# ATTITUDE OF STUDENTS AND MATHEMATICS TEACHERS TOWARDS STATISTICS AT SECONDARY LEVEL

A

THESIS

BY

PREM NEPAL

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE

DEGREE OF MASTER OF EDUCATION

SUBMITTED TO

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## LETTER OF CERTIFICATE

This is to certify that Mr. Prem Nepal, a student of academic year 069/070 with Campus Roll No.2159, Thesis No. 1090, Exam Roll No. 281167 (2070), T.U. Regd. No. 9-2-1148-2007 has completed his thesis under my supervision during the period prescribed by the rules and regulations of Tribhuvan University, Nepal. The thesis entitled, **"Attitude of Students and Mathematics Teachers towards Statistics at Secondary Level"** embodies the results of his investigation conducted during the period of 2017 under the Department of Mathematics Education, Central Department of Education, University Campus, Kirtipur, Kathmandu. I recommend and forward that his thesis be submitted for the evaluation for awarding the Degree of Master of Mathematics Education.

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(Mr. Abatar Subedi)

Supervisor

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(Assoc. Prof. Laxmi Narayan Yadav)

Head

Date: ………………….., 2018

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**LETTER OF APPROVAL**

**A**

**Thesis**

**By**

**PREM NEPAL**

**Entitled**

**ATTITUDE OF STUDENTS AND MATHEMATICS TEACHERS TOWARDS**

**STATISTICS AT SECONDARY LEVEL**

has been approved in partial fulfillment for the requirements for degree of the Master of Education.

| **Committee for the Viva-Voice** | **Signature** |
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| | |
| Assoc. Prof. Laxmi Narayan Yadav | ………………………… |
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Date: ………………., 2018

## ACKNOWLEDGEMENTS

**ABSTRACT**

The present study "attitude of students and mathematics teachers towards statistics at secondary level" is carried out to find out the attitude of students and teachers towards statistics and to find out the comparative attitude of boys and girls students as well as students and teachers towards statistics at secondary level.

The study adopted the descriptive survey design. 240 students and 25 teachers of Ilam district were selected as the sample of respondents by random sampling method. Two sets of opinionnaire were developed as the tools for data collecting. One set was used for the students and the another for the teachers. Both sets of opinionnaires were consisted of five level of statements classified into receiving, responding, valuing, organization and characterization according to the affective domain of David Krathwohl. The reliability of the opinionnaires was predicted by test-retest method.

The attitude scores of students and teachers were divided into five categories strongly disagree, disagree, undecided, agree and strongly agree for each item arranged in the likert scale. The obtained data was analyzed using percentage, mean, t-test and $\chi^2$-test at 0.05 level.

The result of the study showed that the students and mathematics teachers have positive attitude towards statistics, the boy and girl students do not have significant difference in attitude towards statistics, the students and mathematics teachers have a significant difference in attitude towards statistics at secondary level.

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**Chapter I**

**INTRODUCTION**

**Background of the Study**

Secondary level is the foundation for higher education. Therefore, to provide

mathematical foundation for higher education and to solve the daily life problems of

human being, mathematics curriculum is applied at secondary level.  In this

curriculum, there are eight areas of mathematics associated in a sequenced and

balanced way. They are set, arithmetic, menstruation, algebra, geometry,

trigonometry, statistics, and probability. Among these areas statistics is the scope of

this study. In the present curriculum of the secondary level mathematics, the topics

mean, median, mode, standard deviation, variance, mean deviation, quartile deviation,

pie-chart, histogram etc has been included in the chapter statistics. This chapter is

helpful to solve the daily life problems, to study the other subjects and for the higher

education.

There are hundreds of definitions of statistics that could be considered. In the

words of Kendall and Staurt "statistics is the branch of scientific method which deals

with the data obtained by counting or measuring the properties of population." Lovitt

defines statistics as the science which deals with the collecting, classifying,

presenting, comparing and interpreting numerical data collected to throw light on any

sphere of enquiry. Mood defines statistics as the technology of scientific method and

it is concerned with the designs of experiments and investigations, and statistical

inference. In the words of R.A. Fisher, "statistics is a branch of applied mathematics

which specializes in data." By seeing the above definitions we can conclude that

statistics is the branch of mathematics in which facts and information are collected, sorted, displayed and analyzed to make decision on various aspects.

In early times, "statistics" was considered only as the science of statecraft. However with passage of time the science of statistics has been applied very widely. So, in modern times, the scope of statistics has considerably enlarged. It is used not only to the state in administration but it is used in economics, science, business, research, bank, planning and health etc. Also statistics facilities comparison, helps in formulation of policies and in forecasting. It summarizes the data. Thus, we can say there is hardly any place of human activity where statistics has not been used.

The scope of statistics is broaden day to day. Statistics provides the ideas, knowledge and skills to the students for solving their daily life problems. But the researcher found different difficulty level and different understanding in students and teachers at secondary level on statistics. Those students who are not interested with mathematics are interested in statistics and learn statistics in harmonious way. On the other hand, some students feel boring and difficulty to learn about statistics. Also, for the better achievement of students there should be positive attitudes of students and teachers towards statistics. Jacson (2010) states that there is a successive connection between attitudes, learning, performance and practical utility of mathematics. Moreover, studies carried out by Yara (2009) showed that, attitude of students can be influenced by the attitude of the teacher and his method of teaching. Thus, for affective teaching and learning of statistics there should be positive attitude of students and teachers towards it. Hence, it was essential to find out the attitudes of students and teachers towards statistics at secondary level.

**Statement of the Problem**

The researcher worked in secondary schools for 3 years and assessed the mathematical performance and potential of students. The researcher studied the result of the students in mathematics and found that some of the students who are weak in other topics are good in statistics and some of the students who are good in other topics are weak in statistics.

Clark (2013) states that students' attitudes influence their performance, beliefs and behavior in classes, especially in terms of motivation and achievement. Moreover, Yara (2009) stated in his findings that teacher's attitude towards mathematics is a predictor of students' attitude in mathematics. Several studies revealed that positive attitudes are conducive to good achievement in mathematics. Thus, the researcher identified that the attitude is one of factors of learning mathematics to secondary students. Hence, the researcher had decided to study on the statement of the problem "attitude of secondary level students and teachers towards statistics.

The study was mainly concerned with the study of secondary level students´ and teachers' attitudes about the topic "statistics". This study was intended to answer the following questions:

- What are the attitudes of students towards statistics?
- What are the attitudes of teachers towards statistics?
- Does the attitude of male students differ that of female students towards statistics?
- Do the secondary level students and teachers have the same attitudes towards statistics?

**Significance of the Study**

Mathematics is an essential part of school curriculum. Mathematics learning helps the students to understand and interpret the important quantitative aspects. This is possible only if the attitude of the students and teachers towards mathematics is favorable. Statistics is one of the most important sectors of mathematics and for the better achievement of students there should be positive attitude of students and teachers towards it. So, it should be necessary to know the attitudes of teachers and students towards statistics. This study would have the following significance:

- According to the finding of this study, the curriculum designers can understand the attitude of students, their interest, demand and capacity towards statistics, which helps them to make student centered curriculum. Also, they can understand the attitude of teachers regarding many aspects of teaching statistics such as teaching objective, teaching materials, teaching methods, contents, weightage of marks, number of periods, evaluation process etc, which helps them to design a good mathematics curriculum.

- By seeing the result of this study, the teacher can understand the interest, demand, capacity and knowledge of students on statistics so that the teacher can apply the appropriate teaching methods, materials and evaluation process which helps to improve the teaching and learning process.

- The result of this study depicts the attitude of teachers about various aspects of statistics such as teaching objective, teaching methods, materials, evaluation process, contents of statistics, activities of students etc. This result helps the district education office and teacher training center to provide affective training for secondary level teachers according to their attitudes towards statistics.

- This study is also significant to the students. The result of this study helps in designing student centered curriculum, in providing affective teacher training and in applying student centered teaching learning process which leads the students to a good learning achievement .

- This study helps the researcher for further study. This study gives the attitude of secondary level students and teachers towards statistics, comparative attitude of male students and female students as well as students and teachers towards statistics. Thus, further research can be done in any gap of this research. The research can be done in higher level, in other districts, in other domains of mathematics such as algebra, vector, functions, analysis, trigonometry, arithmetic etc. or in any aspects of mathematics. This study also provides the ways of research for further study.

## Objectives of the Study

The objectives of this study were:

- To find out the students' attitude towards statistics at secondary level.

- To find out the mathematics teachers' attitude towards statistics at secondary level.

- To compare the attitude of boys students and girls students towards statistics at secondary level.

- To compare the attitude of students and mathematics teachers towards statistics at secondary level.

## Research Hypothesis of the Study

A research hypothesis is a specific, clear and testable proposition or predictive statement about the possible outcome of a scientific research study based on a

particular property of a population, such as presumed differences between groups on a particular variable or relationships between variables. Specifying the research hypothesis is one of the most important steps in the study because the research design is determined by the stated hypothesis.

The research hypotheses of this study were as follows:

- There is a positive attitude of students towards statistics at secondary level.

- There is a positive attitude of mathematics teachers towards statistics at secondary level.

- There is no significant difference between the attitude of boys and girls students towards statistics at secondary level.

- There is no significant difference between the attitude of students and mathematics teachers towards statistic at secondary level.

**Delimitation of the Study**

This study had the following limitations:

- This study was limited on the public and private secondary schools of Ilam district.

- This study was limited on urban and rural area of Ilam district.

- This study was limited to the students and teachers of grade IX and X.

- This study was limited on the compulsory mathematics of secondary level.

- This study was limited on a sample of 240 students and 25 teachers. They were selected by random sampling method.

- This study was limited on the opinionnaire.

**Operational Definition of Terms**

**Attitude.** In this study, the term "Attitude" means the thought, feelings, ideas, capacities, demands, and activities of students and teacher towards many aspects of statistics class at secondary level.

**Opinionnaire.** In this study, the term "Opinionnaire" means the set of statements which is constructed and distributed to the students and teachers to measure the inner concept, interest and attitudes towards many aspects of statistics at secondary level.

**Attitude scale.** In this study attitude scale is the scale used to measure the attitudes of students and teachers at secondary level towards statistics which was developed by the educator and psychologist Renis Likert named "Likert Scale". It has five choices strongly disagree, disagree, undecided, agree and strongly agree. This scale determine to what degree the students and teachers agrees, disagrees or neutral with the given statements.

**Community school.** In this study "Government school" means the schools of Ilam district which are established and financed by the government of Nepal.

**Institutional school.** In this study, the "Private school" means the schools of Ilam district which are established and financed by the private sector and does not receive the government funding.

**Secondary level.** In this study, the terms "Secondary level" refers to the stage of education which provides the secondary education by class IX and X in Ilam district.

**Statistics.** Statistics is the science which deals with the collecting, classifying, presenting, comparing and interpreting numerical data collected to throw light on any

sphere of inquiry. In this study, the term "Statistics" means the chapter included in the mathematics curriculum of public and private schools at secondary level.

**Urban area.** In this study, "Urban area" means the region enclosed in Ilam Municipality and Sunmai Municipality of Ilam district.

**Rural area.** By the term "Rural area" in this study we understand the remaining part of Ilam district excluding Ilam Municipality and Sunmai Municipality.

## Chapter II

## REVIEW OF RELATED LITERATURE

**Literature Review**

Review of related literature helps to conduct the new research in a systematic manner by providing the general outline of the research study and avoids the unnecessary duplications. The main purpose of review of related literature is to find out what work has been done and what work has not been done in the area of study being undertaken. Review of related literature helps the researchers to give better idea about the various component of the research. Mainly the literatures are previous thesis, books and journals, articles, different sources of website etc. Realizing the importance of literature review, some of the studies related to attitude towards mathematics have been reviewed.

Timsina (2008) carried out a research on "attitude of students and teachers towards solid geometry at secondary level". The objective of his research was to find out the attitude of students and teachers towards solid geometry and to compare the attitude of boys and girls as well as students and teachers towards solid geometry. This study was quantitative in nature and the design was considered as a survey type. He had selected 200 students and 15 teachers from 6 public and 4 private schools as a sample by purposive sampling method in the academic year 2063/64. He had used the Likert scale of five points for each items of the opinionnaire and the collected data were analyzed by applying $\chi^2$-test, t-test at 0.05 level of significance and calculating the mean and standard deviation. After analyzing the data he concluded that the secondary level students had a positive attitude towards solid geometry but the mathematics teachers had negative attitudes towards solid geometry. He also concluded that the secondary level boys had better attitude than those of girls' attitude

towards solid geometry and the secondary level students had the better attitude than those of teachers' attitude.

Ravanan, Mary and Julie (2008) conducted a study entitled "attitude towards mathematics of XI standard students in Trichy district". The purposes of the study were to investigate the difference of male and female, to investigate the difference of region, to investigate the difference of stream of study, to investigate the difference of medium of instruction, to investigate the difference scores of types of management and to investigate the difference of socio-economic status due to their attitude towards mathematics. This study adopted the descriptive survey design. The sample constituted 450 XI students drawn from 11 schools from government, aided and unaided in Trichy district. Random sampling was used to select the sample. The tools used for the study was mathematics attitude scale prepared and standardized by C. Dandapani (1992). After data was collected and classified the methods of analysis were used students' t-test, ANOVA, Chi-square test and Karl Pearson's product moment. The reliability and validity of tools were tested by split half method. At the end of the study, they concluded that; There is no significant difference in attitude towards mathematics of XI standard students in Trichy district, owing to differences in there gender, region and medium of instruction. Also They found that there is a significant difference in attitude towards mathematics XI standard students in Trichy districts, owing to differences in there stream of study, types of school management and socio-economic status. Moreover, they found that there is no significant association between attitudes towards mathematics of XI standard students in Trichy district regarding their gender and medium of instruction.

From the above two research, it is concluded that in descriptive survey research, the researcher can select the sample by purposive or random sampling and

can collect the data using the opinionnaire. The attitude score can be measure using the Likert scale or any other attitude scale. Finally, the researcher can analyze the data by applying $\chi^2$-test, t-text or ANOVA method.

Moreover, Mallick (2009) did a research on "attitude of secondary level students and teachers towards set theory". The objectives of her research were to find out the attitude of students and teachers towards set theory and to compare the attitude of boys and girls as well as students and teachers towards set theory. She selected 200 students from 20 sampled schools of Kathmandu valley by random sampling methods which was limited only in the public schools. The research was of quantitative, descriptive and survey type. She developed opinionnaires and used the Likert scale to measure the attitudes of students and teachers towards set theory. She used mean, standard deviation, $\chi^2$-test and t-test at 0.05 level of significance to analyzed the collected data and concluded that the secondary level mathematics teachers had positive attitude towards set theory. She also concluded that there was no gender wise difference in attitude among students and between teachers and students towards set theory.

The above researches were also conducted to find out the attitude of students and teachers towards set theory which is in descriptive survey design. The researcher had used the opinionnaire and Likert scale to measure the attitude and analyzed the collected data using $\chi^2$-test and t-test at 0.05 level. Thus, this review also helped the researcher to conduct this study.

In the similar way, Yara (2009) conducted a study entitled "relationship between teacher's attitude and students' academic achievement in mathematics in some selected senior secondary school in southwestern Nigeria". The main objective

of the research was to find out the relationship among teachers' attitude and students' academic achievement in secondary school mathematics. The study was an ex-post facto type, which adopted descriptive survey design. 1542 students and 123 mathematics teachers were selected for the study. The data were analyzed using simple frequency and percentages. The findings revealed that there was a good and positive attitude of teachers towards the teaching of mathematics in secondary school in spite of the shortcomings that has bedeviled the teaching profession and particularly in the teaching of mathematics. It is very important that teachers of mathematics should be adequately remunerated and well equipped and be psychological prepared to teach the subject in the secondary schools.

Acharya (2010) conducted a descriptive survey research as his master's thesis entitled "attitude of secondary level mathematics teachers towards trigonometry at Kaski district". The main objective of this study was to find out the attitude of secondary level mathematics teachers towards trigonometry. It was also aimed to compare attitude of male and female, urban and rural, mathematics teachers towards trigonometry. A set of opinionnaire with 31 statements about trigonometry was taken as the tool for data collection. In his research, all the secondary level mathematics teachers who had been teaching in government schools of Kaski district were considered as the population. From the population, 21 teachers form urban area and 20 teachers form rural area were selected by using stratified sampling technique. He used $\chi^2$-test and t-test to analyze the collected data. After analyzing the result he concluded that the secondary level mathematics teachers had positive attitude towards trigonometry. He also found that, there was no difference in attitude among male and female mathematics teachers as well as urban and rural mathematics teachers towards trigonometry.

From the above two research, it is concluded that in descriptive survey research the sample can be drawn by stratified random sampling method. The researcher can apply the opinionnaire as a tool of the study and can analyze the data using $\chi^2$-test and t-test or simple frequency and percentages.

In addition, Jackson (2010) did a research entitled "attitudes towards learning and performance in mathematics among students in selected secondary schools in Bureti district, Kenya". The purpose of this study was to investigate the attitudes' influence towards learning and performance in mathematics by students in secondary schools in Bureti District. The objectives of the study were: a) to determine the attitudes form by the students towards learning and performance in mathematics, b) to find out whether such attitudes contributed to inappropriate learning of mathematics and consequently poor performance in secondary schools and c) to established factors which influence attitude towards learning and performance of mathematics among secondary school students. The study adopted a descriptive survey design and data was largely descriptive by nature. Data was collected using questionnaires. These were administered on a sample of 24 teachers 359 student respectively selected from six secondary schools in Bureti district. The data were analyzed by SPSS method. Findings indicated that the major problem associated with attitudes in the learning of mathematics in the secondary schools included lack of confidence and interest in the ability to learn and perform well in mathematics as reported by 45% of the respondents. Lack of interest in mathematics was mentioned by 24% of the respondents with regards to attitudes towards  mathematics as a subject, 56 % of the respondents strongly agreed that they enjoyed learning mathematics as a subject. In addition, the same percentage (56%) strongly disagreed that mathematics classes/lessons were not interesting. Out of the students respondents 49% of them

strongly agreed that they would like to continue doing mathematics after secondary schools. Only 38% of the respondents strongly disagreed that understanding mathematics was difficult while 70% of the respondents strongly agreed that mathematics was a very useful subject in life.

The above research had also adopted the descriptive survey design. The sample were taken using simple random sampling method and the data were collected using the questionnaire. The researcher analyzed the collected data using SPSS method.

Similarly, Khatiwada (2010) conducted a quantitative survey as his master's thesis entitled "a study on attitude of secondary level students and teachers towards probability". The objectives of the research were to find out the attitude of student and teachers towards probability and to compare the attitude of boys and girls as well as students and teachers towards probability. The study adopted the descriptive survey design and also 200 students and 25 mathematics teachers were selected as a sample for the study. He had used the Likert scale of five points for each items of the opinionnaire and the collected data were analyzed by calculating the mean value and t-test at 0.05 level of significance. After analyzing the study, he concluded that the secondary level students and mathematics teachers had a positive attitude towards probability. Also, he concluded that there was no gender wise differences in attitude among students towards probability and both the boys and girls had significantly better attitude than teachers towards probability. Likewise, he found that the secondary level students who had positive attitude had more achievement score than those students who had negative attitude towards probability.

Jazdzewski (2011) did a research entitled "attitudes about mathematics: compare and contrast boys and girls from high and low socio-economic status". The

main purpose of this study was to compare the attitudes about mathematics for boys and girls in grade III through VIII from high and low socio- economics status. The study was considered as a survey design. There were a total of 533 students surveyed. Likert scales of five responses were used to give score on each statement of the tools. Attitude scores were analyzed using SPSS and a three-way ANOVA. The only attitude that was found statistically significant was stereotype of mathematics as a male domain. For this attitude, it was found that gender and SES did play a role. Girls were much less likely to stereotype math as a male domain than boys at all grade levels. High SES students were less likely to stereotype math as a male domain than low SES students at all grade levels, with the exception of grade VIII. Gender and SES do not seem to play a role in the other attitudes about mathematics.

From the above two researches, it is concluded that in descriptive survey research, the researcher can use the opinionnaire and the Likert five point scale in collecting and scoring the data  and also the researcher can apply $\chi^2$-test, t-test or ANOVA method to analyze the data.

Kannan, Sivapragasam and Sen Thilkumar (2015) conducted a study entitled "attitude of secondary school students towards mathematics". The objectives of the study were to develop the attitude scale towards mathematics for secondary school students, to find the different between; government and self- finance, government and government- aided, government- aided and self-finance, male and female, urban and rural, English and Tamil medium secondary school students towards mathematics. The normative survey method were used for the study. 200 Students were selected by the random sampling technique in Palani educational district, Tamil Nadu, India. An attitude scale was used and the collected data were analyzed by calculating the mean, standard deviation and t-test. The result showed that the secondary school female

students had a better attitude towards mathematics than that of male students, the self-finance and government-aided secondary school students had a better attitude towards mathematics than that of government secondary school students. also, the researcher found that there was no significant difference between English and Tamil medium, between the government- aided and self- finance secondary school students' attitudes towards mathematics.
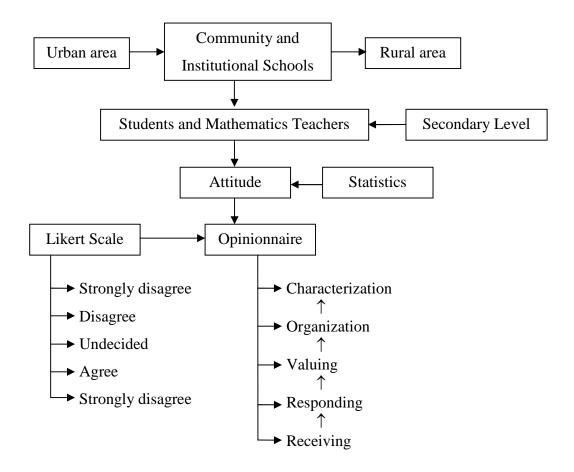
From the above review, it is concluded that in survey research the sample can be drawn by random sampling method. The opinionnaire and the Likert scale can be used to measure the data. Also, the mean, standard deviation and t-test can be used to analyze the collected data,

Hence, it had seen that many researches were conducted about the attitude of students and teachers towards mathematics but the study about the attitude of students and teachers towards statistics at secondary level, comparative study about the attitude of boy and girl students towards statistics and the comparative study about the attitude of students and teachers towards statistics at secondary level had not be conducted in Nepal. So, the researcher had conducted the study on this field and the review of the above mentioned studies had helped the researcher to refine the research problem, to develop significance for the research, to identity the methodology, to choose the appropriate tools and the method of analysis of the collected data.

**Conceptual Framework of the Study**

A conceptual framework is a theoretical structure of assumptions and rules that holds together the ideas comprising a broad concept. Generally conceptual frameworks is presented either in graphical or narrative forms, which shows the

relation between the variables and bring clarity and focus to see and organize the research question more clearly.

This study was based on a conceptual framework that depicts the attitude of students and mathematics teachers of community and institutional schools including both urban and rural areas. It is a type of research method that attempts to connect the various aspects of inquiry. E.g. problem, tools, variables etc. are presented in the conceptual framework of the study. Standing on the base of the literature review, the conceptual framework of this study was constructed by the researcher is as follows:



In this study, the community and institutional schools were selected as the sample of the study from both the urban and rural area. From those sampled schools, the students and mathematics teachers were selected from grade IX and X to find out their attitude towards statistics chapter of compulsory mathematics.

To find out the attitude of students and teachers towards statistics, two sets of opinionnaire were used. Both sets of opinionnaire were consisted of five level of statements classified into receiving, responding, valuing, organization and characterization on the affective domain of David Krathwohl. The opinionnaire were focused on the various aspect of statistics chapter of compulsory mathematics, such as curriculum, textbook, teaching learning activities, evaluation, teaching methods, nature of students and their classroom activities etc. Furthermore, to collect the responses on each of the opinionnaire, the Likert scale of five choices strongly agree, agree, undecided, disagree and strongly disagree was used.

**Chapter III**

**METHODS AND PROCEDURES**

This chapter is the most important part of the research which provides the ways of research to achieve the goal of the study. This section explains the nature of the study in detail. It includes not only the design but also the population and sample of the study, tools and the procedures needed for the data collection. It also explains the procedure of data analysis. These studies were essentially enumeration of the opinions of secondary level students and mathematics teachers about statistics. The major procedures for this study were done as follows:

**Design of the Study**

This study used the descriptive survey design. Survey is a kind of descriptive research in which the information, opinion and attitude of the respondents are collected through the questionnaire, interview or observation and the data are analyzed by the various statistical methods.

According to Creswell, (2014), a survey design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population. From sample results, the researcher generalizes or draws inferences to the population. In this study also, the thoughts, opinions and feelings from the group of students and teachers towards statistics are collected through the opinionnaire. Thus, this study is based on the survey design.

**Population of the Study**

All the secondary level students and mathematics teachers of Ilam district were taken as the population of this study.

**Sample of the Study**

There were altogether 124 secondary schools in Ilam during the academic year 2073. Out of them 36 schools were private and 88 schools were public. In this study, 12 public and 12 private schools were selected as the sample of the schools by stratified sampling method including both the urban and rural areas. Also, from those sampled schools, 240 students and 25 teachers were selected as the respondents by random sampling technique.

Also, the samples of students were selected from 6 public and 6 private secondary schools from both the urban and rural area of Ilam district. From each of the selected schools, 10 students (5 boys + 5 girls) were selected from both the grade IX, X by random sampling method.

Also, out of all the secondary level mathematics teachers of Ilam district, 25 teachers were selected randomly. For that, including all the secondary level mathematics teachers of sampled school, 12 other secondary level mathematics teachers were selected from urban and rural areas including 3 public and 3 private schools.

**Instruments**

Every study requires tools to collect data.  Since this study was conducted to collect the attitude or belief of an individual, the opinionnaire was most appropriate tools for the data collection. So, the collection of data for this study was done with the help of the set of opinionnaire.

In this study two sets of opinionnaire were used. One set were used for students and another for the teachers to collect their attitude towards statistics. In both of the set of opinionnaire, both the positive and negative statements were put. Also,

both sets of opinionnaire were consisted of five level of statements classified into receiving, responding, valuing, organization and characterization on the affective domain of David Krathwohl. The opinionnaire were focused on the various aspect of statistics chapter of compulsory mathematics, such as curriculum, textbook, teaching learning activities, evaluation, teaching methods, nature of students and their classroom activities etc. Furthermore, to collect the responses on each of the opinionnaire, the Likert scale of five choices strongly agree, agree, undecided, disagree and strongly disagree was used. The model of previous opinionnaire from reviewed thesis had been followed to prepare the opinionnaire for this study according to the guideline of the supervisor.

**Reliability and Validity of Tools**

To predict the reliability of the opinonnaire, the researcher used the test- retest method. The coefficient of correlation of the attitude scores of students was found as 0.87 and that of teachers was found as 0.95. Both coefficients showed that there is high degree of reliability on the opinionnaire. Also, the opinionnaire was taken from the reviewed literatures Mallik (2009), Acharya (2010), Khatiwada (2010) which are very similar to our objectives and prepared through the consultation with the supervisor. Hence, the validity of tool was established.

**Data Collection Procedures**

For the collection of data, the researcher visited each sampled school one by one. The researcher met the Head teacher and mathematics teachers of respective schools and explained the purpose of the study. After that the researcher had taken permission with head master and mathematics teacher along with the date and time for administering the opinionnaire.

In the second phase, the researcher visited the sampled schools in the given date and time by the headmaster and mathematics teachers. In some of the sampled schools, the opinionnaire were administered to the students during their mathematics period and in the remaining schools, the opinionnaire were administered at the end of school time. Also, some teachers were participated during their mathematics period and the rest were participated during their leisure period. The students and teachers were informed about the ways of respond to all items on each of the attitude scale with the help of instruction given along with opinionnaire.

After administering the opinionnaire, the collected data were tabulated by using Likert's method of summated rating for statistical analysis, which was as follows:

| Response | Favorable statement | Unfavorable statement |
| --- | --- | --- |
| Strongly Agree (SA) | 5 | 1 |
| Agree (A) | 4 | 2 |
| Undecided (U) | 3 | 3 |
| Disagree (D) | 2 | 4 |
| Strongly Disagree (SD) | 1 | 5 |

**Data Analysis Procedures**

After quantifying the opinionnaire, the researcher analyzed the data using mean value, percentage, t-test and $\chi^2$-test. The researcher used the Likert scale and found the mean value and percentages of attitude scores on 25 statements to find out the attitude of students and teachers towards statistics at secondary level. The mean value grater than 3 indicates the positive attitude and the mean value less than 3 indicates the negative attitude towards statistics. Also, the two tailed t-test at. 0.05 level of significance was used to find out the comparative attitude of boys and girls as well as students and teachers.

**Chapter IV**

**ANALYSIS OF DATA AND INTERPRETATION OF RESULT**

This study used the descriptive survey design which was conducted to find out the attitude of students and teachers towards statistics and to compare the attitude of male and female students as well as students and teachers towards statistics at secondary level. All the secondary level students and mathematics teachers of Ilam district were taken as the population of this study. In this study, 12 schools were selected from 36 private schools and 12 schools were selected from 88 public schools by stratified random sampling technique including both the urban and rural areas of Ilam district. Also, from those sampled schools, 240 students and 25 teachers were selected by random sampling technique. Two sets of opinionnaire were used as data collection tools. One set were used for students and the another for the teachers to collect their attitude towards statistics. To predict the reliability and the validity of the opinionnaire, the researcher used the test-retest method. Also, the opinionnaire were taken from the reviewed literatures, which were prepared through the consultation with the supervisor. The obtained data were analyzed using percentage, mean, t-test and chi-square test. The overall obtained data were analyzed and interpreted under the following headings.

- Attitude of students and mathematics teachers towards statistics at secondary level.

- Comparison of boy and girl students' attitude towards statistics at secondary level.

- Comparison of students' and teachers' attitude towards statistics at secondary level.

**Attitude of students towards statistics at secondary level**

The first objective of this study was to find out the attitude of secondary level students towards statistics at secondary level. In order to achieve this objective, the researcher formulated the hypothesis as "there is a positive attitude of students towards statistics at secondary level." For testing the significance of the statements, the number of responses of 240 students on 25 statements on each of five points of Likert scale is given in appendix-C. Also, the average score on each of five point of Likert scale and expected frequency are given in table 1.

**Table 1. Observed and Expected Frequencies of 240 Students**

|  | Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree | $\chi^2$-value |
|---|---|---|---|---|---|---|
| $f_0$ | 24.92 | 41.32 | 34.68 | 96.16 | 42.92 | 64.58 |
| $f_e$ | 48 | 48 | 48 | 48 | 48 | |

From the above table, the $\chi^2$-value of 240 students on 25 statement is 64.58, which is greater than the tabulated value of $\chi^2_{0.05,4} = 9.48$. Thus, the null hypothesis ($H_0$) is rejected. It shows that the statements are significant at 0.05 level.

Also, to find out the attitude of students towards statistics, the raw attitude score of 240 students are given in appendix-E. From appendix-E, the mean attitude score of 240 students on 25 statements is 3.46. In Likert scale, the number greater than 3 indicates the positive attitude. Hence, it shows that there is a positive attitude of students towards statistics at secondary level.

**Attitude of Mathematics Teachers towards Statistics at Secondary Level**

The second objective of this study was to find out the attitude of mathematics teachers towards statistics at secondary level. In order to achieve this objective the

researcher formulated the hypothesis as "there is a positive attitude of teachers towards statistics at secondary level." For testing the significance of the statements, the number of responses of 25 teachers on 25 statements on each of five points of Likert scale is given in appendix-D. Also, the average score on each of five points of Likert scale and expected frequency are given in table 2.

**Table 2. Observed and Expected Frequencies of 25 Teachers**

|  | Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree | $\chi^2$-value |
|---|---|---|---|---|---|---|
| $f_o$ | 0 | 4.12 | 1.16 | 15.24 | 4.44 | 29.08 |
| $f_e$ | 5 | 5 | 5 | 5 | 5 | |

From the above table, the $\chi^2$-value of 25 teachers on 25 statement is 29.08, which is greater than the tabulated value of $\chi^2_{0.05,4} = 9.48$. Thus, the null hypothesis ($H_0$) is rejected. It shows that the statements are significant at 0.05 level.

Also, to find out the attitude of teachers towards statistics, the raw attitude score of 25 teachers are given in appendix-F. From appendix-F, the mean attitude score of 25 teachers on 25 statements is 3.8. In Likert scale, the number greater than 3 indicates the positive attitude. Hence, it shows that there is a positive attitude of teachers towards statistics at secondary level.

**Students' and Teacher's Attitude towards Receiving Area**

Receiving area represents the lowest level of learning outcomes in the affective domain. Receiving refers to the students willingness to particular phenomena of stimuli (classroom activities, textbook etc.). In the table given below, 5 statements of the students' and teachers' opinionnaire under the receiving area has been presented, in which strongly disagree and disagree of the likert scale are merged into disagree. Also, agree and strongly agree are merged into agree. Also, the mean value and $\chi^2$-value are given in the table.

**Table 3. Students' Attitude towards Receiving Area**

| S.N. | Statements | A | UD | DA | M | $\chi^2$ | D |
|------|-----------|-----|-----|-----|-----|-----|-----|
| | Student's Responses (in %), N = 240 | | | | | | |
| 1 | I feel more curious while learning statistics. | 82.92 | 1.25 | 15.2 | 3.8 | 249.66 | S |
| 2 | The class of statistics is more interesting than other topic of mathematics . | 77.08 | 1.6 | 21.25 | 3.8 | 151.54 | S |
| 3 | Statistics is related with other topic of mathematics . | 42.92 | 33.75 | 23.33 | 3.2 | 98.37 | S |
| 4 | Only pupil with a very special talent can learn statistics. | 17.5 | 3.3 | 79.17 | 2.1 | 157.92 | S |
| 5 | The problem of statistics is always solved by a rule. | 62.92 | 13.38 | 23.75 | 3.5 | 99.04 | S |

*Note : A = Agree, UD = Undecided, DA = Disagree, M = Mean, D = Decision, S = Significant.*

From the above table, the first statement "I feel more curious while learning statistics" under the receiving area is the second highest significant statement with $\chi^2$-value 249.66 at 0.05 level. Also, 82.92% students are agreed and 15.8% are disagreed with this statement. It indicates that the greater numbers of students are interested and feel more curious while learning statistics.

Similarly, the statement "the class of statistics is more interesting than other topic of mathematics" is the 12th highest significant statement under receiving area with $\chi^2$-value 151.54% at 0.05 level. Also, it was found that 77.08% of the students are agreed and 21.25% disagreed with this statement. It shows that the greater majority of students are interested in the class of statistics rather than other topic.

Moreover, the third statement of receiving area is "statistics is related with other topics of mathematics" with $\chi^2$- value 98.37 at 0.05 level, which is significant. Also, it was found that 42.92% of the students are agreed, 23.33% are disagreed and 33.75% of the students are undecided with this statement. It indicates that, by a few

majority of students, there is a relationship between statistics and the other topics of mathematics.

About the fourth statement of receiving area "only pupil with a very special talent can learn statistics", the $\chi^2$- value is 157.92 at 0.05 level, which is significant. Also, it was found that 17.5% students are agreed and 79.17% of students are disagreed with this statement. It shows that the majority of students accepted that not only the talent students can learn statistics, all types of students can learn statistics.

Likewise, the fifth statement of receiving area is "the problems of statistics is always solved by a rule" with $\chi^2$- value 99.04 at 0.05 level, which is significant. It was found that 62.92% of the students are agreed, 13.33% are undecided and 23.75% are disagreed with this statement. It shows that the greater majority of students are in favor of this statement.

From the above table, the mean values of all the statements except the 4th statement are grater than 3. It shows that the students had positive attitudes towards the these statements under receiving area. Also, the 4th statement has the mean value 2.1, which is less than 3. It indicates that the students are not in favor of this statement. Also, the total mean value of receiving area is 3.28, which is greater than 3. Thus, it is concluded that there is a favorable attitude of students towards the statements in receiving area.

**Table 4. Teacher's Attitude towards Receiving Area**

| S.N. | Statements | A | UD | DA | M | $\chi^2$ | D |
|------|-----------|---|----|----|----|------|---|
| | Teacher's Responses (in %), N = 25 | | | | | | |
| 1 | The students and teachers both are curious and active while teaching statistics. | 80 | 00 | 20 | 3.68 | 45.5 | S |
| 2 | The knowledge of statistics is essential in secondary level. | 100 | 00 | 00 | 4.4 | 40 | S |
| 3 | Training is needed to teach statistics. | 96 | 00 | 04 | 4.48 | 34.4 | S |
| 4 | I would like to give the concept of statistics in psychological manner after finding out the student's discrimination. | 72 | 24 | 04 | 3.72 | 40.4 | S |
| 5 | I think without teaching materials, teaching of statistics is impracticable. | 52 | 04 | 44 | 3.2 | 21.2 | S |

*Note : A = Agree, UD = Undecided, DA = Disagree, M = Mean, D = Decision, S =*

*Significant.*

From the above table, the first statement under the receiving area is "The

students and teachers both are curious and active while teaching statistics" with $\chi^2$-

value 45.5 at 0.05 level, which is the eighth highest significant statement. Also, 80%

of the teachers are agreed and 20% are disagreed with this statement. It indicates that

the students and teachers both are curious and active while teaching statistics.

Also, the $\chi^2$- value of the statement "The knowledge of statistics is essential in

secondary level" under the receiving area is 40 at 0.05 level, which is significant.

Also, it was found that 100% of the teachers are agreed with this statement. It

indicates that the knowledge of statistics is essential in secondary level.

Likewise, the significant statement "Training is needed to teach statistics"

under the receiving area has the $\chi^2$- value 34.4 at 0.05 level. Also, 96% of the teachers

are agreed with this statement. It shows that the training is needed to teach statistics.

Similarly, the fourth statement under the receiving area is "I would like to give

the concept of statistics in psychological manner after finding out the students

discrimination" with $\chi^2$-value 40.4 at 0.05 level, which is the 13th significant

statement. It was found that 72% teachers are agreed, 24% are undecided and only 4% are disagreed with this statement. It shows that the majority of teachers were in favor of finding out the students discrimination before giving them concept of statistics in psychological manner.

Moreover, the fifth statement under the receiving area is "I think without teaching materials teaching of statistics is impracticable" with $\chi^2$- value 21.2 at 0.05 level, which is significant. It was also found that 52% of the teachers are agreed, only 4% of the teachers are undecided and 44% of the teachers are disagreed with this statement. This indicates that most of the teachers think that without teaching materials teaching of statistics is impracticable.

From the above table, the mean value of all the statements under the receiving area are greater than 3. It shows that the teachers are in favor of all the statements under this area. Also, the total mean of all the statements is 3.89, which is greater than 3. Thus, it is concluded that the teacher had highly positive attitude towards the statements under the receiving area.

**Student's and Teacher's Attitude towards Responding Area**

Responding refers to active participation on the part of the student. Learning outcomes in this area may emphasize acquiescence in responding, willingness to respond, or satisfaction in responding. In the table given below, 5 statements of the students' and teachers' opinionnare under the responding area has been presented, in which strongly disagree and disagree of the likert scale are merged into disagree. Also, agree and strongly agree are merged into agree. Also, the mean value and $\chi^2$- value are given in the table.

**Table 5. Student's Attitude towards Responding Area**

| S.N. | Statements | A | UD | DA | M | $\chi^2$ | D |
|---|---|---|---|---|---|---|---|
| | Student's Responses (in %), N = 240 | | | | | | |
| 6. | I don't care passing time, when I solve the problems of statistics. | 83.33 | 5.41 | 11.25 | 3.9 | 247.17 | S |
| 7. | The topic statistics is not appropriate at secondary level. | 7.5 | 19.58 | 72.92 | 4.1 | 144.17 | S |
| 8. | The understanding of statistics is affected by the lack of reference book. | 61.25 | 17.75 | 25 | 3.3 | 132.58 | S |
| 9. | The teachers gives hints to all types of problem of statistics. | 78.33 | 4.16 | 17.5 | 3.87 | 194.04 | S |
| 10 | The example and formulae given in textbook in the topic statistics are not sufficient. | 28.75 | 9.58 | 61.66 | 2.57 | 115.67 | S |

*Note : A = Agree, UD = Undecided, DA = Disagree, M = Mean, D = Decision,  S = Significant.*

From the above table, the statement "I don't care passing time, when I solve the problems of statistics" having $\chi^2$ - value 247.17 at 0.05 level is the third highest significant statement. Also, it was found that 83.3% students are in favor of this statement. It shows that the majority of the students didn't care passing time during solving the problems of statistics.

Likewise, the seventh statement under responding area is "the topic statistics is not appropriate at secondary level" with $\chi^2$- value 144.17 at 0.05 level, which is the thirteenth highest significant statement.  Only 7.5% students are agreed and most of the students (72.92%) are disagreed with this statement. It shows that the topic statistics is appropriate at secondary level.

In addition, the eighth statement under the responding area is "the understanding of statistics is affected by the lack of reference book." with $\chi^2$- value 132.58 at 0.05 level, which is the fifteenth highest significant statement. Also, it was

found that 61.25% of the students are agreed and 25% are disagreed with this statement. It indicates that understanding of statistics is affected by the lack of reference book.

Similarly, the ninth  statement under responding area is "The teacher gives hints to all types of problems of statistics" with $\chi^2$- value 194.04 at 0.05 level, which is the sixth highest significant statement. Also, it was found that the majority of students (78.33%) are in favor of this statement.

Moreover, the tenth statement under the responding area is "The examples and formulae given in textbook in the topic statistics are not sufficient" with $\chi^2$- value 115.67 at 0.05 level, which is significant. It was also found that only 28.75% of the students are agreed and 61.66% of the students are disagreed with this statement. Hence, it shows that the examples and formulae given in textbook in the topic statistics are sufficient.

From the above table, the mean values of all the statements except the 10th statement are greater than 3. It indicates that the students had positive attitude towards these statements. But the 10th statement in the responding area has the mean value 2.57, which is less than 3. It shows that the students are not in favor of the this statement. Also, the total mean value of the statements under the responding area is 3.54, which is greater than 3. Thus, it is concluded that the students had positive attitude towards the statements under the responding area.

**Table 6. Teacher's Attitude towards Responding Area**

| S.N. | Statements | A | UD | DA | M | $\chi^2$ | D |
|------|-----------|---|----|----|----|---------|---|
| | Teacher's Responses (in %), N = 25 | | | | | | |
| 6 | The topic statistics is appropriate at secondary level. | 96 | 00 | 04 | 4.36 | 33.2 | S |
| 7 | The examples, formulae and direction given to teach in the topic statistics are sufficient. | 68 | 04 | 28 | 3.4 | 42.8 | S |
| 8 | The distribution of weightage of marks of statistics is appropriate. | 68 | 08 | 24 | 3.44 | 40.8 | S |
| 9 | The existing topic statistics has been designed for different intellectual level of students. | 40 | 04 | 56 | 2.84 | 34.4 | S |
| 10 | The content of statistics should be limited. | 60 | 00 | 40 | 3.2 | 40 | S |

*Note : A = Agree, UD = Undecided, DA = Disagree, M = Mean, D = Decision,  S = Significant.*

From the above table, the sixth statement under the responding area is "The topic statistics is appropriate at secondary level" with $\chi^2$- value 33.2 at  0.05 level. It is the nineteenth highest significant statement. It was found that 96% of the teachers are agreed with this statement, which indicates that the topic statistics is appropriate at secondary level.

Also, the statement "The examples, formulae and direction given to teach in the topic statistics are sufficient" with $\chi^2$- value 42.8 at 0.05 level is the 10th significant statement under the responding area. It was also found that 68% teachers are agreed and 28% are disagreed with this statement. It indicates that the examples, formulae and direction given to teach in the topic statistics are sufficient.

Likewise, the 12th significant statement is "The distribution of weightage of marks of statistics is appropriate" with $\chi^2$- value 40.8 at 0.05 level, which is the eighth statement under the responding area. It was also found that 68% of the teachers are agreed, 8% are undecided and 24% are disagreed with this statement. It shows that

most of the teachers are in favor that the distribution of weightage of marks of statistics is appropriate.

Moreover, the ninth statement under the responding area is "The existing topic statistics has been designed for different intellectual level of students" with $\chi^2$- value 34.4 at 0.05 level. It is significant. Also, it was found that 40%, 4% and 56% of the teachers are agreed, undecided and disagreed respectively with with this statement. Thus, it is concluded that the existing topic statistic has not been designed for different intellectual level of students.

Also, the tenth statement under the responding area is "The content of statistics should be limited" with $\chi^2$- value 40 at 0.05 level, which is significant. Also, it was found that 60% of the teachers are agreed and 40% are disagreed with this statement. Thus, it is concluded that the content of statistics should be limited.

From the above table, the mean value of all the statements except the nineth statement under the responding area are greater than 3. It indicates that the teachers are in favor of these statements. But the statement no. 9 has the mean value 2.84, which is less than 3. It shows that the teachers are not in favor of this statement. Also, the total mean of all the statements under the responding area is 3.44, which is greater than 3. Hence, it is concluded that the teachers had positive attitude towards the statements under the responding area.

**Students' and Teachers' Attitude towards Valuing Area**

Valuing is concerned with the worth or value a student attaches to a particular object, phenomenon, or behavior. Valuing is based on the internalization of a set of specified values, but clues to this values are expressed in the students' overall behavior. In the table given below, 5 statements of the students' and teachers'

opinionnaire under the valuing area has been presented, in which strongly disagree and disagree of the likert scale are merged into disagree. Also, agree and strongly agree are merged into agree. Also, the mean value and $\chi^2$-value are given in the table.

**Table 7. Students' Attitude towards Valuing Area**

| S.N. | Statements | A | UD | DA | M | $\chi^2$ | D |
|---|---|---|---|---|---|---|---|
| Student's Responses (in %), N = 240 |
| 11 | The low achievement of mathematics is due to statistics | 27.5 | 18.33 | 54.16 | 2.41 | 64.12 | S |
| 12 | Statistics is sufficient to the base for studying the higher level mathematics | 49.58 | 41.25 | 9.17 | 3.52 | 136.17 | S |
| 13 | Statistics is a useful chapter | 81.67 | 7.9 | 10.41 | 3.97 | 200.5 | S |
| 14 | The knowledge gained from the topic statistics is sufficient for daily life activities. | 48.17 | 17.5 | 33.75 | 3.23 | 80.96 | |
| 15 | Greater priority should be given to teach statistics rather than other topics of mathematics | 39.17 | 17.9 | 42.92 | 3.004 | 67.33 | S |

*Note : A = Agree, UD = Undecided, DA = Disagree, M = Mean, D = Decision,  S = Significant.*

From the above table the eleventh statement under the valuing area is "The low achievement of mathematics is due to statistics" with $\chi^2$- value 64.12 at 0.05 level, which is significant. It was also found that only 27.5%  of the students are agreed and most of the students i.e. 54.16% are disagreed with this statement. It shows that the chapter statistics is not the cause of low achievement.

Also, the twelfth statement "statistics is sufficient to the base for studying the higher level mathematics" under valuing area is the 14th significant statement with $\chi^2$-value 136.17 at 0.05 level. Also, it was found that 49.58% are agreed, 41.25% are undecided and  9.17% are disagreed with this statement. Hence, a few majority of the students are in favor of this statement.

Likewise, the statement "statistics is a useful chapter" under valuing area is fifth highest significant statement with $\chi^2$- value 200. 5 at 0.05 level. Also, it was found that 81.67% of the students are agreed and 10.41% are disagreed with this statement. Hence, it shows that the majority of students are in favor of usefulness of the chapter statistics.

In addition, the fourteenth statement "The knowledge gained from the topic statistics is sufficient for daily life activities" with $\chi^2$- value 87.96 at 0.05 level is also significant under the valuing area . Also, it was found that 48.75% of the students are agreed, 17.5% are undecided and 33.75% are disagreed and with this statement. It shows that the knowledge gained from the topic statistics is sufficient for daily life activities.

Moreover, the statement "greater priority should be given to teach statistics rather than other topics of mathematics" with $\chi^2$- value 67.33% at 0.05 level is also significant under the valuing area. Also, it was found that 39.17% of the students are agreed, 17.9% are undecided and 42.92% of the students are disagreed with this statement. It indicates that there should not be given greater priority to teach statistics than other topics of mathematics.

From the above table, the mean values of all the statements except the statement no. 11 under the valuing area are greater than 3. It shows that the students are in favor of these statements. But the statement no. 11 has the mean value 2.41, which is less than 3. It indicates that the students are not in favor of this statement. Also, the total mean of the statements in the valuing area is 3.46, which is greater than 3. Thus, it is concluded that the students had positive attitude towards the statements under the valuing area.

**Table 8. Teachers' Attitude towards Valuing Area**

| S.N. | Statements | A | UD | DA | M | $\chi^2$ | D |
|------|-----------|----|----|----|----|------|---|
| | Teacher's Responses (in %), N = 25 | | | | | | |
| 11 | The existing topic statistics is sufficient to the base for studying the higher level mathematics. | 52 | 00 | 48 | 3.08 | 32.8 | S |
| 12 | Statistics is useful for daily life. | 100 | 00 | 00 | 4.08 | 81.6 | |
| 13 | The allocated time and the number of periods are sufficient to teach statistics. | 76 | 04 | 20 | 3.56 | 52.4 | S |
| 14 | Greater priority should be given to teach statistics rather than other topics of mathematics. | 84 | 12 | 4 | 3.92 | 43.6 | S |
| 15 | The low achievement of mathematics is due to statistics. | 64 | 00 | 36 | 3.36 | 31.2 | S |

*Note : A = Agree, UD = Undecided, DA = Disagree, M = Mean, D = Decision,  S =*

*Significant.*

From the above table, the eleventh statement under the valuing area is "The

existing topic statistics is sufficient to the base for studying the higher level

mathematics" with $\chi^2$- value 32.8 at 0.05 level. It is also significant. Also, 52% of the

teachers are agreed and 48% are disagreed with this statement. It shows that the

majority of teachers are in favor that the existing topic statistics is sufficient to the

base for studying higher level mathematics.

Among 25 statements, the statement no. 12 under the valuing area "Statistics

is useful for daily life" is the highest significant statement with $\chi^2$- value 81.6 at 0.05

level. Also, it was found that 100%  of the teachers are agreed with this statement. It

shows that statistics is useful for daily life.

Also, the thirteenth statement under the valuing area is "The allocated time

and the number of periods are sufficient to teach statistics" with $\chi^2$- value 52.4 at 0.05

level. It is the fifth highest significant statement. It was also found that 76% teachers

are agreed and 20% are disagreed with this statement. Thus, it is concluded that the allocated time and the number of periods are sufficient to teach statistics.

Similarly, the fourteenth statement "Greater priority should be given to teach statistics rather than other topics of mathematics" with $\chi^2$- value 43.6 at 0.05 level is the ninth significant statement. 84% teachers are agreed with this statement. It indicates that the greater priority should be given to teach statistics.

The fifteenth statement under the valuing area is "The low achievement of mathematics is due to statistics" with $\chi^2$-value value 31.2 at 0.05 level. It is significant. It was found that 64% of the teachers are agreed and 36% of the teachers are disagreed with this statement. It indicates that the chapter statistics is the cause of low achievement.

From the above table, the mean values of all the statement under valuing area are greater than 3. It shows that the teachers are in favor of all the statements under this area. Also, the total mean of all the statements is 3.6, which is greater than 3. Thus, it is concluded that the teachers had positive attitude towards the statements under the valuing area.

**Student's and Teacher's Attitude towards Organization Area**

Organization is concerned with bringing together different values, resolving conflicts between them, and beginning the building of an internally consisted value system. Thus, in this category, the emphasis is on, comparing, relating and synthesizing values. In the table given below, 5 statements of the students' and teachers' opinionnaire under the organization area has been presented, in which strongly disagree and disagree of the likert scale are merged into disagree. Also, agree

and strongly agree are merged into agree. Also, the mean value and $\chi^2$-value are given in the table.

**Table 9. Student's Attitude towards Organization Area**

| Student's Responses (in %), N = 240 | | | | | | | |
|---|---|---|---|---|---|---|---|
| S.N. | Statements | A | UD | DA | M | $\chi^2$ | D |
| 16 | I Like to concern extra references book related to statistics | 73.75 | 7.9 | 18.33 | 3.7 | 218.7 | S |
| 17 | I think by the lack of standard problems, study of statistics will be incomplete | 32.92 | 29.16 | 37.92 | 2.88 | 48.37 | S |
| 18 | I want to know deeply about statistics | 78.75 | 5 | 16.25 | 3.9 | 169.20 | S |
| 19 | An appropriate types of teaching instrument should be used for the topic statistics | 78.73 | 8.7 | 12.92 | 3.75 | 299.12 | S |
| 20 | There should be used alternative method for solving problems of statistics | 72.08 | 10 | 17.92 | 3.76 | 156.04 | S |

*Note : A = Agree, UD = Undecided, DA = Disagree, M = Mean, D = Decision,  S = Significant.*

From the above table, regarding the sixteenth statement under organization area "I like to concern extra references book related to statistics", the $\chi^2$- value is 218.70 at 0.05 level, which is the fourth highest significant statement. It was found that 73.75% of the students are agreed and 18.33% disagreed with this statement, which indicates that the greater number of students liked to concern extra reference book.

Likewise, the seventeenth statement under the organization area is "I think by the lack of standard problems, study of statistics will be incomplete" with $\chi^2$- value 48.37% at 0.05 level, which is significant. Also, it was found that 32.92% of the students are agreed, 29.16% are undecided and 37.92% of the students are disagreed

with this statement. It shows that the study of statistics will not be incomplete although there is lack of standard problems.

The eighteenth statement under organization area is "I want to know deeply about statistics" with $\chi^2$- value 169.20 at 0.05 level, which is the seventh highest significant statement. Also, it was found that 78.75% of the students are agreed with this statement. It shows that the majority of the students want to know much about statistics.

The statement no. 19 under the organization area "an appropriate types of teaching instrument should be used for the topic of statistics" with $\chi^2$ value 299.12 at 0.05 level is the highest significant statement among 25 statements. Also, it was found that the majority of students (78.3%) were agreed with the statement that for the topic of statistics, appropriate types of teaching instruments should be used.

Similarly, the statement no. 20 under the organization area is "There should be used alternative method for solving problems of statistics" with $\chi^2$- value 156.04 at 0.05 level, which is the eleventh highest significant statement. Also, it was found that 72.08% of the students are agreed and 17.92% are disagreed with this statement. It shows that for solving problems of statistics, alternative method should also be used.

From the above table, the mean values of all the statements except the 17th statement under the organization area are greater than 3. It indicates that the students are in favor of these statements. But the mean value of the 17th statement is 2.88, which is less than 3. Thus, the students are not in favor of this statement. Also, the total mean of the statements under the organization area is 3.6, which is greater than 3. Thus, it is concluded that the students had positive attitude towards the statements under the organization area.

**Table 10. Teacher's Attitude towards Organization Area**

| S.N. | Statements | A | U.D | DA | M | $\chi^2$ | D |
|------|-----------|---|-----|-----|---|----------|---|
| | Teacher's Responses (in %), N = 25 | | | | | | |
| 16 | A successful math teacher should be clear on subject matter and the objectives of teaching statistics. | 100 | 00 | 00 | 4.64 | 42.4 | S |
| 17 | The students are able to solve the problems of statistics by applying the method and instruction given to the mathematics curriculum. | 88 | 00 | 12 | 3.8 | 65.2 | S |
| 18 | The topic statistics can be taught by any methods. | 28 | 32 | 40 | 2.88 | 17.6 | S |
| 19 | Alternative method may be used for affective teaching of statistics. | 92 | 04 | 04 | 3.88 | 81.2 | S |
| 20 | I always prefer students to do home task after teaching statistics. | 100 | 00 | 00 | 4.32 | 45.6 | S |

*Note : A = Agree, UD = Undecided, DA = Disagree, M = Mean, D = Decision, S = Significant.*

From the above table, the sixteenth statement under the organization area is "A successful math teacher should be clear on subject matter and the objectives of teaching statistics" with $\chi^2$- value 42.4 at 0.05 level. Also, it is the eleventh highest significant statement. Also, it was found that 100% of the teachers are agreed with this statement. It indicates that a successful math teacher should be clear on the objective of teaching statistics.

Similarly, the seventeenth statement under the organization area is "the students are able to solve the problems of statistics by applying the method and instruction given in the mathematics curriculum", which is the third highest significant statement with $\chi^2$- value 65.2 at 0.05 level. Also, it was found that most of the teachers (88%) are in favor of this statement.

In addition, the eighteenth statement under the organization area is "The topic statistics can be taught by any method" with $\chi^2$- value 17.6 at 0.05 level. It is the

lowest significant statement among 25 statements. It was also found that only 28% of the teachers are agreed, 32% of the teachers are undecided and 40% disagreed with this statement. It shows that by a few number, the majority of teachers are not in favor of this statement. It implies that the topic  statistics cannot be taught by any method.

Moreover, the second highest significant statement is "Alternative method may be used for affective teaching of statistics" with $\chi^2$- value 81.2 at 0.05 level. It is the nineteenth statement under the organization area. Also, it was found that 92% of the teachers are agreed with this statement. It indicates that for affective teaching of statistics, an alternative method can be used.

Likewise, the statement no. 20 under the organization area is "I always prefer students to do home task after teaching statistics" with $\chi^2$- value 45.6. It was also found that all of the teachers (100%) are agreed with this statement. It indicates that the teachers always prefer students to do home task after teaching statistics.

From the above table, the mean value of all the statements except the 18th statement under the organization area are greater than 3. It shows that the teachers are in favor of these statements. But the mean value of the 18th statement under this area is 2.88, which is less than 3. It indicates that the teachers are not in favor of this statement. Also, the total mean of the statements under the organization area is 3.9, which is greater than 3. Thus, it is concluded that the teachers had positive attitude towards the statements under the organization area.

**Student's and Teacher's Attitude towards Characterization Area**

Characterization area has a value system that controls the students' behavior. The behavior is pervasive consistent, predictable, and most importantly, characteristic of the learner. Instructional objectives that are concerned with the student's general

patterns of adjustment (personal, social, emotional) would be appropriate in this area. In the table given below, 5 statements of the students' and teachers' opinionnaire under the characterization area has been presented, in which strongly disagree and disagree of the likert scale are merged into disagree. Also, agree and strongly agree are merged into agree. Also, the mean value and $\chi^2$-value are given in the table.

**Table 11. Student's Attitude towards Characterization Area**

| Student's Responses (in %), N = 240 | | | | | | | |
|---|---|---|---|---|---|---|---|
| S.N. | Statements | A | UD | DA | M | $\chi^2$ | D |
| 21 | Mathematics lab is useful for affective learning of statistics | 63.33 | 23.75 | 12.91 | 3.67 | 106.75 | S |
| 22 | Continuous evaluation helps to improve the students' performance in statistics | 78.33 | 15 | 6.67 | 4.07 | 158.04 | S |
| 23 | The topic statistics should be revised | 55.42 | 26.25 | 18.33 | 3.44 | 128.25 | S |
| 24 | I am able to solve the problems of statistics by applying alternative technique | 49.17 | 19.16 | 31.67 | 3.1 | 46.12 | S |
| 25 | Instructional materials are essential for the teaching of statistics | 77.5 | 7.5 | 15 | 3.82 | 156.79 | S |

*Note : A = Agree, UD = Undecided, DA = Disagree, M = Mean, D = Decision,  S = Significant.*

From the above table, the twenty-first statement under the characterization area is "Mathematics lab is useful for affective learning of statistics" with $\chi^2$- value 106.75 at 0.05 level, which is the eighteenth highest significant statement. Also, 63.33% of the students are agreed, 23.75% are undecided and 12.91% are disagreed with this statement. It indicates that most of the students are in favor of usefulness of mathematics lab for affective learning of statistics.

Similarly, the twenty-second statement under the characterization area is "continuous evaluation helps to improve the students' performance in statistics "with

$\chi^2$- value 158.04 at 0.05 level, which is the eighth highest significant statement. Also, 78.83% students are agreed and few no. of students (i.e. 6.67%) are disagreed with this statement. Thus, it is concluded that for improvement of performance of students in statistics, the continuous evaluation is essential.

In addition, the twenty-third statement under the characterization area is "The topic statistics should be revised" having $\chi^2$- value 128.25% at 0.05 level, which is the sixteenth highest significant statement. Also, it was found that 55.42% of the students are agreed, 26.25% are undecided and 18.33% are disagreed with this statement. It indicates that the topic statistics should be revised.

Moreover, the twenty-fourth statement under the characterization area is "I am able to solve the problems of statistics by applying alternative technique" with $\chi^2$-value 46.12 at 0.05 level, which is the lowest significant statement among 25 statements. Also, it was found that 49.17% of the students are agreed, 19.17% of the students are undecided and 31.67% of the student are disagreed with this statement. It shows that most of the students can solve the problems of statistics by applying alternative technique.

Likewise, the twenty-fifth statement under the characterization area is "Instructional materials are essential for the teaching of statistics" with $\chi^2$-value 156.79% at 0.05 level, which is the tenth highest significant statement. Also, 77.50% students are agreed and 15% are disagreed with this statement. Hence, it shows that the instructional materials are essential for teaching statistics.

From the above table, the mean values of all the statements are greater than 3. Also, the total mean value of the statements under characterization area is 3.62, which

is greater than 3. Hence, it is concluded that the students had positive attitude towards the statements under the characterization area.

**Table 12. Teacher's Attitude towards Characterization Area**

| S.N. | Statements | A | UD | DA | M | $\chi^2$ | D |
|------|------------|---|----|----|----|------|---|
| | Teacher's Responses (in %), N = 25 | | | | | | |
| 21 | The performance of students on statistics is affected by their family environment. | 88 | 04 | 08 | 4.32 | 26 | S |
| 22 | Continuous evaluation of the students helps to improve the students performance in statistics. | 100 | 00 | 00 | 4.56 | 38.4 | S |
| 23 | The existing topic of statistics should be revised. | 80 | 12 | 08 | 3.88 | 32 | S |
| 24 | Instructional materials are essential for affective teaching of statistics. | 92 | 04 | 04 | 4.04 | 50.8 | S |
| 25 | Mathematics lab is useful for effective teaching of statistics. | 92 | 04 | 04 | 3.96 | 64.4 | S |

*Note : A = Agree, UD = Undecided, DA = Disagree, M = Mean, D = Decision,  S = Significant.*

From the above table, the twenty-first statement under the characterization area is "The performance of students on statistics is affected by their family environment" with $\chi^2$- value 26 at  0.05 level, which is significant. Also, 88% of the teachers are agreed with this statement. It shows that the family environment of students affects their performance on statistics.

Similarly, the 16th highest significant statement is "continuous evaluation of the students helps to improve the students' performance in statistics." with $\chi^2$- value 38.4 at 0.05 level, which is the twenty-second statement under the characterization area. Also, 100% of the teachers are agreed with this statement. It shows that continuous evaluation of the students helps to improve the student's performance in statistics.

Moreover, the statement "The existing topic of statistics should be revised" under the characterization area has the $\chi^2$- value 32 at 0.05 level. It was also found

that 80% of the teachers are agreed with this statement. It indicates that most of the teachers are in favor of revision of the topic of statistics.

Also, the statement no. 24 "instructional materials are essential for affective teaching of statistics" under the characterization area is the sixth highest significant statement with $\chi^2$- value 50.8 at 0.05 level. It was found that 92% teachers are agreed with this statement. It indicates that for affective teaching, instructional materials are essential.

Likewise, the statement no. 25 "Mathematics lab is useful for affective teaching of statistics" under the characterization area is the fourth highest significant statement with $\chi^2$- value 64.4 at 0.05 level. It was also found that 92% of the teachers are agreed with this statement. It shows that a greater majority of teachers are in favor of usefulness of mathematics lab for affective teaching of statistics.

From the above table, the mean value of all the statements under characterization area are greater than 3. It shows that the teachers are    in favor of all the statements under the characterization area. Also, the total mean of all the statements is 4.1, which is greater than 3. Thus, it is concluded that the teachers had highly positive attitude towards the statements under characterization area.

**Comparison of Boy and Girl Student's Attitude towards Statistics**

The third objective of this study was to compare boy and girl student's attitude towards statistics at secondary level. In order to achieve this objective, the researcher formulated the hypothesis as "There is no significant difference between the attitude of boy and girl students towards statistics at secondary level".

To verify this hypothesis, the raw attitude score of boy and girl students are given in Appendix-G and H respectively. Also the calculated value of mean, standard deviation and t-value are given in table 13.

**Table 13. Comparison of boy and girl student's attitude towards statistics**

| Compared group | Sample | Mean | Standard deviation | mean difference | d.f. | t-value |
|---|---|---|---|---|---|---|
| boys | $n_1$=120 | 3.4 | 0.75 | -0.08 | 238 | -0.96 |
| girls | $n_2$=120 | 3.48 | 0.52 | | | |

According to the above table, the mean attitude score of 120 boys is 3.4 and that of 120 girls is 3.48. The standard deviation of boys' attitude score is 0.75 and that of girls' is 0.52. The calculated t-value with respect to mean attitude difference of given magnitude is -0.96, which is greater than the tabulated t-value -1.96 and less than 1.96. Thus, the null hypothesis ($H_o$) is accepted. Hence, it is concluded that there is no significant difference between the attitude of boy and girl students towards statistics.

**Comparison of Students' and Teachers' Attitude towards Statistics**

The fourth objective of this study was to compare the students' and teachers' attitude towards statistics. In order to achieve this objective, the researcher formulated the hypothesis as "There is no significant difference between the attitude of students and mathematics teachers towards statistics at secondary level".

To verify this hypothesis, the raw attitude score of students and teachers are given in Appendix-E and F respectively. Also, the calculated value of mean, standard deviation and t-value are given in table 14.

**Table 14. Comparison of students' and teachers' attitude towards statistics.**

| Compared group | Sample size | Mean value | Standard deviation | Mean Difference | d.f. | t-value |
|---|---|---|---|---|---|---|
| students | 240 | 3.46 | 0.48 | -0.34 | 263 | -3.2 |
| teachers | 25 | 3.8 | 0.51 | | | |

According to the above table, the mean attitude score of 240 students is 3.46 and their standard deviation is 0.48. Also, the mean attitude score of 25 teachers is 3.8 and their standard deviation is 0.51. The calculated t-value with respect to mean attitude difference of given magnitude is -3.2, which is less than the tabulated t-value i.e. -1.96. Hence, the null hypothesis ($H_0$) is rejected and the alternative hypothesis is accepted. Thus, it is concluded that there is a significant difference between the attitude of students and teachers towards statistics at secondary level.

**Chapter V**

**SUMMARY, FINDINGS, CONCLUSIONS, IMPLICATIONS AND**

**RECOMMENDATIONS**

This chapter deals with summary, findings, conclusions and implications of the study. The first section of this chapter presents the summary, second section presents the major findings of the study. The third section presents the conclusion derived from the second section. Also, the fourth section presents the implications of the study. Finally, the fifth section presents the recommendations for further study.

**Summary**

The main purpose of this study was to find out the attitude of students and teachers towards statistics at secondary level. The objectives of this study were:

- To find out the attitude of students towards statistics at secondary level.

- To find out the attitude of mathematics teachers towards statistics at secondary level.

- To compare the attitude of boy and girl students towards statistics at secondary level.

- To compare the attitude of students and mathematics teachers towards statistics at secondary level.

To achieve the objectives of the study, the researcher formulated the null hypothesis as "There is a positive attitude of students towards statistics at secondary level ", "There is a positive attitude of teachers towards statistics at secondary level", "There is no significant difference between the attitude of boy and girl students towards statistics at secondary level" and "There is no significant difference between the attitude of students and mathematics teachers towards statistics at secondary

level". The populations for the study were consisted of all the secondary school's students and mathematics teachers of Ilam district during the academic year 2073.

In this study, 12 schools were selected from 36 private schools and 12 schools were selected from 88 public schools by stratified random sampling technique including both the urban and rural areas of Ilam district. Also, from those sampled schools, 240 students and 25 teachers were selected by random sampling technique.

Two sets of opinionnaires were developed as the tools for collecting data. One set was used for students and the another for the teachers to collect their attitude scores towards statistics. Both sets of opinionnaires consisted of five level of statements classified into receiving, responding, valuing, organization and characterization according to the affective domain of David Krathwohl. The opinionnaires thus developed were administered on the sample of students and teachers according to the instruction given for each part, and were collected on the spot. To predict the reliability and the validity of the opinionnaire, the researcher used the test-retest method. Also, the opinionnaire were taken from the reviewed literatures, which were prepared through the consultation with the supervisor.

The attitude scores of students and teachers were divided into five categories strongly disagree, disagree, undecided, agree and strongly agree for each item arranged in the likert scale. The obtained data were analyzed using percentage, mean value, t-test and $\chi^2$-test.

To verify the hypothesis of the study, mean value and percentage were used to determine the attitude of students and teachers towards statistics. Also, t-test at 0.05 level was used to test the significant difference between the mean attitude scores of

students and teachers as well as boy and girl students towards statistics at secondary level.

**Findings**

The major findings of the study were as follows:

- The students and mathematics teachers had a positive attitude towards statistics at secondary level.

- Boys and girls students had similar attitude towards statistics at secondary level.

- There was a significant difference between the attitude of students and mathematics teachers towards statistics at secondary level.

- The mean attitude score of teachers towards statistics was greater than that of students at secondary level.

- The mean attitude score of girls students towards statistics was greater than that of boys students at secondary level.

**Conclusions**

In this section, the conclusions are drawn about the attitude of students and teachers towards statistics at secondary level. The conclusions are drawn according to the findings presented in the previous section.

The students and mathematics teachers have a positive attitude towards statistics at secondary level. The attitude is related with the teaching objectives, teaching-learning methods, teaching materials, teaching learning activities, content, weightage of marks, evaluation process etc. towards statistics at secondary level.

Also, the boy and girl students have a similar attitude towards statistics at secondary level. Thus, it is concluded that the gender of students does not effect on

their attitude towards statistics at secondary level. The students and teachers have a positive attitude towards statistics but they have a significant difference in attitude towards statistics at secondary level.

**Implications**

The implications of this study are as follows:

- According to the finding of this study, the curriculum designers can understand the attitude of students, their interest, demand and capacity towards statistics, which helps them to make student centered curriculum. Also, the curriculum designers can understand the attitude of teachers regarding many aspects of teaching statistics such as teaching objective, teaching materials, teaching methods, contents, weightage of marks, number of periods, evaluation process etc, which helps them to design a good mathematics curriculum.

- By seeing the result of this study, the teacher can understand the interest, demand, capacity and knowledge of students on statistics so that the teacher can apply the appropriate teaching methods, materials and evaluation process which helps to improve the teaching and learning process.

- According to the result of the study, the district education office and teacher training center can provide affective training for secondary level teachers according to their attitudes towards statistics.

- Further research can be done in any gap of this study. The research can be done in higher level, in other districts, in other domains of mathematics such as algebra, vector, functions, analysis, trigonometry etc. or in any aspect of mathematics.

- In order to establish the findings of the study, the study would be carried out district-wise, regional-wise as well as national-wise.

- The finding of this study indicated that the students had comparatively less attitude score than that of teachers. Thus, to improve students' attitude towards statistics, student centered curriculum should be designed according to the attitude of students, their interest, demand and capacity towards statistics.

**Recommendations**

On the basis of this study, following recommendations for further research are presented:

- Further research should be done in any gap of this study. The research can be done in higher level, in other districts or in other domains of mathematics such as algebra, vector, functions, analysis, trigonometry etc.

- The students and teachers had positive attitude towards statistics at secondary level. It indicates that attitude was not the cause of low achievement of students in statistics. Thus, to find out the causes of low achievement in statistics, further research should be done.

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**Appendix A**
**Opinionniare for Students**
**Tribhuvan University**
**University Campus**
**Department of Mathematics Education**
**T.U., Kirtipur, Kathmandu**

Dear Students,

There are 25 statements concerned with attitude. There is no right or wrong answer. The right answer is your own opinion or feeling. Please, study the statements carefully and give your own opinion by putting tick mark ($\sqrt{}$) on any one of the five ratings of each statement.

Name of Student :                                    Sex :
School :                                                    Class :
Address :                                                  Roll No. :

**Receiving**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. |
|------|-----------|--------|------|------|-----|------|
| 1 | I feel more curious while learning statistics. | | | | | |
| 2 | The class of statistics is more interesting than other topic of mathematics . | | | | | |
| 3 | Statistics is related with other topic of mathematics . | | | | | |
| 4 | Only pupil with a very special talent can learn statistics. | | | | | |
| 5 | The problem of statistics is always solved by a rule. | | | | | |

**Responding**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. |
|------|-----------|--------|------|------|-----|------|
| 6. | I don't care about passing time, when I solve the problems of statistics. | | | | | |
| 7. | The topic statistics is not appropriate at secondary level. | | | | | |

| 8. | The understanding of statistics is affected by the lack of reference book. | | | | | |
|---|---|---|---|---|---|---|
| 9. | The teachers gives hints to all types of problem of statistics. | | | | | |
| 10 | The example and formulae given in textbook in the topic statistics are not sufficient. | | | | | |

**Valuing**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. |
|---|---|---|---|---|---|---|
| 11 | The low achievement of mathematics is due to statistics | | | | | |
| 12 | Statistics is sufficient to the base for studying the higher level mathematics | | | | | |
| 13 | Statistics is a useful chapter | | | | | |
| 14 | The knowledge gained from the topic statistics is sufficient for daily life activities. | | | | | |
| 15 | Greater priority should be given to teach statistics rather than other topics of mathematics | | | | | |

**Organization**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. |
|---|---|---|---|---|---|---|
| 16 | I Like to concern extra references book related to statistics | | | | | |
| 17 | I think by the lack of standard problems, study of statistics will be incomplete | | | | | |
| 18 | I want to know deeply about statistics | | | | | |
| 19 | An appropriate types of teaching instrument should be used for the topic statistics | | | | | |
| 20 | There should be used alternative method for solving problems of statistics | | | | | |

**Characterization**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. |
|------|-----------|--------|------|------|-----|------|
| 21 | Mathematics lab is useful for affective learning of statistics | | | | | |
| 22 | Continuous evaluation helps to improve the students' performance in statistics | | | | | |
| 23 | The topic statistics should be revised | | | | | |
| 24 | I am able to solve the problems of statistics by applying alternative technique | | | | | |
| 25 | Instructional materials are essential for the teaching of statistics | | | | | |

*Note :*

*S.D.A.  = Strongly disagree*

*D.A.     = Disagree*

*U.D.     = Undecided*

*A.        = Agree*

*S.A.     = Strongly agree*

**Appendix B**

**Opinionniare for Teachers**

**Tribhuvan University**

**University Campus**

**Department of Mathematics Education**

**T.U., Kirtipur, Kathmandu**

Dear Sir, Madam

  As a part of the requirements for the masters degree of Education, I am going to conduct a study on the topic, "A study of attitude of secondary level students & teachers towards statistics."

  This opinionnaire consisting of 25 statements, is related to the topic statistics of secondary level. There is no right or wrong answers. The right answer is your own opinion or feeling. The validity & reliability of the study will depend on your kind cooperation to have your unbiased response. Please study the statements carefully & give your opinion by putting tick mark (√) on any one of fine ratings for each statements.

  Thank you for your kind co0operation for my study by giving your valuable opinions.

               Yours,

               Prem Nepal

Name :               Date :

School :

Qualification :

Address :

**Receiving**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. |
|---|---|---|---|---|---|---|
| 1 | The students and teachers both are curious and active while teaching statistics. | | | | | |
| 2 | The knowledge of statistics is essential in secondary level. | | | | | |

| 3 | Training is needed to teach statistics. | | | | | |
|---|---|---|---|---|---|---|
| 4 | I would like to give the concept of statistics in psychological manner after finding out the student's discrimination. | | | | | |
| 5 | I think without teaching materials, teaching of statistics is impracticable. | | | | | |

**Responding**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. |
|---|---|---|---|---|---|---|
| 6 | The topic statistics is appropriate at secondary level. | | | | | |
| 7 | The examples, formulae and direction given to teach in the topic statistics are sufficient. | | | | | |
| 8 | The distribution of weightage of marks of statistics is appropriate. | | | | | |
| 9 | The existing topic statistics has been designed for different intellectual level of students. | | | | | |
| 10 | The content of statistics should be limited. | | | | | |

**Valuing**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. |
|---|---|---|---|---|---|---|
| 11 | The existing topic statistics is sufficient to the base for studying the higher level mathematics. | | | | | |
| 12 | Statistics is useful for daily life. | | | | | |
| 13 | The allocated time and the number of periods are sufficient to teach statistics. | | | | | |
| 14 | Greater priority should be given to teach statistics rather than other topics of mathematics. | | | | | |
| 15 | The low achievement of mathematics is due to statistics. | | | | | |

**Organization**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. |
|------|-----------|--------|------|------|-----|------|
| 16 | A successful math teacher should be clear on subject matter and the objectives of teaching statistics. | | | | | |
| 17 | The students are able to solve the problems of statistics by applying the method and instruction given to the mathematics curriculum. | | | | | |
| 18 | The topic statistics can be taught by any methods. | | | | | |
| 19 | Alternative method may be used for affective teaching of statistics. | | | | | |
| 20 | I always prefer students to do home task after teaching statistics. | | | | | |

**Characterization**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. |
|------|-----------|--------|------|------|-----|------|
| 21 | The performance of students on statistics is affected by their family environment. | | | | | |
| 22 | Continuous evaluation of the students helps to improve the students performance in statistics. | | | | | |
| 23 | The existing topic of statistics should be revised. | | | | | |
| 24 | Instructional materials are essential for affective teaching of statistics. | | | | | |
| 25 | Mathematics lab is useful for effective teaching of statistics. | | | | | |

*Note:*

*S.D.A.  = Strongly disagree*

*D.A.    = Disagree*

*U.D.    = Undecided*

*A.      = Agree*

*S.A.    = Strongly agree*

**Appendix C**

**Number of Responses of 240 Students**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. |
|------|-----------|--------|------|------|-----|------|
| 1 | I feel more curious while learning statistics. | 17 | 21 | 3 | 138 | 61 |
| 2 | The class of statistics is more interesting than other topic of mathematics . | 15 | 36 | 4 | 101 | 84 |
| 3 | Statistics is related with other topic of mathematics . | 16 | 40 | 81 | 87 | 16 |
| 4 | Only pupil with a very special talent can learn statistics. | 91 | 99 | 8 | 27 | 15 |
| 5 | The problem of statistics is always solved by a rule. | 15 | 42 | 32 | 106 | 45 |
| 6. | I don't care passing time, when I solve the problems of statistics. | 6 | 21 | 13 | 137 | 63 |
| 7. | The topic statistics is not appropriate at secondary level. | 106 | 69 | 47 | 15 | 3 |
| 8. | The understanding of statistics is affected by the lack of reference book. | 25 | 35 | 33 | 119 | 28 |
| 9. | The teachers gives hints to all types of problem of statistics. | 2 | 40 | 10 | 121 | 67 |
| 10 | The example and formulae given in textbook in the topic statistics are not sufficient. | 39 | 109 | 23 | 54 | 15 |
| 11 | The low achievement of mathematics is due to statistics | 89 | 41 | 44 | 54 | 12 |
| 12 | Statistics is sufficient to the base for studying the higher level mathematics | 9 | 13 | 99 | 81 | 38 |
| 13 | Statistics is a useful chapter | 10 | 15 | 19 | 123 | 73 |
| 14 | The knowledge gained from the topic statistics is sufficient for daily life activities. | 11 | 70 | 42 | 91 | 26 |
| 15 | Greater priority should be given to teach statistics rather than other topics of mathematics | 17 | 86 | 43 | 67 | 27 |
| 16 | I Like to concern extra references book related to statistics | 6 | 38 | 19 | 136 | 41 |

| 17 | I think by the lack of standard problems, study of statistics will be incomplete | 30 | 61 | 70 | 64 | 15 |
|----|----------------------------------------------------------------------------------|-----|------|-----|------|------|
| 18 | I want to know deeply about statistics | 8 | 31 | 12 | 112 | 77 |
| 19 | An appropriate types of teaching instrument should be used for the topic statistics | 9 | 22 | 21 | 154 | 34 |
| 20 | There should be used alternative method for solving problems of statistics | 3 | 40 | 24 | 117 | 56 |
| 21 | Mathematics lab is useful for affective learning of statistics | 8 | 23 | 57 | 101 | 51 |
| 22 | Continuous evaluation helps to improve the students' performance in statistics | 10 | 6 | 36 | 93 | 95 |
| 23 | The topic statistics should be revised | 7 | 37 | 63 | 108 | 25 |
| 24 | I am able to solve the problems of statistics by applying alternative technique | 48 | 28 | 46 | 87 | 31 |
| 25 | Instructional materials are essential for the teaching of statistics | 26 | 10 | 18 | 111 | 75 |
|    | Total | 623 | 1033 | 867 | 2404 | 1073 |

*Note:*

*S.D.A.  = Strongly disagree*

*D.A.     = Disagree*

*U.D.     = Undecided*

*A.        = Agree*

*S.A.      = Strongly agree*

**Appendix D**

**Number of Responses of 25 Teachers**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. |
|------|-----------|--------|------|------|-----|------|
| 1 | The students and teachers both are curious and active while teaching statistics. | 0 | 5 | 0 | 18 | 2 |
| 2 | The knowledge of statistics is essential in secondary level. | 0 | 0 | 0 | 15 | 10 |
| 3 | Training is needed to teach statistics. | 0 | 1 | 0 | 10 | 14 |
| 4 | I would like to give the concept of statistics in psychological manner after finding out the student's discrimination. | 0 | 1 | 6 | 17 | 1 |
| 5 | I think without teaching materials, teaching of statistics is impracticable. | 0 | 11 | 1 | 10 | 3 |
| 6 | The topic statistics is appropriate at secondary level. | 0 | 1 | 0 | 13 | 11 |
| 7 | The examples, formulae and direction given to teach in the topic statistics are sufficient. | 0 | 7 | 1 | 17 | 0 |
| 8 | The distribution of weightage of marks of statistics is appropriate. | 0 | 6 | 2 | 17 | 0 |
| 9 | The existing topic statistics has been designed for different intellectual level of students. | 0 | 14 | 1 | 10 | 0 |
| 10 | The content of statistics should be limited. | 0 | 10 | 0 | 15 | 0 |
| 11 | The existing topic statistics is sufficient to the base for studying the higher level mathematics. | 0 | 12 | 0 | 12 | 1 |
| 12 | Statistics is useful for daily life. | 0 | 0 | 0 | 23 | 2 |
| 13 | The allocated time and the number of periods are sufficient to teach statistics. | 0 | 5 | 1 | 19 | 0 |
| 14 | Greater priority should be given to teach statistics rather than other topics of mathematics. | 0 | 1 | 3 | 18 | 3 |
| 15 | The low achievement of mathematics is due to statistics. | 0 | 9 | 0 | 14 | 2 |
| 16 | A successful math teacher should be clear on | 0 | 0 | 0 | 9 | 16 |

| | | S.D.A. | D.A. | U.D. | A. | S.A. |
|---|---|---|---|---|---|---|
| | subject matter and the objectives of teaching statistics. | | | | | |
| 17 | The students are able to solve the problems of statistics by applying the method and instruction given to the mathematics curriculum. | 0 | 3 | 0 | 21 | 1 |
| 18 | The topic statistics can be taught by any methods. | 0 | 10 | 8 | 7 | 0 |
| 19 | Alternative method may be used for affective teaching of statistics. | 0 | 1 | 1 | 23 | 0 |
| 20 | I always prefer students to do home task after teaching statistics. | 0 | 0 | 0 | 17 | 8 |
| 21 | The performance of students on statistics is affected by their family environment. | 0 | 2 | 1 | 9 | 13 |
| 22 | Continuous evaluation of the students helps to improve the students performance in statistics. | 0 | 0 | 0 | 11 | 14 |
| 23 | The existing topic of statistics should be revised. | 0 | 2 | 3 | 16 | 4 |
| 24 | Instructional materials are essential for affective teaching of statistics. | 0 | 1 | 1 | 19 | 4 |
| 25 | Mathematics lab is useful for effective teaching of statistics. | 0 | 1 | 1 | 21 | 2 |
| | Total | | 103 | 29 | 381 | 111 |

Note:

S.D.A.  = Strongly disagree

D.A.    = Disagree

U.D.    = Undecided

A.      = Agree

S.A.    = Strongly agree

**Appendix E**

**Attitude Scores Obtained by 240 Students**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. | Total Score | Mean Value |
|---|---|---|---|---|---|---|---|---|
| 1 | I feel more curious while learning statistics. | 17 | 42 | 9 | 552 | 305 | 925 | 3.8 |
| 2 | The class of statistics is more interesting than other topic of mathematics . | 15 | 72 | 12 | 404 | 420 | 923 | 3.8 |
| 3 | Statistics is related with other topic of mathematics . | 16 | 80 | 243 | 348 | 80 | 767 | 3.2 |
| 4 | Only pupil with a very special talent can learn statistics. | 91 | 198 | 24 | 108 | 75 | 896 | 2.1 |
| 5 | The problem of statistics is always solved by a rule. | 15 | 84 | 96 | 424 | 225 | 844 | 3.5 |
| 6. | I don't care passing time, when I solve the problems of statistics. | 6 | 42 | 39 | 548 | 315 | 950 | 3.9 |
| 7. | The topic statistics is not appropriate at secondary level. | 530 | 276 | 141 | 30 | 3 | 980 | 4.1 |
| 8. | The understanding of statistics is affected by the lack of reference book. | 25 | 70 | 99 | 476 | 140 | 812 | 3.3 |
| 9. | The teacher gives hints to all types of problem of statistics. | 2 | 80 | 30 | 484 | 335 | 931 | 3.87 |
| 10 | The example and formulae given in textbook in the topic statistics are not sufficient. | 39 | 218 | 69 | 216 | 75 | 617 | 2.57 |
| 11 | The low achievement of mathematics is due to statistics | 89 | 82 | 132 | 216 | 60 | 579 | 2.41 |
| 12 | Statistics is sufficient to the base for studying the higher level mathematics | 9 | 26 | 297 | 324 | 190 | 846 | 3.52 |
| 13 | Statistics is a useful chapter | 10 | 30 | 57 | 492 | 365 | 954 | 3.97 |
| 14 | The knowledge gained from the topic statistics is sufficient for daily life activities. | 11 | 140 | 126 | 364 | 130 | 771 | 3.23 |

| 15 | Greater priority should be given to teach statistics rather than other topics of mathematics | 17 | 172 | 129 | 268 | 135 | 721 | 3.004 |
|----|----|----|----|----|----|----|----|----|
| 16 | I Like to concern extra references book related to statistics | 6 | 76 | 57 | 544 | 205 | 888 | 3.7 |
| 17 | I think by the lack of standard problems, study of statistics will be incomplete | 30 | 122 | 210 | 256 | 75 | 693 | 2.88 |
| 18 | I want to know deeply about statistics | 8 | 62 | 36 | 448 | 385 | 939 | 3.9 |
| 19 | An appropriate types of teaching instrument should be used for the topic statistics | 9 | 44 | 63 | 616 | 170 | 902 | 3.75 |
| 20 | There should be used alternative method for solving problems of statistics | 3 | 80 | 72 | 468 | 280 | 903 | 3.76 |
| 21 | Mathematics lab is useful for affective learning of statistics | 8 | 46 | 171 | 404 | 255 | 884 | 3.67 |
| 22 | Continuous evaluation helps to improve the students' performance in statistics | 10 | 12 | 108 | 372 | 475 | 977 | 4.07 |
| 23 | The topic statistics should be revised | 7 | 74 | 189 | 432 | 125 | 827 | 3.44 |
| 24 | I am able to solve the problems of statistics by applying alternative technique | 48 | 56 | 138 | 348 | 155 | 745 | 3.1 |
| 25 | Instructional materials are essential for the teaching of statistics | 26 | 20 | 54 | 444 | 375 | 919 | 3.82 |

$\bar{X}$ = 3.46, Standard Deviation (S) = 0.48

**Appendix F**

**Attitude Scores Obtained by 25 Teachers**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. | Total Score | Mean Value |
|------|-----------|--------|------|------|-----|------|-------------|------------|
| 1 | The students and teachers both are curious and active while teaching statistics. | 0 | 10 | 0 | 72 | 10 | 92 | 3.68 |
| 2 | The knowledge of statistics is essential in secondary level. | 0 | 0 | 0 | 60 | 50 | 110 | 4.4 |
| 3 | Training is needed to teach statistics. | 0 | 2 | 0 | 40 | 70 | 112 | 4.48 |
| 4 | I would like to give the concept of statistics in psychological manner after finding out the student's discrimination. | 0 | 2 | 18 | 68 | 5 | 93 | 3.72 |
| 5 | I think without teaching materials, teaching of statistics is impracticable. | 0 | 22 | 3 | 40 | 15 | 80 | 3.2 |
| 6 | The topic statistics is appropriate at secondary level. | 0 | 2 | 0 | 52 | 55 | 109 | 4.36 |
| 7 | The examples, formulae and direction given to teach in the topic statistics are sufficient. | 0 | 14 | 3 | 68 | 0 | 85 | 3.4 |
| 8 | The distribution of weightage of marks of statistics is appropriate. | 0 | 12 | 6 | 68 | 0 | 86 | 3.44 |
| 9 | The existing topic statistics has been designed for different intellectual level of students. | 0 | 28 | 3 | 40 | 0 | 71 | 2.84 |
| 10 | The content of statistics should be limited. | 0 | 20 | 0 | 60 | 0 | 80 | 3.2 |
| 11 | The existing topic statistics is sufficient to the base for studying the higher level mathematics. | 0 | 24 | 0 | 48 | 5 | 77 | 3.08 |
| 12 | Statistics is useful for daily life. | 0 | 0 | 0 | 92 | 10 | 102 | 4.08 |
| 13 | The allocated time and the number of | 0 | 10 | 3 | 76 | 0 | 89 | 3.56 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | periods are sufficient to teach statistics. | | | | | | |
| 14 | Greater priority should be given to teach statistics rather than other topics of mathematics. | 0 | 2 | 9 | 72 | 15 | 98 | 3.92 |
| 15 | The low achievement of mathematics is due to statistics. | 0 | 18 | 0 | 56 | 10 | 84 | 3.36 |
| 16 | A successful math teacher should be clear on subject matter and the objectives of teaching statistics. | 0 | 0 | 0 | 36 | 80 | 116 | 4.64 |
| 17 | The students are able to solve the problems of statistics by applying the method and instruction given to the mathematics curriculum. | 0 | 6 | 0 | 84 | 5 | 95 | 3.8 |
| 18 | The topic statistics can be taught by any methods. | 0 | 20 | 24 | 28 | 0 | 72 | 2.88 |
| 19 | Alternative method may be used for affective teaching of statistics. | 0 | 2 | 3 | 92 | 0 | 97 | 3.88 |
| 20 | I always prefer students to do home task after teaching statistics. | 0 | 0 | 0 | 68 | 40 | 108 | 4.32 |
| 21 | The performance of students on statistics is affected by their family environment. | 0 | 4 | 3 | 36 | 65 | 108 | 4.32 |
| 22 | Continuous evaluation of the students helps to improve the students performance in statistics. | 0 | 0 | 0 | 44 | 70 | 114 | 4.56 |
| 23 | The existing topic of statistics should be revised. | 0 | 4 | 9 | 64 | 20 | 97 | 3.88 |
| 24 | Instructional materials are essential for affective teaching of statistics. | 0 | 2 | 3 | 76 | 20 | 101 | 4.04 |
| 25 | Mathematics lab is useful for effective teaching of statistics. | 0 | 2 | 3 | 84 | 10 | 99 | 3.96 |

Mean Value $(\bar{X}) = 3.8$, Standard Deviation $(S) = 0.51$

**Appendix G**

**Attitude Scores Obtained by 120 Boys**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. | Total Score | Mean Value |
|------|------------|--------|------|------|-----|------|-------------|------------|
| 1 | I feel more curious while learning statistics. | 7 | 22 | 0 | 312 | 120 | 461 | 3.8 |
| 2 | The class of statistics is more interesting than other topic of mathematics . | 7 | 36 | 9 | 16 | 190 | 458 | 3.8 |
| 3 | Statistics is related with other topic of mathematics . | 12 | 40 | 96 | 188 | 45 | 381 | 3.1 |
| 4 | Only pupil with a very special talent can learn statistics. | 40 | 116 | 15 | 48 | 25 | 244 | 2.0 |
| 5 | The problem of statistics is always solved by a rule. | 4 | 44 | 51 | 216 | 115 | 430 | 3.58 |
| 6. | I don't care passing time, when I solve the problems of statistics. | 1 | 24 | 24 | 264 | 165 | 478 | 3.98 |
| 7. | The topic statistics is not appropriate at secondary level. | 230 | 160 | 69 | 18 | 2 | 479 | 3.99 |
| 8. | The understanding of statistics is affected by the lack of reference book. | 14 | 44 | 45 | 220 | 70 | 393 | 3.2 |
| 9. | The teacher gives hints to all types of problem of statistics. | 2 | 42 | 21 | 224 | 170 | 459 | 3.8 |
| 10 | The example and formulae given in textbook in the topic statistics are not sufficient. | 110 | 212 | 27 | 64 | 4 | 417 | 3.4 |
| 11 | The low achievement of mathematics is due to statistics | 41 | 56 | 66 | 88 | 35 | 286 | 2.3 |
| 12 | Statistics is sufficient to the base for studying the higher level mathematics | 5 | 16 | 144 | 140 | 120 | 425 | 3.5 |
| 13 | Statistics is a useful chapter | 7 | 16 | 30 | 240 | 175 | 468 | 3.9 |
| 14 | The knowledge gained from the topic statistics is sufficient for daily life activities. | 37 | 76 | 51 | 168 | 80 | 382 | 3.1 |

| 15 | Greater priority should be given to teach statistics rather than other topics of mathematics | 10 | 84 | 57 | 136 | 75 | 362 | 3.01 |
|----|---|---|---|---|---|---|---|---|
| 16 | I Like to concern extra references book related to statistics | 3 | 34 | 24 | 284 | 105 | 450 | 3.75 |
| 17 | I think by the lack of standard problems, study of statistics will be incomplete | 17 | 68 | 93 | 124 | 35 | 337 | 2.8 |
| 18 | I want to know deeply about statistics | 4 | 32 | 21 | 220 | 190 | 467 | 3.8 |
| 19 | An appropriate types of teaching instrument should be used for the topic statistics | 6 | 18 | 36 | 304 | 85 | 449 | 3.7 |
| 20 | There should be used alternative method for solving problems of statistics | 2 | 54 | 30 | 224 | 125 | 435 | 3.6 |
| 21 | Mathematics lab is useful for affective learning of statistics | 3 | 32 | 87 | 184 | 130 | 436 | 3.6 |
| 22 | Continuous evaluation helps to improve the students' performance in statistics | 5 | 6 | 54 | 192 | 230 | 487 | 4.05 |
| 23 | The topic statistics should be revised | 5 | 30 | 99 | 192 | 95 | 421 | 3.5 |
| 24 | I am able to solve the problems of statistics by applying alternative technique | 22 | 28 | 51 | 196 | 90 | 387 | 3.2 |
| 25 | Instructional materials are essential for the teaching of statistics | 16 | 14 | 27 | 212 | 175 | 444 | 3.7 |

Mean Value ($\bar{X}$) = 3.4, Standard Deviation (S) = 0.75

**Appendix H**

**Attitude Scores Obtained by 120 Girls**

| S.N. | Statements | S.D.A. | D.A. | U.D. | A. | S.A. | Total Score | Mean Value |
|------|-----------|--------|------|------|-----|------|-------------|------------|
| 1 | I feel more curious while learning statistics. | 10 | 20 | 9 | 240 | 185 | 464 | 3.8 |
| 2 | The class of statistics is more interesting than other topic of mathematics . | 8 | 36 | 3 | 188 | 230 | 465 | 3.8 |
| 3 | Statistics is related with other topic of mathematics . | 4 | 40 | 147 | 160 | 35 | 386 | 3.2 |
| 4 | Only pupil with a very special talent can learn statistics. | 51 | 82 | 9 | 60 | 50 | 252 | 2.1 |
| 5 | The problem of statistics is always solved by a rule. | 11 | 40 | 45 | 208 | 110 | 414 | 3.4 |
| 6. | I don't care passing time, when I solve the problems of statistics. | 5 | 18 | 15 | 284 | 150 | 472 | 3.9 |
| 7. | The topic statistics is not appropriate at secondary level. | 300 | 116 | 72 | 12 | 1 | 501 | 4.1 |
| 8. | The understanding of statistics is affected by the lack of reference book. | 11 | 26 | 54 | 256 | 70 | 417 | 3.4 |
| 9. | The teachers gives hints to all types of problem of statistics. | 0 | 38 | 9 | 260 | 165 | 472 | 3.9 |
| 10 | The example and formulae given in textbook in the topic statistics are not sufficient. | 17 | 112 | 42 | 88 | 55 | 314 | 2.6 |
| 11 | The low achievement of mathematics is due to statistics | 240 | 52 | 66 | 64 | 54 | 427 | 3.5 |
| 12 | Statistics is sufficient to the base for studying the higher level mathematics | 4 | 10 | 153 | 184 | 70 | 421 | 3.5 |
| 13 | Statistics is a useful chapter | 3 | 14 | 27 | 252 | 190 | 486 | 4 |
| 14 | The knowledge gained from the topic statistics is sufficient for daily life activities. | 4 | 64 | 75 | 196 | 50 | 389 | 3.2 |

| 15 | Greater priority should be given to teach statistics rather than other topics of mathematics | 7 | 88 | 72 | 132 | 60 | 359 | 2.9 |
|----|---|---|---|---|---|---|---|---|
| 16 | I Like to concern extra references book related to statistics | 3 | 42 | 33 | 260 | 100 | 438 | 3.6 |
| 17 | I think by the lack of standard problems, study of statistics will be incomplete | 13 | 54 | 117 | 132 | 40 | 356 | 2.9 |
| 18 | I want to know deeply about statistics | 4 | 30 | 15 | 228 | 195 | 472 | 3.9 |
| 19 | An appropriate types of teaching instrument should be used for the topic statistics | 3 | 26 | 27 | 312 | 85 | 453 | 3.7 |
| 20 | There should be used alternative method for solving problems of statistics | 1 | 26 | 42 | 244 | 155 | 468 | 3.9 |
| 21 | Mathematics lab is useful for affective learning of statistics | 5 | 14 | 84 | 220 | 125 | 448 | 3.7 |
| 22 | Continuous evaluation helps to improve the students' performance in statistics | 5 | 6 | 54 | 180 | 245 | 490 | 4 |
| 23 | The topic statistics should be revised | 2 | 44 | 90 | 240 | 30 | 406 | 3.3 |
| 24 | I am able to solve the problems of statistics by applying alternative technique | 26 | 28 | 87 | 152 | 65 | 358 | 2.9 |
| 25 | Instructional materials are essential for the teaching of statistics | 10 | 6 | 27 | 232 | 200 | 475 | 3.9 |

Mean Value ($\bar{X}$) = 3.48, Standard Deviation (S) = 0.52

## Appendix I

## $t^2$-Value of 25 Statements of Administered Attitude Scale to Students

## (According to the Level of Affective Domain)

| S.N. | Statements | $\chi^2$-Value | Decision |
|------|-----------|----------------|----------|
| 1 | I feel more curious while learning statistics. | 249.66 | S |
| 2 | The class of statistics is more interesting than other topic of mathematics . | 151.54 | S |
| 3 | Statistics is related with other topic of mathematics . | 98.37 | S |
| 4 | Only pupil with a very special talent can learn statistics. | 157.92 | S |
| 5 | The problem of statistics is always solved by a rule. | 99.04 | S |
| 6. | I don't care passing time, when I solve the problems of statistics. | 247.17 | S |
| 7. | The topic statistics is not appropriate at secondary level. | 144.17 | S |
| 8. | The understanding of statistics is affected by the lack of reference book. | 132.58 | S |
| 9. | The teachers gives hints to all types of problem of statistics. | 194.04 | S |
| 10 | The example and formulae given in textbook in the topic statistics are not sufficient. | 115.67 | S |
| 11 | The low achievement of mathematics is due to statistics | 64.12 | S |
| 12 | Statistics is sufficient to the base for studying the higher level mathematics | 136.17 | S |
| 13 | Statistics is a useful chapter | 200.5 | S |
| 14 | The knowledge gained from the topic statistics is sufficient for daily life activities. | 87.96 | S |
| 15 | Greater priority should be given to teach statistics rather than other topics of mathematics | 67.33 | S |
| 16 | I Like to concern extra references book related to statistics | 218.7 | S |
| 17 | I think by the lack of standard problems, study of statistics will be incomplete | 48.37 | S |
| 18 | I want to know deeply about statistics | 169.20 | S |
| 19 | An appropriate types of teaching instrument should be used for the topic statistics | 299.12 | S |
| 20 | There should be used alternative method for solving | 156.04 | S |

| | | | |
|---|---|---|---|
| | problems of statistics | | |
| 21 | Mathematics lab is useful for affective learning of statistics | 106.75 | S |
| 22 | Continuous evaluation helps to improve the students' performance in statistics | 158.04 | S |
| 23 | The topic statistics should be revised | 128.25 | S |
| 24 | I am able to solve the problems of statistics by applying alternative technique | 46.12 | S |
| 25 | Instructional materials are essential for the teaching of statistics | 156.79 | S |

Note : S = Significant and critical region $\chi^2_{\alpha,v}$ = 9.48, where, $\alpha$ = 0.05, v = degree of freedom = (r - 1), (c - 1) = 4 and r = number of rows, c = number of columns.

**Appendix J**

**t$^2$-Value of 25 Statements of Administered Attitude Scale to Teachers**

**(According to the Level of Affective Domain)**

| S.N. | Statements | $\chi^2$-Value | Decision |
|---|---|---|---|
| 1 | The students and teachers both are curious and active while teaching statistics. | 45.5 | S |
| 2 | The knowledge of statistics is essential in secondary level. | 40 | S |
| 3 | Training is needed to teach statistics. | 34.4 | S |
| 4 | I would like to give the concept of statistics in psychological manner after finding out the student's discrimination. | 40.4 | S |
| 5 | I think without teaching materials, teaching of statistics is impracticable. | 21.2 | S |
| 6 | The topic statistics is appropriate at secondary level. | 33.2 | S |
| 7 | The examples, formulae and direction given to teach in the topic statistics are sufficient. | 42.8 | S |
| 8 | The distribution of weightage of marks of statistics is appropriate. | 40.8 | S |
| 9 | The existing topic statistics has been designed for different intellectual level of students. | 34.4 | S |
| 10 | The content of statistics should be limited. | 40 | S |
| 11 | The existing topic statistics is sufficient to the base for studying the higher level mathematics. | 32.8 | S |
| 12 | Statistics is useful for daily life. | 81.6 | S |
| 13 | The allocated time and the number of periods are sufficient to teach statistics. | 52.4 | S |
| 14 | Greater priority should be given to teach statistics rather than other topics of mathematics. | 43.6 | S |
| 15 | The low achievement of mathematics is due to statistics. | 31.2 | S |
| 16 | A successful math teacher should be clear on subject matter and the objectives of teaching statistics. | 42.4 | S |
| 17 | The students are able to solve the problems of statistics by applying the method and instruction given to the | 65.2 | S |

| | | | |
|---|---|---|---|
| | mathematics curriculum. | | |
| 18 | The topic statistics can be taught by any methods. | 17.6 | S |
| 19 | Alternative method may be used for affective teaching of statistics. | 81.2 | S |
| 20 | I always prefer students to do home task after teaching statistics. | 45.6 | S |
| 21 | The performance of students on statistics is affected by their family environment. | 26 | S |
| 22 | Continuous evaluation of the students helps to improve the students' performance in statistics. | 38.4 | S |
| 23 | The existing topic of statistics should be revised. | 32 | S |
| 24 | Instructional materials are essential for affective teaching of statistics. | 50.8 | S |
| 25 | Mathematics lab is useful for effective teaching of statistics. | 64.4 | S |

Note : S = Significant and critical region $\chi^2_{\alpha,v}$ = 9.48, where, $\alpha$ = 0.05, v = degree of freedom = (r - 1), (c - 1) = 4 and r = number of rows, c = number of columns.

**Appendix K**

**Statistical Formulae Used for Data Analysis**

- $$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}}$$

Where,

Degree of freedom $= n_1 + n_2 - 2$

$\bar{X}_1 =$ Mean of the first sample

$\bar{X}_2 =$ Mean of the second sample

$n_1 =$ Size of the first sample

$n_2 =$ Size of the second sample

$s_1^2 =$ Variance of the first sample

$s_2^2 =$ Variance of the second sample

- $$t = \frac{\bar{X} - \mu}{\dfrac{s}{\sqrt{n}}}$$

Where,

$\bar{X} =$ Mean of the sample

$\mu =$ Population mean

$s =$ Standard deviation of the sample

$n =$ Size f the sample

- $$\chi^2 = \sum \frac{[f_o - f_e]^2}{f_e}$$

Where,

$f_o$ = Observed frequency

$f_e$ = Expected frequency

- Standard Deviation $(s) = \sqrt{\dfrac{\sum x^2}{n} - \left(\dfrac{\sum x}{n}\right)^2}$

Where,

$n =$ No. of items in the sample