c-kv]cw \_Ô-s¸«v ]e hen-¸-¯n-epÅ N§-e-I-tfm he-b-§-tfm XoÀ¡m-\pÅ ImÀ\_-Wnsâ Ign-hns\ F´p hnfn-¡p-¶p ?

 (a) sFtkm-a-dnkw (b) emIvtä-j³ (c) Imä-t\-j³ (d) ]mc-^n-\p-IÄ

 H H

 | |

27. H-C-O-C-H Cu LS-\-bpsS X·m{Xm hmIy-sa´v ?

 | |

 H H

 (a) FY-t\mÄ (b) FssY³ (c) CutY³ (d) ssU aossYÂ CuYÀ

28. ]qcnX sslt{Um ImÀ\_-Wp-IÄ¡v DZm-l-c-W-taXv ?

 (a) BÂs¡-bv\p-IÄ (b) BÂ¡o-\p-IÄ (c) BÂ-ss¡-\p-IÄ (d) Ch-sbÃmw

29. XmsgsIm-Sp-¯-h-bnÂ \n¶pw Ben-^m-än¡v ssl-t{Um ImÀ\_-Wns\ sXc-sª-Sp-s¯-gp-Xp-I.

 (a) ssk-t¢m \_yqt«³ (b) \_yqt«³ (c) FtYbv³ (d) Css-Y³

30. BÂs¡-bv\p-IÄ cmk-{]-hÀ¯-\-¯nÂ GÀs¸-Sm³ XmÂ¸-cy-an-Ãm-¯-h-bm-Wv. Imc-W-sa´v ?

 (a) A]q-c-X-am-b-Xn-\mÂ (b) ]qcn-X-am-b-Xn-\mÂ (c) sNbn³ kwbp-à-§Ä D­m-¡p-¶-Xn-\mÂ (d) heb kwbp-à-§Ä D­m-¡p-¶-Xn-\mÂ

**\_tbm-fPn**

**1. {]Imi-e-`y-X-bpsS Gä-¡p-d-¨nÂ Imcy-£-a-ambn {]tbm-P-\-s¸-Sp-¯p¶ Irjn-co-Xn-tbXv ?**

(a) Iq«p Irjn (b) an{i-Irjn (c) hnf-]-cybw (d) taÂ¸-d-ª-h-sbÃmw

2. Xmsg sIm-Sp-¯-h-bnÂ sXämb {]kvXm-h-\-tbXv ?

 (a) skÃp-temkv Zl-\-¯n\v hnt[-b-am-Ip-¶nÃ (b) skÃp-temkv Zl-\-s¯ klm-bn-¡p¶p (c) Ab-sh-«p¶ arK-§-fnÂ skÃp-temkv Zln-¡p-¶p

(d) skÃp-temkv Zl-\t¡Sp-­m-¡p-¶p.

3. izk\w GXp Xc-¯n-epÅ {]hÀ¯-\-amWv ?

 (a) A]-Nbw (b) D]-Nbw (c) kwtÇjWw (d) BKn-cWw

4. Xcw-K-cq-]-¯n-epÅ A¶-]-Y-¯nse Ne\w

 (a) sl¸m-än-änkv (b) ]cm-en-knkv (c) Ub-men-knkv (d) s]cn-ÌmÄknkv

5. hnf-I-fnse ssh-dkv tcmKw ^e-{]-Z-ambn \nb-{´n-¡m-\pÅ amÀ¤w F´v ?

 (a) hocyw Ipdª cmk-Io-S-\m-in-\n-IÄ IqSnb -A-f-hnÂ {]-tbm-Kn-¡pI

 (b) hocyw IqSnb cmk-Io-S-\m-in-\n-IÄ Ipdª -A-f-hnÂ {]-tbm-Kn-¡pI

 (c) ssPhIo-S-\m-in-\n-IÄ {]-tbm-Kn-¡pI

 (d) tcmK\_m-[n-X-amb kky-§Ä \in-¸n¨v tcm-K-hym-]\w XS-bpI

6. Xmsg ]d-bp-¶-h-bnÂ Gähpw icn-bmb {]kvXm-h-\-tbXv ?

 (a) P´p-¡-fn-sÃ-¦nÂ kky-§-fnÃ (b) kky-§-fnsÃ¦nÂ ]c-t]m-jn-I-fnÃ

 (c) a\p-jy\v kky-§-fn-Ãm-sXbpw Pohn¡mw

 (d) a\pjy\nsÃ-¦nÂ aäp-Po-hn-I-fn-Ã.

7. amwky-¯nsâ ASn-Øm-\-L-SIw GXv ?

 (a) sIm-gp¸v (b) ¥qt¡mkv (c) Aan-t\m BknUv (d) t]in

8. ]ip-¡-fnse Ipf¼v tcm-K-¯n\v Imc-W-am-Ip¶ Pohn-GXv ?

 (a) ssh-dkv (b) \_mIvSo-cnb (c) ^wKkv (d) s{]m-t«m-tkmh

9. am§ D¸n-en-«mÂ Npfp-§n-t¸m-Ip-¶-Xn\v Gähpw A\p-tbm-Py-amb hni-Zo-I-c-W-sa´v?

(a) FIvtkmkv tam-knkv (b) Ftâm-kvtam-knkv (c) ¹mkvtam-sse-knkv

(d) ss¥-t¡m-sse-knkv

10. Xmsg sIm-Sp-¯-h-bnÂ sXämb {]kvXm-h-\-tbXv?

(a) Aao\_ Hcp Pe-Po-hn-bmWv (b) Aao\_ Hcp GItImiPo-hn-bmWv

(c) Aao\_ Hcp ]c-t]mjn BWv (d) Aao\_ Hcp kq£a Po-hn-bmWv

11. ImXv Ip¯p-t¼mÄ IqSp-X-embn càw s]m-Sn-bp-¶n-Ã. ImcWw ?

 (a) Xcp-Wm-Øn-bpÅ `mK-§-fnÂ càw s]s«¶v I« ]nSn-¡p¶p

 (b) ico-c-¯nsâ A{K-`m-K-§-fnÂ cà-¡p-g-epIÄ Ipd-hm-b-Xp-sIm­v

 (c) XcpWm-ØnIfnÂ cà-¡p-g-ep-I-fnÃ

 (d) Xcp-Wm-ØnIfnÂ cà-¡p-g-epIÄ Xmc-X-ta\y Ipd-hm-Wv.

12. izmk-tIm-i-¯nsâ ASn-km-Ym-\-L-S-I-§-fmWv hmbp Ad-IÄ F¶p ]d-bm³ Imc-W-sa´v?

 (a) cà-tem-an-I-IÄ Bh-cWw sNbvXXp-sIm­v (b) izmk-tIm-i¯nse hmbp tiJ-cn-¡p¶ Øm\-am-b-Xp-sIm­v (c) hmX-I-hn-\n-abw \S-¡p¶ Øe-am-b-Xp-sIm­v

(d) kq£-a-ZÀi\n sIm­v am{Xw ImWm³ Ign-bp-¶-Xp-sIm­v.

13. Bhmbp izk\w \S-¯p¶ Pohn-IÄ¡v DZm-l-cWw GXv?

 (a) D]-b-Po-hn-IÄ (b) boÌp-IÄ (c) kky-§Ä (d) ssh-d-kp-IÄ

14. At\_m-[m-h-Ø-bnepw A¶-]-Y-¯n-eqsS `£Ww \o§p¶p; ImcWw A¶-]Yw \nÀ½n-¨n-cn-¡p-¶Xv

 (a) sF-Ýn-I-t]-in-I-fmWv (b) Ass\-ÝnI t]in-I-fmWv (c) AØn-t]-in-I-fmWv

(d) tcJm-¦nX t]in-I-fmWv

15. Hcp PohnhÀ¤s¯ F¡m-ehpw \ne-\nÀ¯m-\m-h-iy-amb amÀ¤w GXv?

 (a) h\-\-io-I-cWw XS-bpI (b) Po³ ]qÄ kwc-£n¡pI (c) th«-bm-SÂ \ntcm-[n-¡pI

(d) tZio-b-]mÀ¡p-IÄ Øm]n-¡pI

16. a\p-jy-\nse Npcp­apSn {]I-S-Kp-Whpw \o­-apSn Kp]vX-Kp-WhpamsW-¶n-cn-¡-s«. F¶mÂ \o­ap-Sn-tbm-Sp-Iq-Snb ]nXm-hn\pw Npcp-­-ap-Sn-tbm-Sp-Iq-Snb amXm-hn\pw P\n¨ \mep a¡-fnÂ apSn-bpsS kz`mhw F´m-bn-cn¡pw ?

 (a) \mep a¡Ä¡pw \o­-apSn (b) \mep a¡Ä¡pw Npcp­ \o­-apSn (c) c­v a¡Ä¡v Npcp­ apSn, HcmÄ¡v \o­-apSn (d) aq¶p a¡Ä¡p Npcp­ apSn HcmÄ¡v \o­-apSn.

17. Xmsg ]d-bp¶ {]kvXm-h-\-I-fnÂ icn-bm-b-tXXv ?

 (a) Ipªn\v P\-\w-hsc kz´-ambn càanÃ (b) amXm-hn-sâbpw ]nXm-hn-sâbpw càw ¡qSn-¡-e-cp-¶nÃ (c) amXm-hnsâ cà-¯nÂ\n¶v Ipªnsâ càw cq]-s¸-Sp¶p (d)amXm-hnâbpw Ipªn-sâbpw càw IqSn-¡-e-cp-¶p.

18. a\n-jy-\nse enwK-t`Zw Hcp-tPmUn t{Ima-tkm-ap-I-fmÂ \nÀ®-bn-¡-s¸-Sp-¶p. XX t{Ima-tkm-w tPmUn h¶mÂ kv{XoIfpw XYt{Im-a-tkmw tPmUn h¶mÂ ]pcp-j³amcpw, F¦nÂ Ipªnsâ enwK \nÀ®-b-¯n\v B[mcw

 (a) ]pcp-j-\_o-P-amWv (b) kv{Xo\_o-P-amWv (c) ]pcp-j-tâbpw kv{Xobp-tSbpw \_oP-amWv

 (d) c­p-aÃ

19. RNA bpsS {][m\ [À½-sa´v?

 (a) hwi-]m-c-¼cyw \ne-\nÀ¯pI (b) amwky kwtÇ-jWw (c) tIm-i-hn-`-P\w

 (d) DNA \nÀ½mWw.

20. C´y-bnÂ ]mep-Â]m-Z\w ]À²n-¸n-¡m³ klm-bn¨ hn¹hw GXv?

 (a) ]mÂ hn¹hw (b) lcnX hn¹hw (c) [hf hn¹hw (d) tizX hn¹-hw.

21. t]io-hy-h-Øb-psS [À½-a-Ãm-¯-tXXv?

 (a) ico-c-¯n\v kuµcyw \ÂIpI (b) Ne-\-§Ä¡v klm-bn-¡pI (c) Xmt]m-ev]m-Z\w \S-¯pI (d) B´-co-Im-h-b-h-§sf kwc-£n-¡p-I.

22. knwl-¯nsâ imkv{X-\maw ]m³tYm entbm F¶pw-I-Sp-h-bp-tSXv ]m³tYd ssS-{Knkv F¶p-am-Wv. CXnÂ\n¶v shfn-hm-Ip¶ hkvXp-X.

 (a) Ch-c­pw Hcp kv]ojn-knÂs¸Sp-¶p. (b) Ch c­pw Hcp ^man-en-bnÂs¸-Sp¶p

 (c) Ch c­pw Hcp Po\-ÊnÂ s]Sp¶p (d) Ch c­pw Hcp HmÀU-dnÂs¸-Sp-¶p.

23. {]Im-i-kw-tÇ-j-W-¯nÂ

 (a) CO2 s\ Pe-hp-ambn tNÀ¯v ImÀt\_msslt{Uäv D­m-¡p¶p

 (b) CO s\ hnL-Sn¨v O2 s\ ]pd-¯p-hn-Sp¶p

 (c) Pew hnL-Sn¨v O2 s\ ]pd-¯p-hn-Sp¶p

 (d) Pes¯ ImÀ\_-Wp-ambn tNÀ¯v ImÀt\_msslt{Uäv D­m-¡p¶p

24. \mw Ign-¡p¶ Blm-c-¯n-se- A-¶Pw amÄt«mkv B¡n-am-äp¶ cmk-án-tbXv?

 (a) {Sn]vkn³ (b) Aan-tekv (c) ent]kv (d) amÄt«mkv.

25. lotam-t¥m-\_n-\nÂ t¢m-tdm-^nÂ a bnse aáojy¯n\p ]I-c-apÅ aqe-I-taXv?

 (a) tkm-Unbw (b) s]m-«mkyw (c) Atb¬ (d) \n¡Â

26. Xmsg sIm-Sp-¯-hbnÂ kmt{]m-ss^äpI-sf-kw-\_-Ôn¨v icn-tbXv?

(a) Ah hkvXp-¡-fnÂ\n¶pw t]m-j-I-§Ä BKn-cWw sN¿p-¶p.

(b) Ah Pohn-I-fnÂ\n¶pw t]mjI-§Ä BKn-cWw sN¿p-¶p.

(c) Ah arX-amb Ie-I-fnÂ\n-¶pw-t]m-j-I-§Ä BKn-cWw sN¿p¶p

(d) Ah APoh Poh-I-e-I-fnÂ \n¶pw- t]mjI-§Ä BKn-cWw sN¿p-¶p.

27. kky-§Ä¡v Bh-iy-apÅ Pew F§-s\-bmWv Ah-bn-te¡v {]thin-¡p-¶Xv?

(a) hrXn-hym-]-\w-hgn (b) AXn-hym-]\w hgn (c) A´Àhym-]\w hgn

(d) hrXn-hym-]-\w-h-gnbpw AXn-hym-]\w hgn-bpw.

28. ]bÀ sNSn-I-fpsS Ce-IÄ¡v aª-\n-dw- h-cp-¶Xpw hfÀ¨ apcp-Sn-¡p-¶-Xp-amb tcm-K-amWv

 (a) {ZpX-hm«w (b) sam-ss-k¡v (c) hm«w (d) ss»äv tcmKw

29. Ab-hn-d-¡p¶ Pohn-I-fpsS Bam-ib-¯n\v \mev Ad-I-fp-­v. Xmsg-s¡m-Sp-¯-bnÂ \n¶pw Ah-bnÂ s]Sm-¯Xv FSp-s¯-gp-Xp-I.

(a) sdän-¡pew (b) Hm-amkw (c) kÀKmkw (d) At\_m-amkw

30. DNA bnÂ AS-§n-bn-«n-Ãm¯ ss\-t{Sm-sP-\kv t\_kv GXv?

 (a) AUn-\n³ (b) Kzm\n³ (c) bpdm-kn³ (d) ssX-an³