Chapter-I

INTRODUCTION

Background of the Study

Those students who are unable to understand the mathematical concept and feel uneasy while solving mathematical problem. Also learning difficulties is obstruction of learning situation in which students feels as difficulty.

This study focuses on student's perceived and actual learning difficulties experienced in mathematics. The way students perceive learning plays an important role in determining the outcome of any educational endeavor and it is not in doubt that when difficulties are experienced in learning, achievement is frustrated. For this reason, one of the issues that any educational programmed should address seriously is the difficult level of a course or subject. To achieve the goal of any course or subject, the difficulty level of its contents must match the developmental level of students involved. Levels of difficulties perceived or experienced by students in mathematics have been addressed by some researchers.

Students sometimes prejudge their performance to certain activities or topics and categorize them as either easy or difficult based on their perceptions. Test results however do not always confirm these perceptions. One perceives only what he/she wants to pay attention to and that which the person is interested in. His or her needs, motives and social situation all affect the manner by which reality is filtered. Marton(1988) carried out the seminal work in the area of learning difficulties and found that learning difficulties are influenced significantly by student's perception of the learning environment. Ramdem (1991) reported the influence of teaching characteristics on learning difficulties which includes the teaching methods, teacher enthusiasm and commitment and the pace and level at which information is presented.

Furthermore, surface learning difficulties have been reported to be influenced by factors like overload of work, student's perception of the relevance of the content, assessment process requiring and rewarding reproduction of content, poor teaching, poor student teacher interpersonal relationship and lack of opportunity for self management (Macro, 1983 ; Marton,1997).

The study of Macro (1983) dealt with the perceived and actual learning difficulties. He investigated the relationship between student's perceived and actual learning difficulties in College Algebra. Results of the Spearman Rank Difference co-relation revealed that a significant positive co-relation existed between perceived and actual learning difficulties in mathematics. Topics such as exponents, radical linear and quadratic equations, inequalities and solving verbal problems were identified to be difficult.

Through this research I tried to find learning difficulties of students in secondary school mathematics which consequently affected their learning strategies. In our context students may have a variety of attitudes. However, these attitudes are not systematically studied so that I am interested to find out these attitudes which have direct bearing on learning difficulties in secondary school mathematics.

Statement of the Problem

This study was mainly concern about learning difficulties of students in secondary school mathematics. So, it was well appropriate to discussed about the learning difficulties faced by secondary school mathematics students to improve the condition. It is an indisputable fact that individuals are differently endowed. As a result of this, the way and manner they perceive issues are of course different. Perceptions are subjective and idiosyncratic but they can provide teachers useful information that may affect planning of lessons and decision making in the classroom.

Reality is not always perceived in its exact form. The following were the main related research question for the study:

- What topics are perceived difficult by the students?
- What is the relationship between student's perceived and actual learning difficulties?
- What is the difference between male and female actual learning difficulties?

Objective of the Study

This study was undertaken to determine if there exists any relationship between student's perceived and actual learning difficulties in mathematics at the secondary school level.

The objectives of the study were as follows:

- To identify topics perceived difficult by students in secondary school mathematics.
- To determine if there exists any significant relationship between perceived and actual learning difficulties in secondary school mathematics.
- To determine if there exists any difference in student's actual learning difficulties across gender.

Research Hypothesis

The following hypotheses were formulated and tested at 0.05 level of significance:

Ho1: There is no significant relationship between perceived and actual learning difficulties in secondary school mathematics.

Ho2: There is no significant difference between boys and girls actual learning difficulties in mathematics.

Significance of the Study

This study was concerned with the learning difficulties of students in secondary school mathematics. Mathematics had been an important place in the curricula of all levels of school education. Most of the students were weak in mathematics. However, it was felt that most of the students dislike mathematics and afraid of it. Students were not clear concept about mathematics. The following were the significances of this study:

- Its finding would help to improve the mathematics achievement of students.
- This study would open the doors for the further study in learning difficulties of students in secondary school mathematics.
- This study would help to mathematics teachers at class while teaching mathematics.
- This study would help for the curriculum designer while designing the curriculum for them.

Delimitation of the Study

Some limitations of the study were in listed below:

- The study was only in the Rautahat District of Nepal.
- It was selected at least 10% schools from Rautahat District.
- It was included in secondary level (Class IX & X).
- The sample of study was selected by stratified random sampling from Rautahat District.
- The researcher was assuming that the test as well as the split-half is reliable.

Definition of Related Terms

Difficulty

In this study, difficulty is defined as the thing or situations that cause problems faced by students in learning mathematics at secondary level.

Learning Difficulties

Learning difficulties is obstruction in learning of mathematics in which students feel due to communication, interaction, pattern and behavior, participation and learning opportunities at home and school.

Actual Learning Difficulties

In this study, actual learning difficulty is obstacles of mathematics which is measured by MAT.

Student's Perceived Difficulty

Student's perceived difficulty is obstacles of mathematics difficult under mathematics contents prescribed by curriculum at secondary level which is measured by SPMDCQ.

Chapter-II

REVIEW OF RELATED LITERATURE

Review of Literature

This review of related literature should conclude was the summary of area of agreement and disagreement in findings. Reviews of articles that summarize related study were often useful ensuring time and effort. Capitalizing on the review of expert research could be fruitful for such review as those include in the review of educational research are already critical and provides helpful ideas and suggestion. This chapter described the Theoretical Literature, Conceptual Framework and Empirical Literature of this study.

Empirical Literature

Ghimire (2005) did a case study on "Difficulties on learning Algebra". The objectives of the study were to identify the difficulties on content of algebra and to identify the difficulties on the classroom practices. This study was conducted with the sample size of four blind students. The students were selected by random sampling process. Different tools such as: observation, interview and writer test were applied to identify their learning difficulties on algebra. The study conducted that the blinds students have able to only add, subtract, multiply of simple very short algebraic terms but unable to divide and they have limited knowledge about factorization, HCF and LCM. They were only recognized the equation but cannot solve it and the co-ordinate geometry was not of their capacity. The major difficulties of the blind student found such as: to develop clear concept on subject matter, to write algebraic concept, to solve process of mathematical problem in Brail script, to adjust in integrated class in learning mathematics and to use material and methods in mathematics learning.

Poudyal (2008) did a study on "Difficulties in learning mathematics". The objectives to identify the difficulties in learning mathematics of stone Quarries students at school and to find out the cause of difficulties in learning mathematics of stone Quarries students at school level. The sample of this study was 4 public schools in Kathmandu district at near to Chovar V.D.C. of only five stone Quarries students at lower secondary level. Interview and observation were the main instruments of this study. Finding of this study was there is no sufficient time for mathematics learning at home for stone Quarries students. There is discontinuity between practices of mathematical concepts in school and home. Also the learning environment at home and school, that creates the difficulties in mathematics learning.

A study conducted by Tirosh (2000) on prospective teachers conducted that prospective teacher's abilities to analyze the reasoning behind student's responses were very poor. This suggests that novices sometimes fail to make sense of student's work, resulting in failure to understand the children's learning difficulties. Tirosh recommended that teachers in training must be helped to understand the mathematics thought processes of their students. Tirosh goes further to suggest that more effort should be devoted to exploring how prospective teachers' programs could improve teachers' knowledge of children's way of thinking.

Slavin (2003) learned helplessness is the expectation, based on experienced, that one's actions will ultimately lead to failure. It is an internal factor and relates to student confidence sometimes; learned helplessness is also related to external factors. For example, some students lack help for learning mathematics. They failed in mathematics because of rarely getting help in their learning process. If they achieved academic success on certain mathematics exams, they thought that there were instability factors, such as luck. Otherwise, failures are based on some uncontrollable

factors, such as knowledge of mathematics foundations and loss of interest in the subject or low ability in mathematics learning and lack of ability. There self confidence can be enhanced thru guiding them to improve learning skills and correct negative attribution.

Kafle (2001) studied on "A study on attitude of secondary level students and teachers towards compulsory mathematics curriculum." He selected fifteen teachers and one hundred sixty students from Kavre district and concluded that secondary level students had appositive attitude where as teacher has negative attitude towards secondary level compulsory mathematics curriculum. The secondary level boys and girls had similar attitude towards compulsory mathematics curriculum. The mean attitude towards compulsory mathematics had no difference than their teacher attitude score on compulsory mathematics.

Shrestha (1991) has conducted a study on the topic "A study of sex difference achievement in mathematics of nine grade students in Gorkha district." The objective of this study was to determine the sex influence achievement in mathematics. He prepared two sets up tools, which are achievement tests and questionnaire and administered them to two hundred eighty students of five schools. He applied test to conclude that boy devote more time than girls at home study mathematics together with all subjects and to perform better than girls in mathematics achievements.

Hanich(2001). Study on article "Performance across different areas of mathematical cognition in children without learning difficulties." Performance of 2010, second grader in different areas of mathematical cognition was examined. Children were divided into four achievement groups. Although children with difficulties in mathematics performed across worse than normally achieving groups in

most of areas of mathematical cognition, those with difficulty only in mathematics show an advantage over the group with difficulty in both mathematics and reading.

Van Grinsven and Tillema (2006) report in the article, Learning Opportunities to Support Student Self Regulation: Comparing Different Instructional Formats, on the need for teachers to provide environments for students to learn and participate in organizing their own learning and knowledge acquisition. This study in vocational programs, involving 623 sixteen to eighteen year old students, categorized, factors of different types of learning environments. He found student motivation had the strongest influence and largest impact on use of regulated learning strategies. Motivation was greater in environments where autonomy rather than teacher control was the norm. Another finding of the study regarded student perception of the learning environment. If student perceived the environment as promoting self regulated learning, the data indicated students participated and put more effort into learning. When students reached this turning point, they experienced a lack of motivation to learn mathematics. Many of the students mentioned that they were not motivated to succeed in their math classes. Some expressed that they do not have support from home to motivate them. Others did not see the value of their education for their future or how learning mathematics would apply to their situation, which consequently reinforced their negative attitudes towards having to learn mathematics.

Sharma (2004) did a study on “Appropriateness of arithmetic contents of secondary level mathematics curriculum”. The objective of this study was to examine the appropriateness of arithmetic contents of secondary level mathematics curriculum on the basis of content weight age perspective and re-organizational perspective, to examine the relevancy of arithmetic contents of secondary level mathematics curriculum to the practical life needs of people in different occupations and to suggest

some pedagogical implications. This study was descriptive survey type. In addition, it is qualitative and observational as well. Moreover, the sample population consisted of purposively selected twenty two mathematics teachers of secondary level from each mentioned occupations. The simple statistical tools such as mean and percent were used to analyze the information descriptively, logically and analytically. The major findings of this study was the course could hardly be finished within the allocated time, unitary method, simple interest, profit and loss and area of plane figures of secondary level arithmetic curriculum could be taught at lower secondary level.

Khadka (2006) did study on "Factor influences the attitudes towards the learning mathematics to the children of Ex-Kamaiyas". The objectives of the study were to find out the factor influencing the attitudes towards learning mathematics to the children of Ex-Kamaiyas in kailali district and like and dislike factors of mathematics to the focused group. Interview observed and case study is applied together related information and data. This study concluded that school condition, socio-economic status of Ex-Kamaiyas teachers attribution expectation usefulness of mathematics mechanism distributer of incentives, average of focused children, over crowed classroom teachers of incentives average of focused children parent low involvement in education found that most influencing attitudes in learning mathematics. Similarly low family income, trend of tuition, trend of grace mark system, on trained teacher and non-experience teachers, high gap between the school and community relation myths and misconception towards mathematics anxiety towards mathematics, non availability of textbook on time, lack of local teacher facilities and teaching materials, low interaction between the students, teachers and parents conflict have influenced the attitude of the learning mathematics.

Mahara (2010) did a study on “Difficulties in learning mathematics of Tamang students at lower secondary level”. The objectives to identify the impact of home environment to Tamang children to learn mathematics at school. This research is qualitative. The sample of this study was only five students of class VII at all the students. This study was as one of the non-probability sampling. The main tools used to collect the information for this study were; in-depth interview, observation form and written documents. Finding of this study were Tamang financial condition is not strong enough to send their children school and afford them in their further education. Since the size of Tamang family is large, the children of Tamang parents do not have conductive environment for mathematics do not have conductive environment for mathematics learning.

Crawford et al. (1993) found that the majority of students perceived mathematics as “numbers, rules and formulae” (p. 213). For some students awareness of mathematics involves simply the recall of facts and the use of formal procedures. These views were associated with what he calls a “surface approach” to learning mathematics, that is, “the reproduction of knowledge and procedures” (p. 212). Research revealed that many students relate mathematics mainly with computations (Iddo& Ginsburg, 1994). Many students tend to identify mathematics with arithmetic. Doing mathematics is normally associated with calculations. It is widely maintained in the literature that negative images and myths of mathematics are widespread among the students. Many students view mathematics as a difficult, cold and abstract subject. It is perceived by many students as an exclusive discipline Behaghor (2013). From epistemological and pedagogical perspectives, it is perceived as a subject that involves a lot of work. The subject is seen as an obstacle, often dreaded and as hard work. Mathematics is also viewed as a static and objective discipline, available for

discovery by mathematicians, in turn to be transmitted by teachers and received by the students.

Theoretical Literature

The researcher was discussed the theoretical framework for the study that would support the significance learning difficulties of students in secondary school mathematics. There were many learning theories which could be used for the analysis and interpretation of data such as social learning theories, conflict theories, sociological theories, structural functionalist theories, cultural language theories, learning disability theories, everyday life theory and cultural difference and discontinuity theory and so on. So for the analysis and interpretation of data the researcher was used learning disability theory which discussed in this section.

Learning Disability Theory

Learning disability is a classification including several areas of functioning in which a person has difficulty learning in a typical manner, usually caused by unknown factor or factors. Given the "difficulty learning in a typical manner" this does not exclude the ability to learn in a different manner. Therefore, some people can be more accurately described as having a "Learning Difference", thus avoiding any misconception of being disabled with a lack of ability to learn and possible negative stereotyping.

While learning disability, learning disorder and learning difficulty are often used interchangeably, they differ in many ways. Learning disabilities is when a person has significant learning problems in an academic area. These problems, however, are not enough to warrant an official diagnosis.(en.wikipedia.org/wiki/Learning_disa…..)

In the 1980s, the National Joint Committee on Learning Disabilities (NJCLD) defines the terms learning disability as: A heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical abilities. These disorders are intrinsic to the individual and presumed to be due to Central Nervous System Dysfunction. Even though a learning disability may occur concomitantly with other handicapping conditions (e.g. sensory impairment, mental retardation, social and emotional disturbance) or environmental influences (e.g. cultural differences, insufficient/inappropriate instruction, psychogenic factors) it is not the direct result of those conditions or influences. It used the term to indicate a discrepancy between a child's apparent capacity to learn and his/her level of achievement.

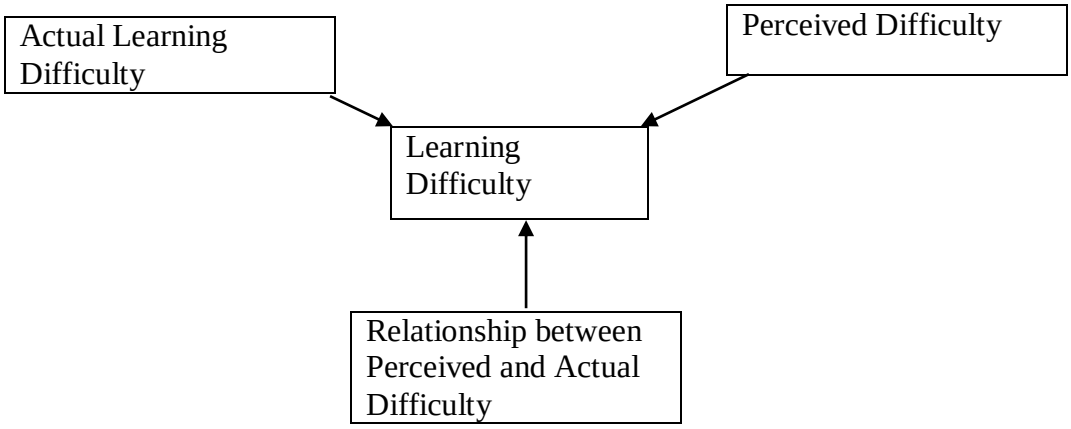
Learning disability is a burning problem of the modern era, one in secondary school mathematics students is likely to suffer this condition. Teachers and parents are becoming more and more aware of the condition; state has also shown sensitivity to the reality of learning disability and has created certain provisions in the policy and practice to help students with learning disabilities.

Conceptual Framework:

This study tried to identify the learning difficulties of students in secondary school mathematics from the already described different empirical and theoretical literature; the conceptual framework has purposed to identify the difficulties and to find the learning difficulties of students in secondary school mathematics. In this review we found the researches along with findings of the people likeKafle(2001), Shrestha(1991), Tirosh(2000), Slavin(2003), Hanich(2001), Ghimire(2005), Van Grinsven and Tillema(2006), Sharma(2004), khadka(2006), poudyal(2008), Mahara(2010), Crawford et al. (1993). They all would have reported the problems

almost same regarding learning of different topics of learning difficulties of students in secondary school mathematics. The combination of the theoretical notions-learning disabilities theory was helpful in exposing the learning difficulties of students in secondary school mathematics.

Conceptual Framework of Learning Difficulties in Mathematics



This conceptual framework describes about the secondary school mathematics students. There are three factors as students' perceived difficulty, actual learning difficulty and relationship between perceived and actual learning difficulties are main elements of learning difficulties in secondary school mathematics students. It was based on survey research. Mathematical difficulty of every student necessary for this study included in it. Mathematical difficulty found out on the based on survey form specially, for secondary students. Finally, learning difficulties of every student found out by making questionnaire.

Chapter-III

METHODS AND PROCEDURES

This chapter contains the methodology to be done to achieve the objectives of the study and to get the answer of the statements of the problems. It describes the design of the study, population and sample, data collection tools, reliability and validity of tools, data collection procedure, data analysis procedure etc.

Design of the Study

The design of the study was survey design concerning with primary data. The primary data was collected by questionnaire and achievement test from sampled students of secondary school mathematics. This study attempts to investigate the relationship between perceived and actual learning difficulties of students in secondary school mathematics. The quantitative technique was adopted for the analysis of data. Thus, this is the survey research design nature.

Population and Sample

The population of this survey was secondary school mathematics students. The sample unit was selected by Stratified Random Sampling method. The study was undertaken in Rautahat district. Researcher was selected at least six schools from Rautahat District. Initially, the sample size was a total of 240 Secondary students(Grade IX & X); and this is made up of 120 boys and 120 girls. Forty (40) students are randomly selected from each of the four co-educational secondary schools in the study area.

Data Collection Tools

Questionnaires were also the major tools for this study. The researcher was developed the set of questionnaire to know the selected students information.

Every study required tools to collect data. Therefore, this study was using the following data collection instruments.

- Student's perception of mathematics difficult concept questionnaire (SPMDCQ)
- Mathematics achievement test (MAT)

SPMDCQ: -SPMDCQ is a 22- item questionnaire measured on a 4- rating scale of very difficult (VD), difficulty (D), simple (S) and very simple (VS). This was structured to determine the topics perceived to be either simple or difficult by students.

MAT: -MAT is constructed with 25 multiple choice questions in accordance with the twenty two items in the questionnaire. This is used to determine the actual learning difficulties topics by students in terms of scores.

Reliability and Validity of Tools

The reliability and validity of tools was established by using theory and literatures with pilot study. The researcher administrated the test among twenty five students of Janasewa Higher Secondary School, Kirtipur, for the pilot testing of questionnaire and achievement test. It was found that of SPMDCQ(questionnaire) and MAT(achievement test) was determined using the split-half test. Using the Pearson's Product Moment Correlation (PPMC), 0.86 (Appendix-G) and 0.63(Appendix-H) were obtained for SPMDC and MAT respectively.

Scoring Procedure

SPMDC was scored using a score range of four (4) for very difficult, three(3) for difficult, two for simple and one for very simple. Items with mean difficult level below 2.5 grouped as simple and items with mean difficult level greater than 2.5 are grouped as difficult.

MAT was consisting of twenty five multiple choice questions with four distracters and one correct option lettered a-d. Each correct answer attracted four(4) marks. There was twenty two area at secondary level and twenty five multiple choice questions included from each area and extra three questions were selected from contents as mensuration, area of triangle and parallelogram and circle which has high weighted given by curriculum.

Data Collection Procedure

The study was carried out on the students at Rautahat district based on primary data. The researcher visited each of the sample students to collect the data. The survey forms were filled up in the direct supervision of researcher. The data were collected by administrator by provide the questionnaire and achievement test among the sampled students.

For data collection, the researcher visited each of the selected schools, meet the Head teacher and other teacher staffs, and explain in detail the purpose of the visiting. Then the researcher selected the name of students by help of teacher and Head teacher, according as objectives. Then the achievement score of each selected students are listed. This approach was followed in all of the selected school in sample. In addition, the researcher visits the selected students and notes the extra information of the students by questionnaire form. The instruments were administered from school to school with the assistance of the subject teachers in each of schools.

Data Analysis Procedure

The researcher analyzed the data by applying the mean($\bar{X}$), percentage (P%), standard deviation(σ) and two tailed t-test at 0.05 level of significance. Correlation is the relationship between two or more paired variables or more sets of data, the degree of two or more sets of data. The degree of relationship was measured and represented

by the Spearmans' rank order correlation method as the data were in ordinal scale. The rank order correlation method was used to compute the correlation between students' perceived and actual learning difficulties towards secondary school mathematics. The correlation coefficient was used for analyzing the comparisons of students' perceived and actual learning difficulties about mathematics between different categories. The statistical tool of t-test was used to find out the significant difference between mean score of perceived(questionnaire) and actual learning (achievement test) difficulties in secondary school mathematics students as well as mathematics achievement with respect to boys and girls. The t-test was used to compute the relation between boys and girls of achievement test. The results were presented in line with the research questions/hypothesis posed.

Chapter-IV

ANALYSIS OF DATA AND INTERPRETATION OF RESULTS

This is a small scale survey research related to learning difficulties of secondary school mathematics students in Rautahat District. The objectives of this study were to identify topics perceived difficult by students in secondary school mathematics, to determine if there exists any significant relationship between perceived and actual learning difficulties in secondary school mathematics and to determine if there exists any difference in student's actual learning difficulties across gender. The major tools used for this study were achievement test and questionnaire.

This chapter includes the analysis of data and interpretation of results. Those data were tabulated and analyzed using mean, percentage, standard deviation and significance of the perceived and actual learning difficulties at secondary school mathematics students. Thus the data was analyzed and interpretation under the following headings:-

- Identification of topics perceived difficult by students in secondary school mathematics.
- Relationship between perceived and actual learning difficulties is secondary school mathematics.
- Comparison of actual and perceived difficulties across gender.

Identification of Topics Perceived Difficult by Students in Secondary School Mathematics

Perceived difficulty is obstacles of mathematics difficult under mathematics contents prescribed by curriculum at secondary level which is measured by SPMDCQ. The main aim of this study is to explore and identify the contents area of

secondary level mathematics according to perceived difficulty level of study towards mathematics as it is perceived by the secondary school students. Students also perceived difficulty in mathematics as an obstacle and attribute failure to their own lack of inherited mathematical ability.

This study explores the influence of students' perceptions on mathematics achievement at secondary school in Rautahat district. In Nepal, mathematics is a perceived as a difficult subject, accessible only to the few.Mathematics achievement in Rautahat is abnormally poor (Flash report, 2071). Many people hold the view that mathematics is only for the clever ones, or only for those who have 'inherited mathematical ability'. Another widely held belief is that mathematics is a male dominant subject. One another stereotyped image is that boys are better in mathematics than girls(Ernest, 2001). Thus, many adults accept this lack of accomplishment in mathematics as a permanent state over which they have little control. The origin of different student perceptions is the individual life histories that each student brings to mathematics learning. Perceptions of what mathematics is and is not, may affect attitudes, performance, confidence and perceived usefulness mathematics.

As shown in Appendix- C, topics like circle, unitary method, mensuration,construction of parallelogram,quadratic equation, trigonometry,area of triangle and quadrilateral, home arithmetic, simultaneous equation and compound interest, population growth and compound depreciation with difficult level above 2.50 are perceived difficulty by students. Whereas topics like sets, construction of triangle,probability, profit, loss and discount, HCF and LCM, simplification of algebraic fractions, roots and surds, simple interest, ratio and proportion, indices,

percentage and statistics with difficulty level below 2.50 are perceived simple by the students.

As shown in Appendix- C topics like unitary method, mensuration and circle were very difficult(VD) for students. The home arithmetic,area of triangle and quadrilateral, quadratic equation, simultaneous equation, construction of parallelogram and trigonometry were difficult(D) for students. The sets, profit, loss and discount, percentage, ratio and proportion, indices, roots and surds, probability, statistics and compound interest, population growth and compound depreciation were simple(S) for students and the simple interest, HCF and LCM, construction of triangle and simplification of algebraic fractions are very difficult(VS) for students were secured marks by students from survey form.

Considering all the respondents of the study in Students' Perception of Mathematics Difficult Concept Questionnaire. The questionnaires showed a good response rate from the research participants. At the end of the data collection phase, the total number of the completed questionnaires was 240, it was found that ten (10) out of twenty-two (22) or 45% of the learning topics were perceived by the respondents as difficult to achieve. This shows clearly that the students lack confidence in their mathematical ability in achieving most of the topics learnt in secondary school mathematics. If, as it is seen in this study, students believe they are unable to tackle 45% of the topics learnt, it is obvious that 55% cannot earn them a pass talk less of a credit in mathematics. Their negative beliefs about themselves as learners of mathematics prevent them from improving their mathematics performance, since they believe that it is beyond their ability to perform well (Chapman, 1988) Hence the poor results recorded in our internal and external examinations year in year out.

Relationship between Students' Perceived and Actual Learning Difficulties in Secondary School Mathematics

There were two instruments, the Students' Perception of Mathematics Difficult Concept Questionnaire(SPMDCQ) and the Mathematics Achievement Test(MAT) were used for collecting data.

SPMDCQ was a 22-item questionnaire measured on a 4-rating scale of very difficult(VD), difficult(D), simple(S) and very simple(VS). This was structured to determine the topics perceived to be either simple or difficult. SPMDCQ was scored using a score range of four for very difficult, three for difficult, two for simple and one for very simple.

MAT was the twenty five(25) multiple choice questions constructed from the twenty two items in the questionnaire. This was used to determine the actual learning difficult topics by students. MAT consisted of twenty five multiple choice questions with four distracters and one correct option lettered a-d.

As shown Appendix –D were two instruments perceived and actual learning difficulties. X denoted the weighted mean of perceived difficulty or questionnaire and Y denoted the percentage of actual difficulty or mathematics achievement test. Rx denoted the rank order of X or perceived difficulty, Ry denoted the rank order of Y or actual difficulty, D denoted the difference between Rx and Ry and also D^2 denoted the square of D.

The area of secondary level mathematics included weighted mean of questionnaire (Perceived difficulty) and mean of achievement test (Actual difficulty) of sets were 2.30 and 0.17, unitary methods were 2.91 and 0.83, percentage were 2.48 and 0.43, home arithmetic were 2.63 and0.63, profit, loss and discount were 2.34 and

0.48, simple interest were 2.18 and 0.42, compound interest, population growth and compound depreciation were 2.55 and 0.48, mensuration were 2.87 and 0.54, HCF and LCM were 2.21 and 0.71, simplification of algebraic fractions were 2.25 and 0.49, indices were 2.44 and 0.38, roots and surds were 2.37 and 0.49, ratio and proportion were 2.43 and0.33, simultaneous equation/variable were2.62 and 0.51, quadratic equation were 2.68 and0.65, area of triangle and quadrilateral were 2.67 and 0.58, construction of triangles were 2.22 and 0.50, construction of parallelograms were 2.73 and 0.50, circle were 2.93 and 0.54, trigonometry were 2.53 and 0.48, statistics were 2.48 and 0.57 and probability were 2.30 and 0.39.

The area of secondary level mathematics included weighted mean of questionnaire (Perceived difficulty) and mean of achievement test (Actual difficulty) of the vast difference of the area of mathematics were sets, unitary method, quadratic equation, probability and circle because these problem of achievement test were practiced regularly in school and home. The vast similar of the area of mathematics were simple interest, compound interest, population group and compound depreciation, HCF and LCM, construction of triangle, trigonometry because these problems of achievement test were already complete the course and practiced regularly.

The computations in Appendix -D shows that there was a negative correlation($r = -0.50$) between the perceived and actual difficulty scores. This means that as the level of perception of learning difficulties increases, the performance in actual learning decreases and vice versa.

The computations in Appendix-E shows that there was a negative correlation ($r = -0.45$) between the perceived and actual learning difficulties scores of only difficult topics. This means that as the level of perception of learning difficulties increases, the performance in actual learning decreases and vice versa.

Table No. 1

Correlation between Students' Perceived and Actual Learning Difficulties

GROUPS	N	Correlation Coefficients (r)	t- value based on correlation	t- critical	Conclusion
Perceived	22	-0.50(negative)	-2.57	-2.086	significance
Actual	22				

The above table shows that the number of area at secondary level mathematics included were 22 from both perceived and actual learning difficulties group. The correlation coefficient of perceived and actual learning difficulties was -0.50. The calculated value of t was -2.57 but the tabulated t-value at 0.05 levels was 2.086. So, the calculated t-value is lower than tabulated t-value. It shows that there is the relationship between students' perceived and actual learning difficulties. Since, the concluded t-value is not exceeded the tabulated t-value, so the null hypothesis was accepted. Thus, it was concluded that there is no significant relationship between students' perceived and actual learning difficulties in secondary school mathematics.

Table No. 2

Correlation between Perceived and Actual Difficulties of Only Difficulty Topics

GROUPS	N	Correlation Coefficients (r)	t- value based on correlation	t- critical	Conclusion
Perceived	10	-0.45(negative)	-1.43	-2.306	No significance
Actual	10				

The above table shows that the number of area at secondary level mathematics included were 10 from both perceived and actual learning difficulties group. The correlation coefficient of perceived and actual learning difficulties was -0.45. The calculated value of t was -1.43 but the tabulated t-value at 0.05 levels was 2.306. So, the calculated t-value is higher than tabulated t-value. It shows that there is the difference between students' perceived and actual learning difficulties. Since, the concluded t-value is exceeded the tabulated t-value, so the null hypothesis was rejected. Thus, it was concluded that there is no significant difference between students' perceived and actual learning difficulties in secondary school mathematics.

Also, there was a negative significant relationship between the perceived and actual learning difficulties of students. Students' with mathematics learning difficulties due to their repeated experience of failure are those who present the most maladapted attribution patterns because the type of attributions that the students make will have repercussion at both the cognitive (expectation) and the affective domain (self concept). It is the self concept level that that determines their motivation and degree of involvement in classroom activities. Doubting their own abilities, they exaggerate the magnitude of their deficiencies, and tend to attribute their failure to lack of ability. The more they magnify their deficiencies, the less they perform. These set of students show low expectations of success, and give up easily in the face of difficulties. The finding of negative relationship is at variance with earlier finding of Marco (1983) who found a positive relationship between the perceived and actual learning difficulties of mathematics students.

Comparison between Actual and Perceived Learning Difficulties across Gender

Perceived difficulty is obstacles of mathematics which is the students' perception of mathematics difficult under mathematics contents prescribed by

curriculum at secondary level which is measured by SPMDCQ. The main aim of this study is to explore and identify the range of perceptions, beliefs and attitudes towards mathematics as it is perceived by the secondary school students. Actual learning difficulty is the obstacles of mathematics which is measured by MAT.

The mean, percentage, standard deviation and corresponding t-value of the scores obtained by students' perceived and actual learning difficulties are presented the following table.

Table No. 3

Comparison of Actual and Perceived Difficulties of Boys' Mathematics Score

GROUPS	N	Correlation Coefficients (r)	t- value based on correlation	t- critical	Conclusion
Perceived	22	-0.38(negative)	-1.83	-2.086	No Significance
Actual	22				

The above table shows that the number of area at secondary level mathematics included were 22 from both perceived and actual learning difficulties of boys group. The correlation coefficient of perceived and actual learning difficulties of boys was -0.38. The calculated value of t was -1.83 but the tabulated t-value at 0.05 levels was 2.086. So, the calculated t-value is higher than tabulated t-value. It shows that there is no relationship between students' perceived and actual learning difficulties or achievement test of boys. Since, the concluded t-value is exceeded the tabulated t-value, so the null hypothesis was rejected. Thus, it was concluded that there is no significance difference between students' perceived and actual learning difficulties of boys in secondary school mathematics.

Table No. 4

Comparison of Actual and Perceived Difficulties of Girls' Mathematics Scores

GROUPS	N	Correlation Coefficients (r)	t- value based on correlation	t- critical	Conclusion
Perceived	22	-0.71(negative)	-4.51	-2.086	Significance
Actual	22				

The above table shows that the number of area at secondary level mathematics included were 22 from both perceived and actual learning difficulties of girls' group. The correlation coefficient of perceived and actual learning difficulties of girls was -0.71. The calculated value of t was -4.51 but the tabulated t-value at 0.05 levels was 2.086. So, the calculated t-value is lower than tabulated t-value. It shows that there is the relationship between students' perceived and actual learning difficulties of girls. Since, the concluded t-value is not exceeded the tabulated t-value, so the null hypothesis was accepted. Thus, it was concluded that there is no significant relationship between students' perceived and actual learning difficulties of girls in secondary school mathematics.

Table No. 5

Comparison of Actual Difficulty of Boys' and Girls' Mathematics Scores

GROUPS	N	X	P	SD	D	t-value	t-critical	Remarks
Boys	120	72.96	60%	17.2	238	10.66	1.96	No Significance
Girls	120	47.92	40%	19.2				

Significance at 0.05 levels. (Two tail test)

The table shows that mean scores of boys are 72.96 and the mean scores of girls are 47.92. It shows that the mean scores of 120 boys are higher than the mean scores of 120 girls. The percentage of the boys is 60% and girls are 40%. The standard deviation of boys is 17.2 and that of girls is 19.2. The calculated t-value is 10.66. Since the calculated

t-value is greater than the tabulated t-value, so the null hypothesis was rejected. Thus, it was concluded that there is no significant difference between boys' and girls' actual learning difficulties in secondary school mathematics. It means that the boy students are better achiever than of girl students.

Table No. 6

Comparison of Perceived Difficulty of Boys' and Girls' Mathematics Scores

GROUPS	N	X	P	SD	d	t-value	t-critical	Remarks
Boys	120	260.14	45%	39.60	238	-12.37	-1.96	Significant
Girls	120	314.18	55%	26.99				

Significance at 0.05 levels. (Two tail test)

The table shows that the number of boys is 120, mean scores are 260.14, percentage is 45% and the standard deviation is 39.60. It shows that the number of girls is 120, mean scores are 314.18, percentage is 55% and the standard deviation are 26.99 and degree of freedom of the boys and girls are 238. The calculated t-value is -12.37. Since the calculated t-value is less than the tabulated t-value, so the null hypothesis was accepted. Thus, it was concluded that there is no significant relationship between boys' and girls' perceived learning difficulties in secondary school mathematics. It means that the boy students are better achiever than of girl students.

Furthermore, a significant difference was found to exist in the actual learning difficulties across gender in favor of the males. This finding supports earlier studies of Leichardt, et al (1997), who found that males do better in mathematics than females while females perform better in reading tests. The finding agrees also with Udousoro(2000) which reports a significant difference in mathematics learning outcomes in favor of the males. Appendix- F shows that the calculated t- value of 10.66 is greater than the critical value of 1.96 at 0.05 significant level. This implies that there is a significant difference between the male and female actual learning difficulties in mathematics.

Chapter-V

SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

After the analysis and interpretation of the collected data, according to the design of the study, in this concluding chapter an attempt has been made to summarize and enlist the finding, provide some recommendation for pedagogical purpose. The first section of this chapter presents the summary of the research, second section presents the finding and third section presents the conclusion based on findings. Finally, the last section presents the recommendation based on the finding and conclusion of the study.

SUMMARY

This is a small scale survey research related to learning difficulties of students at secondary school mathematics in Rautahat District. The objectives of this study were to identify topics perceived difficult by students in secondary school mathematics, to determine if there exists any significant relationship between perceived and actual learning difficulties in secondary school mathematics and to determine if there exists any difference in student's actual learning difficulties across gender.

For this study the researcher selected 10% public schools of Rautahat district. The researcher selected 240 students; 120 students were male and 120 students were female. The researcher use to questionnaire form for students. It is SPMDCQ and MAT from perceived and actual learning difficulties. To standardize test, pilot test was conducted at Janasewa Higher Secondary School, Panga, Kirtipur. The researcher calculated the SPMDCQ was a 22-item questionnaire measured on 4 rating scale of very difficult (VD), difficult (D), simple (S) and very simple (VS) and multiple 4 by

VD, 3 by D, 2 by S and 1 by VS. Items with mean difficult level below 2.5 are grouped as simple and items with mean difficult level greater than 2.5 are grouped as difficult. There was a negative significant relationship between the perceived and actual learning difficulties of students. The researcher calculated the mean, percentage, standard deviation, split-half test of boys and girls students' achievement scores. The mean score of boy students was compared with girl students. It is two tailed t-test at 0.05 level of significance.

FINDINGS

On the basis of the analysis, the findings of the study are as follows:

- Items with mean difficult level below 2.5 are grouped as simple and items with mean difficult level greater than 2.5 are grouped as difficult. So, in this study, researcher found that the high difficult topics were circle, unitary method, mensuration and simple topics were simple interest,HCF and LCM, construction of triangle, simplification of algebraic fractions from questionnaire(Perceived difficult).
- In this study, researcher found that there was a negative significant relationship between the perceived and actual learning difficulties of students.
- In this study, researcher found that there was a negative significant difference between the perceived and actual learning difficulties of students of difficult topics.
- The mean achievement score of boys was 72.96, percentage was 60% and standard deviation was 17.20. Similarly, the mean achievement score of girls was 47.92, percentage was 40 and standard deviation was 19.20. Researcher found that there was significant difference between the mean achievement of

boys and girls from actual difficulty. Whereas, boys had higher mean achievement than girls in secondary school mathematics.

- Researcher found that the correlation coefficient of perceived and actual learning difficulties of boys were -0.38(negative), t-value was -1.83(negative), t-critical value was 2.086 and result was no significant(-1.83>-2,086). So, there was no significant relationship between perceived and actual learning difficulties of boys in secondary school mathematics.
- Researcher found that the correlation coefficient of perceived and actual learning difficulties of boys were -0.71(negative), t-value was -4.51(negative), t-critical value was 2.086 and result was no significant(-4.51<-2,086). So, there was no significant difference between perceived and actual learning difficulties of girls in secondary school mathematics.
- The mean scores of boys were 260.14, percentage was 45% and standard deviation of boys was 39.60. Similarly, the mean scores of girls were 314.18, percentage was 55% and standard deviation was 26.99. Researcher found that there is significant relationship between the mean score of boys and girls from perceived difficulty. Whereas girls had higher mean score than boys in secondary school mathematics.

CONCLUSIONS

The finding of this study has shown that one's perception of the difficulty of an item is not parallel with the outcome when one is exposed to reality. Some biases and personal prejudices, basically the offshoot of one's perceptions, may have affected the results. Students who perceived some topics simple failed to perform well in the actual situation. Furthermore, the results of the study indicate that the students'

actual performance is gender sensitive. The finding of the study, it is concluded that the achievement of boys students is better than that of girls students

RECOMENDATIONS

The following recommendations are made based on the findings of the study: Similar studies could be conducted at all levels of schools and sample could be selected from different district. Mathematics teachers should understand the perceptions of their students and try to adopt instructional strategies that whatever students perceive as easy would really turn out to be easy and whatever is difficult may be properly addressed to improve students' achievement. School administrators should provide proper counseling of students on matters related to them to realize that perceptions are not always real.

REFERENCES

Carnine, D. ,Jitendra, A. , &Silbert, J. (1997). *A descriptive analysis of mathematics curricular materials from a pedagogical perspective.*Remedial and special education, P-3.

Chapman, E. (1998): Workload and the Quality of Students' Learning. *Studies in Higher Education*, 8(3), 34 – 42.

Dumont, J.J. (1994). *Leerstoornissen.* Deel-1: theories en model [Learning disabilities. Part-1 : theory and model]. Rotterdam :Lemniscaat.

Flash Report (2071).*KantipurJarnal*, Bhadra-22, p.- 5.

Garnet, T. (1998*).Math learning Disabilities.*Division for Learning Disabilities Journal of CEC.

Ghimere, D. (2005). *Difficulties in learning algebra.* An unpublished Master's Thesis FOE. TU Kirtipur.

Hanich, (2001).*A study on article "Performance across different areas of mathematical cognition in children with learning difficulties."*

Jaishi, P.R. (2013). *Difficulties in learning mathematics of Tamang students.* An unpublished Master's Thesis FOE. TU Kirtipur.

Kafle, B.R. (2001). *A study on Attitude of Secondary Level Students and Teachers towards Compulsory Mathematics Curriculum.*Master's Thesis, Department of Math Education, T.U., Tahachal.

Khadka, B.K. (2006). *The Factor Influencing the Attitudes towards the Learning Mathematics to the Children of Ex-Kamaiyas.*An Unpublished Master's Thesis FOE. TU Kirtipur.

Lange, T. (2009).*Difficulties, meaning and marginalization in mathematics learning as seen through children's eyes.*Ph.D. Thesis in mathematics education.The

international doctoral school of engineering, science and medicine; Technology and science, Department of education, learning and philosophy, Aalborg University.

Leiuhardt, G.; Seewald, A. &Engelra, B. (1997), Learning What is Taught,Sex Differences in Instruction; *Journal of Educational Psychology*,60, 43 – 90.

Learning disability theory-wikipedia.the free encyclopedia. (en.wikipedia.org/wiki/Learning_disa….)

Levine, M. (1993).*All Kinds of Minds.*Retrieved from http://www.pbs.org.

Louden, L. (2000).*Signs of Arithmetic.*Government of South Astralia. Retrieve from http://www.decd.sa.gov.au.

Mahara, J.D. (2010). *Difficulties in Learning Mathematics of Tamang Students.*An Unpublished Master's Thesis, TU Kathmandu, Nepal.

Marco, F.B. (1983). *Correlation between Student's Perceived and Actual Learning Difficulties in Mathematics IV,* Unpublished Masters Project, Marikina Institute of Science and Technology.

Marton, F.S. (1997). *Approaches to Learning.* Edinburgh: Scottish Academic Press.

Pangali, L.R. (2012). *Difficulties in Learning Arithmetics at Grade IX*. An unpublished Master's Thesis FOE. TU Kirtipur.

Pant, B. (2006). *A study of learning difficulties in Mathematics among grade V students in the Kathmandu valley of Nepal.*A doctoral dissertation submitted to the faculty of Education. TU Kirtipur.

Poudyal, K.P. (2008). *Difficulties in Learning Mathematics: A case study of stone quarries student at Chovar VDC.* An Unpublished Master's Thesis, TU Kirtipur.

Sharma, L. (2004). *Appropriateness of Arithmetic Students of Secondary Level Mathematics Curriculum.*An Unpublished Master's Thesis, TU Kirtipur.

Shrestha, M.B. (1991). *A study of sex difference in achievement in mathematics of nine grade students in Gorkha district.* Master's Thesis, Faculty of Education, T.U., Kirtipur

Slavin, R. (2003). *Educational psychology: Theory and practice (7thed.).*Bostin, MA: Allyn and Bacon.

Tirosh, D. (200). *Enhancing prospective teachers' knowledge of children's conceptions: The case of division of fractions,* Journal for Research in Mathematics Education, 31(1), 5-25.

Udousoro, U. J. (2000), The Relative Effects of Computer and Text – Assisted Instruction on Students' Learning Outcomes in Mathematics. *An Unpublished Ph. D. Thesis of The University ofIbadan*

Van Grinsven, L., and Tillema, H. (2006).*Learning Opportunities to Support Student Self Regulation: Comparing Different Instructional Formats.* Educational Research, 48(1), 77-91.

Appendix- A

QUESTIONNAIRES

Dear Student

As a part of the requirements for the master degree of mathematics education. I am going to conduct a research on the topic "Learning Difficulties of Students in Secondary School Mathematics."

This questionnaire consisting of 25 multiple choice questions is related to compulsory mathematics at secondary level. There are two parts of instruments SPMDCQ(Student's Perception of Mathematics Difficult Concept Questionnaire) and MAT(Mathematic Achievement Test). SPMDCQ is a 22 items questionnaire measured on a 4-rating scale of Very Difficult(VD), Difficult(D), Simple(S) and Very Simple(VS). MATis with 25 multiple choice questions with three distracters and one correct option lettered a-d. Each correct answer attracted four marks. The validity and reliability of the study will depend on you kind co-operation to have your unbiased response. Please study the questions carefully and give your opinion by putting tick (√) on any one of the four ratting scale of VD, D, S and VS stand for strongly disagree for each questions.

Form No.: Date:

School: Address:

Sex: Girls ☐ Boys ☐ Grade:

Survey Form

Perceived Difficulty of Students on Mathematics Contents at Secondary Level

Content	VD	D	S	VS	TOTAL
1. Sets					
2. Unitary Method					
3. Percentage					
4. Home Arithmetic					
5. Profit, Loss and Discount					
6. Simple Interest					
7. Compound Interest, Population Growth and Compound Depreciation					
8. Mensuration					
9. HCF and LCM					
10. Simplification of Algebraic Fractions					
11. Indices					
12. Roots and Surds					
13. Ratio and Proportion					
14. Simultaneous Equation					
15. Quadratic Equation/ Variable					
16. Area of Triangle and Quadrilateral					
17. Construction of Triangle					
18. Construction of Parallelogram					
19. Circle					
20. Trigonometry					
21. Statistics					
22. Probability					

VD = Very Difficult

D = Difficult

S = Simple

VS = Very Simple

Appendix- B

Mathematics Achievement Test for Secondary Level Students

1. Which of the following sets is true?

a.) $n(A \cap B \cap C) = n(A \cap B) - n(A) + n(B \cap C) - n(B) + n(C \cap A) - n(C) + n(A \cup B \cup C)$

b.) $n(A \cup B \cup C) = n(A) - n(A \cap B) + n(B) - n(B \cap C) - n(C) + n(C \cap A)$

c.) $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(C \cap A) - n(A \cap B \cap C)$

d.) $n(A \cap B \cap C) = n(A \cup B \cup C) + n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(C \cap A)$

2. A and B together can do a piece of work in 12 days. They worked together for 4 days, then A left. If B alone can do the remaining work in 10 days, in how many will A alone do the work?

a.) 50 days b.)60 days c.) 65 days d.) 70 days

3. If a person pays Rs. 14,280 on his annuals income of Rs. 82,000 and the allowance of Rs. 31,000, what will be the rate of income tax?

a.) 28% b.)30% c.)32% d.) 35%

4. The minimum charge for the first 100 calls telephone is Rs. 250. If the charge for each additional call is Rs. 2.75. How much will be the charge for 300 telephone calls?

a.) Rs. 500 b.)Rs. 600 c.)Rs. 800 d.)Rs. 1000

5. What's the simple interest when 2 paisa per rupee is paid per month as interest?

a.) 2% b.)12% c.)20% d.) 24%

6. The cost prize of X and Y is Rs. 1800 and Rs.2200 respectively. If X and Y are sold 10% profit on X and 5% loss on Y, how much is profit or loss as a whole?

a.) Rs. 30 profit b.) Rs.30 loss

c.) Rs. 70 profit d.)Rs. 70 loss

7. Suraj bought a watch for Rs. 5,000 and sold it for Rs. 4050 after two years. What was the rate of depreciation?

a.) 5% b.)6% c.)8% d.) 10%

8. If 4m, 3m and 2.5m be the length, breath and height of a rectangular room, then what is the area of 4 walls of the room?

a.) $32m^2$ b.) $35m^2$ c.) $42m^2$ d.) $48m^2$

9. The volume and height of a cylinder are $770cm^3$ and 5cm respectively. What is the area of base of the cylinder?

a.) $354cm^2$ b.) $254cm^2$ c.) $154cm^2$ d.) $150cm^2$

10. Which one of the following shapes covers maximum area while 22 meters long rope is used to surround the shape?

a.) Rectangle b.)Triangle c.) Circle d.) Square

11. What is the H.C.F. of the given algebraic expressions (x^2y+2xy-6-3x)) and ($x^3 - 2x^2 + 8 - 4x$)?

a.) (x+1) b.)(x+2) c.)(x-1) d.)(x-2)

12. What is the value of $(x + y)^2 - (x - y)^2$?

a.) 2xy b.) $2x^2y^2$ c.) 4xy d.) $4x^2y^2$

13. Which of the following is true?

a.) $a^m \div a^n = a^{m+n}$ b.)$a^m \times a^n = a^{m-n}$

c.) $\sqrt[4]{a^m} = (\sqrt[4]{a})^m$ d.)$(ab)^{xy} = a^x \times b^y$

14. What is the value of m of the given algebraic expressions $\sqrt{m^3}$-3m+2 = m?

a.) 2 b.) 3 c.) 4 d.) 6

15. The present ages of a father and his son are 40 years and 8 years respectively. How many years ago, the product of their ages was 105?

a.) 5 years b.)6 years c.) 7 years d.) 8 years

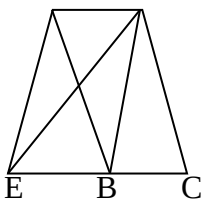
16. If 3 is added to one-third of the square of a natural number, the sum is 30. What is the number?

a.) 7 b.) 8 c.) 9 d.) 12

17. In the given figure, AE ∥ DB and EB = CB. If the area of ▲ABD is $25cm^2$, what will be the area of ▲CDE?

a.) $40cm^2$ b.) $48cm^2$

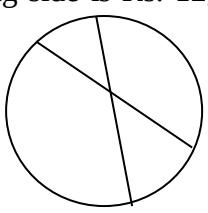
c.) $50cm^2$ d.) $54cm^2$



18. If the total income of the family given in the Pie Chart along side is Rs. 12,000, how much is the income from service?

a.) Rs. 5,000 b.)Rs. 4,000

c.) Rs. 3,000 d.)Rs. 2,000

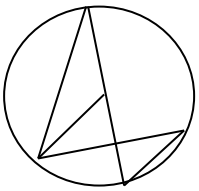


19. If a triangle ABC is drawn to circumscribe circle of radius 4cm such that the segments BD and DC into which BC is divided by the point of contact D are of lengths 8cm and 6cm respectively then find the sides of AB and AC.

a.) 13cm and 11cm b.) 15cm and 13cm

c.) 17cm and 15cm d.) 19cm and 17cm

20. In the given figure, what is the value of x and y?



a.) 64° and 32°b.)$32^{\circ} and 16^{\circ}$

c.) 80° and 40°d.) 72° and 36°

21. If the area of triangle ABC = 13m^2, AB = 4.3m and <B = 60, then what is the

Length of CB?

a.) 5.982m b.) 4.982m c.) 6.982m d.) 6.289m

22. In rectangle PQRS, point T is the midpoint of side QR and area of the rectangle PQRS is 2/9. What is the area of the quadrilateral PQTS?

a.) 2/3 b.)3/4 c.) 4/5 d.) 1

23. In parallelogram ABCD, AB = 10cm. The altitudes corresponding to the sides AB and AD are respectively 7cm and 8cm. what is the value of AD?

a.) 7.75cm b.) 8.75cm c.) 9.75cm d.) 6.75cm

24. If the value of X/Y is 60 and value of Z/Y is 60, what is the value of X/Y + X/Z?

a.) 60 b.) 61 c.) 62 d.) 120

25. If a coin (sides from H and T) or a dice (numbered from 1 to 6), then what is the probability of P(H,4)?

a.) 1/2 b.)1/4 c.) 1/6 d.) 1/12

Thank you for your kind co-operation for any study by giving your valuable opinions.

Yours

Hemraj Dhital

APPENDIX- C

Percentage analysis of responses of students towards perceived difficult topics

Area at Secondary Level	No. of Respondents				N	Weighted Mean	Decision
	VD	D	S	VS			
1.Sets	26	54	125	35	240	2.30	Simple
2.Unitary Method	85	74	56	25	240	2.91	Difficult
3.Percentage	41	66	100	33	240	2.48	Simple
4.Home Arithmetic	45	86	85	24	240	2.63	Difficult
5.Profit, Loss and Discount	34	52	115	39	240	2.34	Simple
6.Simple Interest	39	47	71	83	240	2.18	Simple
7.Compound Interest, Population Growth and Compound Depreciation	50	69	84	37	240	2.55	Difficult
8.Mensuration	84	78	40	38	240	2.87	Difficult
9.HCF and LCM	38	57	63	82	240	2.21	Simple
10.Simplification of Algebraic Fractions	41	57	63	79	240	2.25	Simple
11.Indices	43	59	98	40	240	2.44	Simple
12.Roots and Surds	34	66	95	45	240	2.37	Simple
13.Ratio and Proportion	37	66	100	37	240	2.43	Simple
14.Simultaneous Equation	48	82	80	30	240	2.62	Difficult
15.Quadratic Equation/ Variable	52	83	81	24	240	2.68	Difficult
16.Area of Triangle and Quadrilateral	52	85	74	29	240	2.67	Difficult
17.Construction of Triangle	51	30	79	80	240	2.22	Simple
18.Construction of Parallelogram	68	73	66	33	240	2.73	Difficult
19.Circle	82	81	54	23	240	2.93	Difficult
20.Trigonometry	50	72	70	48	240	2.52	Difficult
21.Statistics	48	62	86	44	240	2.48	Simple
22.Probability	34	59	91	56	240	2.30	Simple

APPENDIX- D

Computation of relationship between Perceived and Actual learning difficulties scores of students using Spearman rho-tied Ranks

Area at Secondary Level	X	Y	Rx	Ry	D=Rx-Ry	D^2
1.Sets	2.30	0.17	17.5	22	-4.5	20.25
2.Unitary Method	2.91	0.83	2	1	1	1
3.Percentage	2.48	0.43	11.5	17	-5.5	30.25
4.Home Arithmetic	2.63	0.63	7	4	3	9
5.Profit, Loss and Discount	2.34	0.48	16	15	1	1
6.Simple Interest	2.18	0.42	22	18	4	16
7.Compound Interest, Population Growth and Compound Depreciation	2.55	0.48	9	15	-6	36
8.Mensuration	2.87	0.54	3	7.5	-4.5	20.25
9.HCF and LCM	2.21	0.71	21	2	19	361
10.Simplification of Algebraic Fractions	2.25	0.49	19	12.5	7.5	56.25
11.Indices	2.44	0.38	13	20	-7	49
12.Roots and Surds	2.37	0.49	15	12.5	2.5	6.25
13.Ratio and Proportion	2.43	0.33	14	21	-7	49
14.Simultaneous Equation	2.62	0.51	8	9	-1	1
15.Quadratic Equation/Variable	2.68	0.65	5	3	2	4
16.Area of Triangle and Quadrilateral	2.67	0.58	6	5	1	1
17.Construction of Triangle	2.22	0.50	20	10.5	-9.5	90.25
18.Construction of Parallelogram	2.73	0.50	4	10.5	-6.5	42.25
19.Circle	2.93	0.54	1	7.5	-6.5	42.25
20.Trigonometry	2.52	0.48	10	15	-5	25
21.Statistics	2.48	0.57	11.5	6	5.5	30.25
22.Probability	2.30	0.39	17.5	19	-1.5	2.25
						$\sum D^2 = 893.5$

The following abbreviations are used in the table:

X = Perceived scores

Y = Actual scores

RX = Rank of perceived scores

RY = Rank of actual scores.

D = Difference between paired ranks

D^2 = Squares of differences between paired ranks

r = rank difference correlation coefficient

r = $\frac{1-6\sum D^2}{N(N^2-1)}$

We solved the above table by correlation,

$$r = \frac{1 - 6\sum D^2}{N(N^2 - 1)} = \frac{1 - 6 \times 893.5}{22(22^2 - 1)} = \frac{1 - 5361}{22 \times 483} = \frac{-5360}{10626} = -0.50$$

APPENDIX- E

Computation of relationship between Perceived and Actual learning difficulties scores of students using Spearman rho-tied Ranks of only difficult topics:

Area at Secondary Level	X	Y	Rx	Ry	D=Rx-Ry	D^2
Unitary Method	2.91	0.83	2	1	1	1
Home Arithmetic	2.63	0.63	7	3	4	16
Compound Interest, Population Growth and Compound Depreciation	2.55	0.48	9	9.5	-0.5	0.25
Mensuration	2.87	0.54	3	5.5	-2.5	6.25
Simultaneous Equation	2.62	0.51	8	7	1	1
Quadratic Equation/Variable	2.68	0.65	5	2	3	9
Area of Triangle and Quadrilateral	2.67	0.58	6	4	2	4
Construction of Parallelogram	2.73	0.50	4	8	4	16
Circle	2.93	0.54	1	5.5	-4.5	20.25
Trigonometry	2.52	0.48	10	9.5	0.5	0.25
						$\sum D^2 = 74$

The following abbreviations are used in the table:

X = Perceived scores

Y = Actual scores

RX = Rank of perceived scores

RY = Rank of actual scores.

D = Difference between paired ranks

D^2 = Squares of differences between paired ranks

r = rank difference correlation coefficient

r = $\frac{1-6\sum D^2}{N(N^2-1)}$

We solved the above table by correlation,

$$r = \frac{1 - 6\sum D^2}{N(N^2 - 1)} = \frac{1 - 6 \times 74}{10(10^2 - 1)} = \frac{1 - 444}{10 \times 99} = \frac{-443}{990} = -0.45$$

APPENDIX- F

T-test analysis of male and female actual scores in mathematics

GENDER	N	X	P	SD	DF	t-cal	t-crit	Decision at P<0.05
Male	120	72.96	60%	17.2	238	10.66	1.96	Significant
Female	120	47.92	40%	19.2				

APPENDIX- G

Split-half test method of SPMDCQ for Pilot Study:-

X	Y	X^2	Y^2	XY
58	64	3364	4096	3712
53	64	2809	4096	3392
55	58	3025	3364	3190
59	61	3481	3721	3599
56	57	3136	3249	3192
53	56	2809	3136	2968
62	63	3844	3969	3906
68	67	4624	4489	4556
61	62	3721	3844	3782
73	70	5329	4900	5110
58	55	3364	3025	3190
∑X=656	∑Y=677	$\sum X^2 = 39506$	$\sum Y^2 = 41889$	∑XY=40597

X = Odd
Y = Even

By Karl Pearson's Formula,

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{N}}{\sqrt{\sum X^2 - \frac{(\sum X)^2}{N}}\sqrt{\sum Y^2 - \frac{(\sum Y)^2}{N}}}$$

$$= \frac{40597 - \frac{656 \times 677}{11}}{\sqrt{39506 - \frac{(656)^2}{11}}\sqrt{41889 - \frac{(677)^2}{11}}}$$

$$= \frac{40597 - 40373.82}{\sqrt{39506 - 39121.45}\sqrt{41889 - 41666.27}}$$

$$= \frac{223.18}{\sqrt{384.55}\sqrt{222.73}}$$

$$= \frac{223.18}{19.61 \times 14.92}$$

$$= \frac{223.18}{292.58}$$

$$= 0.76$$

$$Reliability\ of\ full\ test = \frac{2r}{1+r}$$

$$= \frac{2 \times (0.76)}{1 + (0.76)}$$

$$= \frac{1.52}{1.76}$$

$= 0.86.$

APPENDIX- H

Split-half test methodof MAT for Pilot Study:-

X	Y	X^2	Y^2	XY
0	8	0	64	0
13	9	169	81	117
10	12	100	144	120
8	9	64	81	72
13	15	169	225	195
12	10	144	100	120
8	6	64	36	48
11	11	121	121	121
11	11	121	121	121
12	11	144	121	132
11	8	121	64	88
∑X=109	∑Y=110	$\sum X^2 = 1217$	$\sum Y^2 = 1158$	∑XY=1134

X = Odd
Y = Even

By Karl Pearson's Formula,

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{N}}{\sqrt{\sum X^2 - \frac{(\sum X)^2}{N}}\sqrt{\sum Y^2 - \frac{(\sum Y)^2}{N}}}$$

$$= \frac{1134 - \frac{109 \times 110}{11}}{\sqrt{1217 - \frac{(109)^2}{11}}\sqrt{1158 - \frac{(110)^2}{11}}}$$

$$= \frac{1134 - 1090}{\sqrt{1217 - 1080.09}\sqrt{1158 - 1100}}$$

$$= \frac{44}{\sqrt{136.91}\sqrt{58}}$$

$$= \frac{44}{11.70 \times 7.62}$$

$$= \frac{44}{89.15}$$

$$= 0.49$$

$$Reliability\ of\ full\ test = \frac{2r}{1+r}$$

$$= \frac{2 \times (0.49)}{1 + (0.49)}$$

$$= \frac{0.98}{1.49}$$

$= 0.66.$

APPENDIX- I

Statistical Formulae Used in the Analysis

1.) Mean:- $(\overline{X}) = \frac{\sum fX}{N}$

2.) Standard Deviation:- a.) $s = \sqrt{\frac{(X-\overline{X})^2}{N}}$, where $S^2 = \sigma$ is an unbised estimate population of standard deviation.

a.) $\sigma = h \times \sqrt{\frac{\sum fd'^2}{N} - (\frac{\sum fd'}{N})^2}$

3.) Correlation coefficient:-

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{N}}{\sqrt{\sum X^2 - \frac{(\sum X)^2}{N}} \sqrt{\sum Y^2 - \frac{(\sum Y)^2}{N}}}$$

4.) $Reliability\ of\ Full\ Test = \frac{2r}{1+r}$

5.) Rank order correlation coefficient:-$r = \frac{1-6\sum D^2}{N(N^2-1)}$

6.) Test concerning correlation coefficient:-$t = \frac{r}{\sqrt{1-r^2}}\sqrt{n-2}$

7.) $t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1{}^2}{N_1} + \frac{\sigma_2{}^2}{N_2}}}$

8.) Degree of Freedom = $N_1 + N_2 - 2$

9.) Weighted Mean $= \frac{VD \times 4 + D \times 3 + S \times 2 + VS \times 1}{N}$