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ATTITUDE OF M.ED STUDENTS TOWARDS STATISTICS

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ABSTRACT:-

A total sample of 206 M.Ed students from aided educational institutions affiliated to Punjab University, Chandigarh was taken for the present study. A self constructed Attitude towards Statistics Scale was used to collect the data. Out of 206 students 103 male and 103 female. Further divided into graduate and post graduate. It is difficult to study the whole population for studying any problem. Therefore, it is easy to pick up a sample out of the whole population proposed to be covered by the study. Hence, in sample technique of collecting the data, some units are taken as the whole field and conclusions of these sample units are then extended to the whole field. There are different techniques which can be used for obtaining a sample, which represent the entire population. The adequacy of a sample depends upon our knowledge of population as well as method used in drawing the sample.

INTRODUCTION

Education is a means through which the aims and habits of a group of people sustain from one generation to the next. Generally, it occurs through any experience that has a formative effect on the way one thinks, feels or acts. It is the formal process by which society deliberately transmits its accumulated knowledge, skills, customs and values from one generation to another. It is through education that man develops his thinking and reasoning, intelligence and aptitude, problem solving and creativity, positive sentiments and skills, good values and attitudes.

To impart education, teacher is the most important element. It is the teacher who is mainly responsible for the implementation of the educational process at any stage. Throughout the ages, teaching has been acknowledged the world over as the noblest of professions and the society is indebted immensely to the teachers for the responsibility that they carry for shaping the destiny of the nation through the education of young minds. So, it is essential that the teacher should himself be trained.

In today's educational environment of accountability and emphasis on educational outcomes, the success of teacher education programs that prepare school teachers is measured by the achievement of the students in the classrooms of teacher education. If we want that our schools should produce more powerful learning on the part of students, then we have to offer more powerful learning opportunities to our preservice teachers. Teacher educators have much to contribute to the development of a systematic approach to teacher quality. More importantly, if teacher educators do not contribute, they will move from their current marginalized status to one of irrelevance.

Teacher educators might respond at both a conceptual and pedagogical level in a ways that builds broader political support. Students are trained and educated in the hands of teacher educators to become trained teachers in teacher training institutions. It is the educator only who acts as a role model for his students. As is the educator, so is his students. It is the educator who enables and inculcates appropriate type of behavior including intellect, emotions and attitude among his students.

Attitudes collectively form an important psychological construct that is often used to understand and predict an individual's reaction to an object and how behavior can be influenced. An attitude can be defined as a positive or negative evaluation of people, objects, events, activities, ideas or just about anything in our environment. Attitudes are expressed along a positive-negative continuum for example, like-dislike, pleasant-unpleasant and may represent, for example, feelings towards a teacher, a topic or an activity. A positive favorable attitude towards a subject makes the work not only easier but also more satisfying and professionally rewarding. A negative, unfavorable attitude towards a subject can influence the behavior of the students. Attitude consists of three major components such as Affective: emotions or feelings that something evokes. e.g. fear, sympathy, hate; Cognitive: an individual's thoughts, beliefs, and ideas about something; Conative or behavioral: tendency or disposition to act in certain ways toward something.

There are many measurements and scales used to examine attitudes. Attitudes can be difficult to measure because measurement is arbitrary, meaning people have to give attitudes a scale to measure it against, and attitudes are ultimately a hypothetical construct that cannot be observed directly. However, Attitudes can be measured by two ways; explicit measurements and implicit measurements.

Explicit measures tend to rely on self reports or easily observed behaviors. These tend to involve bipolar scales, for example, good-bad, favorable-unfavorable, support-oppose, etc. Implicit measures are not consciously directed and are assumed to be automatic, which may make implicit measures more valid and reliable than explicit measures, such as self reports. These measures tend to rely on an indirect measure of attitude. For example, people can hold implicit prejudicial attitudes,

but express explicit attitudes that report little prejudice. Implicit measures help account for these situations and look at attitudes that a person may not be aware of or want to show.

CHARACTERISTICS OF ATTITUDES:

- **Favorableness:** Favorableness is the degree to which a person is for or against a psychological object. This dimension determines the direction of attitude. A person may have positive or negative attitude. She/he may approve or disapprove certain practices. When people say that family planning is a must it indicates their favorable attitude.
- **Intensity:** Intensity refers to the strength of the feeling. How strongly a person feels about something, reveals the strength of his/her feeling. For example, Reeta agrees with co-education system, while Sita strongly disagrees with it. It can be inferred that Sita's feelings are stronger against co-education system. Moreover, two people may have attitudes of equal intensity, but their direction may differ. Intensity is equal but in opposite direction. The more favorable or unfavorable an attitude, the more intense it is. However, people who are neutral in their feelings have the least intense attitudes.
- **Salience:** Salience means how freely or spontaneously an individual expresses his attitude. It is the readiness or promptness with which the individual gives vent to his/her feelings. A person may express his/her attitude freely towards caste system or rising prices, but may not express his/her attitude about sex. Salience is affected by cultural permissiveness.
- **Attitudes are acquired:** Attitudes are not inborn or innate. They are not inherited by the individual but are acquired by him/her during the growth process. At the time of birth, the child does not inherit any preference for food, but as he grows, he develops positive and negative attitudes towards certain types of foods.
- **Attitudes are more or less permanent:** Attitudes once acquired become permanent. They are lasting and enduring. They become stable over a period of time. Since they are more or less permanent, an individual's future behavior can be predicted on the basis of his/her attitudes.
- **Attitudes involve subject object relationship:** Attitudes are not formed in vacuum. They are always formed in relation to some person, object or situation.
- **Attitudes involve affective, cognitive and action components:** Affective refers to feelings, cognitive to knowledge and action to predisposition. A person will have some idea or knowledge about psychological object; will also have feelings toward it and predisposition to act positively or negatively.

- **Attitudes are inferred:** Attitudes of a person cannot be known directly because he will not express them frankly. Attitudes therefore can be inferred from individual's actions, behavior or words.

Attitude towards statistics might influence a person's statistical behavior inside and outside classroom and their willingness to attend statistics courses in the future. This is particularly relevant in the preparation of teachers, since positive attitudes towards statistics would help them to understand that statistics is useful in their students' professional and personal lives, and that their students can be trained to understand and use statistics.

Statistics is an old discipline, as old as the human activity. Its utility has been increasing as the ages go by. In the olden days, it was used in the administrative departments of the states and the scope was limited. Earlier it was used by governments to keep record of birth, death, population etc. for administrative purpose. John Graunt was the first man to make a systematic study of birth and death statistics and the calculation of life at different age in the 17th century which led to the idea of Life Insurance.

The word 'Statistics' has been derived from the Latin word 'Status' or the Italian word 'Statista', which means 'Political State' or 'a Government', originally meant information useful to the state, for example, information about the sizes of the population and armed forces. It is a branch of Mathematics. Mathematics serves as a foundation for Statistics. Statistical methods are the techniques used to facilitate the interpretation of collections of quantitative or numerical data. The process of measurement provides the raw data which is meaningless; the statistical analysis makes the raw data meaningful or communicable.

Shakespeare used a word Statist in his drama Hamlet (1602). In the past, the statistics was used by rulers. The application of statistics was very limited but rulers and kings needed information about lands, agriculture, commerce, population of their states to assess their military potential, their wealth, taxation and other aspects of government. This word has now acquired different meanings.

In the firstly place, the word statistics refers to "numerical facts systematically arranged". In this sense, the word statistics is always used in the plural. For example, statistics of prices, statistics of road, accidents, statistics of crimes, statistics of births, statistics of educational institutions, etc. In all these examples, the word statistics denotes a set of numerical data in the respected fields.

In the second place, the word statistics is defined as a discipline that includes procedures and techniques used to collect process and analyze numerical data to make inferences and to reach decisions in the face of uncertainty. In this sense, the word statistics is used in the singular. In the

singular, the word statistics denotes the science of basing decision on numerical data.

Thirdly, the word statistics are numerical quantities calculated from sample observations; a single quantity calculated is called a statistic. The mean of a sample for instance is a statistic.

Statistics has been defined differently by different writers.

According to Webster, "Statistics are the classified facts representing the conditions of people in a state. Specially those facts which can be stated in numbers or any tabular or classified arrangement."

According to Bowley, "Statistics are numerical of facts in any department of enquiry placed in relation to each other."

According to Yule and Kendall, "Statistics means quantitative data affected to a marked extent by multiplicity of causes."

Horace Secrist defined statistics in a broader way. According to him, Statistics means aggregate of facts affected to marked extent by multiplicity of causes, numerically expressed, enumerated or estimated according to a reasonable standard of accuracy, collected in a systematic manner for a predetermined purpose and placed in relation to each other. This definition points out some essential characteristics that numerical facts must possess so that they may be called Statistics. These characteristics are:

- They are enumerated or estimated.
- They are affected by multiplicity of factors.
- They must be numerically expressed.
- They must be aggregate of facts.
- They are estimated with reasonable standard of accuracy.
- Statistics are collected in a systematic manner.
- Statistics are collected for a predetermined purpose.
- They should be placed in relation to each other.

Statistics may be classified into pure statistics and applied statistics. In Pure Statistics, newer and stronger research tools are developed for Applied Statistics whereas the Applied statistics continues to present challenging problems for Pure Statistics.

Statistics presents facts in a precise and definite form. It gives exact quantitative information, which is always more convincing than those stated qualitatively. That makes the statement logical and convincing than mere description. It condenses the whole mass of figures into a single figure. This makes the problem intelligible.

Statistics simplifies the complexity of data. The raw data are unintelligible. It can be made

simple and intelligible by using different statistical measures. Some such commonly used measures are graphs, averages, dispersions, skewness, kurtosis, correlation, regression etc. These measures help in interpretation and drawing inferences. Therefore, statistics enables to enlarge the horizon of one's knowledge.

Statistics help in the arrangement of numerical data with respect to different characteristics possessed by units of the data and in turn, this facilitates comparison and interpretation. For example, the data on age, height, sex, education, income, expenditure etc. of respondents in a certain city do not give a clear picture of various characteristics possessed by respondents unless classification is done according to various characteristics.

It also provides methods for making comparisons. For example, we estimate per capita income of an Indian not for itself, but to compare it with the past years or with other countries. With the help of this comparison, we can see whether standard of living of an Indian in general is improving or better in comparison to other countries under consideration. The object of statistics is to enable comparison between results of past and present to ascertain the reasons for changes, which have taken place and the effect of such changes in future. So, to determine the efficiency of any measure, comparison is necessary. Statistical devices like averages, ratios, coefficients etc. are used for the purpose of comparison.

Not only this, but statistics also helps very much in formulating policies in various fields. Various government policies regarding planning, import and export trade, taxation etc. are formulated on the basis of statistical analysis of data and various inferences drawn from them. For example, Statistics related to prices of commodities will determine the future demand for those communities and thus, help in making policy regarding their supply. Hence, Statistics is essential for planners, economists, scientists and administrators to prepare different plans and programs.

For determining the relationships between different phenomena like coefficient of correlation, association and regression etc., statistics plays significant role. For example, the coefficient of correlation between literacy and employment in Punjab state gives us the extent of relationship between the two characteristics in the state. Along with, Statistics enables one in forecasting the trend and tendencies and in predicting the future values of a variable. For example, a producer forecasts his future production on the basis of the present demand conditions and his past experiences. Similarly, the planners can forecast the future population etc. considering the present population trends.

Statistical techniques are very beneficial in formulating and testing hypothesis. For example, the hypothesis, whether a coin is fair or not, whether quinine is effective in checking malaria or not,

can be tested by the statistical techniques. This helps in developing new theories. So statistics examines the truth and helps in innovating new ideas. It mainly aims at deriving inferences from an enquiry. Statistical techniques are often used by scholars, planners and scientists to evaluate different projects. These techniques are also used to draw inferences regarding population parameters on the basis of sample information.

Statistics has been applied to problems ranging from household to big business i.e. the scope of statistics is vast. There are many areas where statistics can be used, for example, it is very helpful for the state. The state collects information for several problems. This information helps the government in framing suitable policies. All the government departments as well as ministries depend on the data which evaluate functioning. For example, Punjab government wants to control the population; this cannot be done unless it knows the present total population, birth and morality rates etc. similarly, in war times, country needs the estimate of strength of the enemy country to fight it successfully. Thus, statistics are very much significant for the government to arrive at useful conclusions and which in turn help in making decisions.

Business is another area, where statistics is used. In modern times, even if a business firm is operating on a small scale, it has to plan its working very systematically. Statistics methods can be applied to the quantitative information obtained at each step of business activity which in turn helps in formulating suitable policies and making valid decisions. Statistical methods are also employed in accounting and auditing.

Business and Economics are highly interrelated. Economics is mainly concerned with the production and distribution of wealth and on the other side with consumption, saving and investment of income. Statistics, in this area is, of great help for proper understanding of the economic problems and formulating various economic policies, whether at the state, national or international level.

Statistics has also its roots in banks and insurance companies. Bankers have to use statistics in credit rating of all the customers. Stock exchange brokers, speculators and investors should be fully conversant with the existing money rates at the various centre and their future trends. Insurance companies carry on their business with statistical data related to life tables and premium rates etc.

Meteorology (Physical Science) predicts weather using statistics. In Botany (Natural Science), one has to depend on statistics in conducting experiments about the plants; effects of temperature, and climate conditions, type of soil etc. in Sociology and Psychology (Social Sciences), Statistics may be used to determine the reliability and validity of a test.

There is hardly any advanced research work in these days which can be considered worthwhile without the use of statistical data and statistical techniques. The effectiveness of the new

drugs is determined by experiments, first on animals and then on human beings. For a research worker in any field, Statistics is not only useful but necessary.

There are two types of data in statistics: Qualitative data and Quantitative data. Qualitative data is a categorical measurement expressed not in terms of numbers, but rather by means of a natural language description. In statistics, it is often used interchangeably with "categorical data". Although there are categories, the categories may have a structure to them. When there is not a natural ordering of the categories, these are called nominal categories. For example; gender, race, religion, or sport. When the categories may be ordered, these are called ordinal variables. Attitudes (strongly disagree, disagree, neutral, agree, strongly agree) are also ordinal variables; however it may not be known which value is the best or worst of these issues.

Quantitative data is a numerical measurement expressed not by means of a natural language description, but rather in terms of numbers. However, not all numbers are continuous and measureable. Quantitative data is specific and replicable. The "quantitative" in quantitative research contains the word "quantity"- something that can be counted. So quantitative research includes any research methods that produce hard numbers which can be turned into statistics. Quantitative data always are associated with a scale measure.

One can use a mix of research methods to help gather comprehensive evidence or give a more complete picture of his/her study. For example, in a market research scenario, after gathering quantitative information about the number of people who have bought a product in the last six months, one can conduct qualitative interviews to find out why they bought, or didn't buy, the product, as well as how they had heard about it.

Students must have the knowledge about the importance of statistics. In case, students of masters of education (M.Ed) have opted dissertation, the knowledge of statistics is much more of relevance to them. They can effectively use the tools and techniques of statistics in collecting, computing or analyzing of data. The knowledge of statistics will enable them to have an in-depth awareness of the raw data or scores and enable them to deal with them according to the problem in hand.

M.Ed curriculum of Punjab University, Chandigarh and Guru Nanak Dev University, Amritsar consists of one paper that deals with methodology of educational research and educational statistics. It covers various topics such as descriptive and inferential statistics, normal probability curve, type I ant type II error, comparison of sample means (t-test), analysis of variance, correlation, etc. all these topics can be easily dealt and applied suitably in various fields only if students have knowledge about statistics.

Dissertation work is also part of M.Ed curriculum which also needs awareness about statistics and its techniques. It is only through the knowledge of statistics that students are enable to prepare the design of the study, including how to use sampling techniques, collect the data and tabulate suitably, to identify frequencies, calculate central tendency, variance, correlation, regression etc. The overall method and procedure, analysis and interpretation, their conclusions and graphical representation requires knowledge of statistics. If the students have positive attitude towards statistics, they can easily and interestingly carry out their research work; and if the attitude is negative, they will find it boring, weary, and uninteresting and thus, will hesitate to pursue their research work or will follow other unauthentic and unauthorized ways and means to complete their work.

To inculcate a positive attitude among students towards statistics, the role of teacher educator is very significant. If the teacher educator has knowledge about the concept, types, methods or techniques of statistics, then she/he can effectively transduce that knowledge in the students making it more interesting, understandable and exciting on one hand and on the other hand inculcating a positive attitude in them. On the contrary, if teacher educator him/her self lack appropriate knowledge of statistics, the results can be very horrific. Therefore, there is dire need that teachers must update their knowledge regarding statistics, so that they can effectively teach their subject and can bring about positive attitude towards this subject.

THE PROBLEM NEED AND IMPORTANCE

Statistics is a methodological discipline that offers other fields of study a coherent set of ideas and tools for dealing with data. The discipline does not exist for itself, but rather provides means for dealing with data that take into account the omnipresence of variability.

Statistics can be viewed as the most important science in the whole world, the reason behind that the practical application of every other science depends on statistics and it is therefore the one science essential to all political and social administration as well as education consequently, statistics is near universally recognized as an important component of almost all studies at tertiary level.

Statistics is the science of collecting, analyzing and making inference from data. It is a particularly useful branch of mathematics, that is not only studied theoretically by advanced mathematicians but one that is used by researchers in many fields to organize, analyze and summarize data. Statistical methods and analyses are often used to communicate research findings and to support hypotheses and give credibility to research methodology and conclusions. It is

important for researchers and also consumers of research to understand statistics so that they can be informed evaluate the credibility and usefulness of information and make appropriate decisions.

Statistics helps in providing a better understanding and exact description of a phenomenon of nature. A proper and efficient planning of a statistical inquiry in any field of study can also be done with the help of statistics. It helps in presenting complex data in a suitable, tabular, diagrammatic and graphic form for an easy and clear comprehension of the data. It gives quantitative observations and thus, helps in understanding the nature and pattern of variability of a phenomenon.

The objective of statistics course is to help students to understand the value of statistics in acquiring knowledge and making decisions in today's society. It also equips students with basic statistical skills in order to appreciate the value of statistics in their professional and personal lives. It also proves beneficial to students in understanding previous and current research, generate some of their own research, evaluate practices and draw informed conclusions.

However, for most students, statistics is seen only as a professional tool rather than a central skill and their statistics education as part of their degree does not set out to prepare them as statistics consultants. It rather prepares them to recognize when a statistician is needed and to be able to better use a statisticians' consultancy services in their profession. As a result of this, statistics represents a new way of thinking for most students and is also seen as a somewhat unexpected component of their studies and future professions. Most students find the completion of statistics as part of their education quite daunting.

Students may have a fuzzy understanding of what statistics might be about, or be unaware about life domains where statistics may be used, and this lack of knowledge can affect their attitudes. Many statistics educators and most students believe that attitudes toward statistics are important. The perceptions and attitudes of students regarding statistics might therefore pose some challenges for everyone teaching statistics. Students who hold and express negative attitudes can create an uncomfortable classroom climate. In addition, it is believed that attitudes impact students' achievement, course completion, future course enrollment, and colleagues. Investigating students' attitudes toward statistics might aid those teaching statistics to better prepare and guide students. It can also equip teachers to influence students' attitude toward the role of statistics in their future careers.

JUSTIFICATION

It is clear that education is a life-long process. Its period starts from birth and continues till death. To impart education, there are learning institutions. In these institutions, there are teachers.

Teachers training in statistics are generally focused on improving the cognitive aspects of instruction with relatively little attention paid to students' attitudes, feelings, beliefs or motivations. Attitudes towards statistics might influence the students' statistical behavior outside the classroom and their willingness to attend statistics courses in the future. This is particularly relevant in educating teachers since an appropriate use of statistics would make them believe that statistics is useful in their students' professional and personal lives and that their students can be trained to understand and use statistics. Poor attitudes toward statistics in teachers might also be later transmitted to their own students when teaching the topic.

If teacher is interested in teaching statistics, then no doubt his students will have a positive attitude towards statistics. Therefore, it becomes pertinent to know whether the students pursuing M.Ed course and are thus, going to become future teacher educators have appropriate attitude towards this subject.

In context to this and after reviewing the related literature, it was found that although few studies have been conducted to examine the attitude of students or teachers towards statistics, but they are at the international level. In India, no such study so far has been conducted. Thus, the investigator has selected the present problem. It is sure that the results of the study will not only enable in identifying the attitude of M.Ed students towards statistics but also will help in framing proper strategies to be followed by our teacher educators to develop positive attitude in their students.

STATEMENT OF THE PROBLEM

ATTITUDE OF M.ED STUDENTS TOWARDS STATISTICS.

DEFINITIONS OF THE TERMS

Attitude :

An affective response that involves negative or positive feelings of moderate intensity.

M.Ed students :

The students who seek master's degree in education.

Statistics:

It is the study of the collection, organization, analysis, interpretation and presentation of data.

OBJECTIVES OF THE STUDY

- To study the attitude of M.Ed students towards statistics.
- To study the attitude of M.Ed students towards statistics in relation to gender.

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HYPOTHESES

- The attitude of M.Ed students towards statistics will be average.
- There will be no significant difference in the attitude of M.Ed students towards statistics in relation to gender.
- There will be no significant difference in the attitude of M.Ed students towards statistics in relation to subject stream.
- There will be no significant difference in the attitude of M.Ed students towards statistics in relation to educational qualification.

RESEARCH METHODOLOGY

- **Sample:** A total sample of 206 M.Ed students from aided educational institutions affiliated to Panjab University, Chandigarh was taken for the present study.
- **Tool:** A self constructed Attitude towards Statistics Scale was used to collect the data**.**

Statistical techniques : Mean, Standard deviation, 't' test was employed to analyze the data.

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- **REVIEW OF RELATED LITERATURE**

The review of related literature is an important pre-requisite to actual planning as well as to the execution of any research work. It is an exact task calling for a deep insight and clear perspective

of the field. By reviewing literature, the researcher can avoid useless problem areas. She can select those areas in which positive findings are very likely to result and her/his endeavors would be likely to add the knowledge in a meaningful way. The important established reason for reviewing the related literature is to know about recommendations of previous researchers listed in their studies for further research.

Taking into consideration the problem under study, the investigator has reviewed following studies conducted so far:

Begg and Edwards (1999) analyzed the teachers' attitudes towards teaching statistics. They used interviews, an unspecified survey scale, and concept maps to study attitudes in a sample of 22 in-service and 12 prospective primary teachers. Results showed negative attitudes in the affective component, with the teachers expressing feelings like "fear", "horror" or "lack of interest". As regards value, some teachers considered statistics important, since "It helps us make sense of our world" or "It helps us compare and organize things, shows trends and enables us to predict". Despite the teachers' concern about how statistics can be manipulated, they generally disagreed with the statement "Statistics are fairly worthless". So, it was found that 75% of the practicing teachers in their sample felt secure when teaching the topic. The teachers thought that a good understanding of Mathematics was not needed to grasp basic statistical concepts. They did not consider themselves good with statistics, although they were confident about their ability to read and understand statistical terms and graphs in the media.

Carmona (2002) conducted study on 827 college students from two Spanish Universities from various introductory statistics classes. There were 180 males and 647 females students. The study was to check the mathematical background and attitudes towards statistics. Information about secondary studies and math grades was obtained by self-report. The participants were classified into three groups: lower, middle and upper levels according to the number and complexity of math courses taken in secondary education. The attitudes towards statistics were measured using three instruments; The Survey Of Attitudes Toward Statistics (SATS), The Attitudes Toward Statistics Scale (ATS), and The Statistics Attitude Survey (SAS). It was found that mathematical background has a strong association with the affective responses to statistics, especially the attitudes towards statistics course, rather than with the valuing of statistics.

Tempelaar (2002) conducted study on 3500 first year university students to investigate two research questions related to students' attitudes towards statistics. The first question is inspired by a large body of research that concludes that learning attitudes tend to decline while learning for the subject. A second research question refers the position of the effort construct in attitude model. The

results indicated that students express a well articulated set of attitudes, but except for the valuation of the subject of statistics, all other attitudes level diminish during the introductory statistics course.

Schau (2003) assessed students' attitudes towards statistics. Five hundred eighty-one students completed the SATS (Students Attitude Towards Statistics Scale) within the first two weeks of the beginning of their course (the pre-test administration); 288 of these students also completed it within the last two weeks (the post-test administration). Only one student took the SATS (Students Attitude Towards Statistics Scale) during the post-test administration but not during the pre-test administration; that student's data are not included in the analyses. It was revealed that students' spoken attitudes were more negative than were responses to the SATS, they attributed their attitudes to their achievement and to the instructors; mean attributes varied and students' attitudes were positively related to their achievement.

Jameson et.al (2006) collected data from two introductory statistics courses at Ball State University, one college algebra-based and the other calculus-based. Data were collected during three academic years from 14 classes with 5 different instructors and where the majority of students studied in one of three areas- education, computer science or construction management. The purpose was to describe the similarities and differences in attitudes of students from various majors as measured with the Students Attitude Towards Statistics Scale (SATS). The results of the study suggested that students' attitudes toward statistics for the most part declined over the course of the semester. It would appear that something in the statistics environment, perhaps the current teaching methods employed, is resulting in a decline in students' attitudes toward statistics. This study provides further evidence for the need to adjust statistics teaching methods such that student attitudes are more positive toward statistics.

Roiter and Petocz (2006) presented a framework for the design and analysis of introductory statistics courses in Australia. The framework logically preceded the usual process of putting together the syllabus for an introductory statistics course. Four approaches, or paradigms, of statistics teaching were put forward, together with tools for deciding which blend of approaches was most useful in any particular case. Those four main approaches were: statistics as a branch of mathematics; statistics as analysis of data; statistics as experimental design; and statistics as a problem-based subject. Those approaches did not correspond to the two traditional schools of thought in statistics education- probability-driven or data-driven- but rather constitute a new approach. At first glance, the appropriateness of these approaches may not be apparent because many introductory statistics courses in Australia appear to be a blend of them. A way of classifying introductory statistics courses had been developed that was at the same time theoretically and

practically based, together with tools that help to determine which approach was most appropriate in a particular situation. The approaches and questionnaire could logically precede the design of a course by promoting discussion about such issues as structure, use of teaching aids, and assessment of learning outcomes.

Vanhoof et.al (2006) studied students' attitude toward statistics and their relationship with short and long term exam results with the help of Attitudes Toward Statistics Scale (ATS). The results indicate that the sample of undergraduate students have relatively negative attitudes toward the use of statistics in their field of study but relatively positive attitudes toward the use of statistics in which they are enrolled. A relationship between the attitudes toward the course and the results on the first year statistics exam was also found. Additionally, the relationship between the attitudes and the long-term exam results were also investigated. The results showed a positive relationship between students' attitudes toward the use of statistics in their field of study and the dissertation grade. This relationship does not differ systematically from the one between the first year statistics exam results and the dissertation grade in the fifth year. Thus, the affective and cognitive measures at the beginning of the curriculum are equally predictive for long-term exam results. Finally, this study reveals that the relationship between attitudes toward statistics and exam results is content-specific.

Evan (2007) examined students' attitudes toward and conceptions about statistics, both before and after an introductory undergraduate college statistics class. Relationships between those attitudes and conceptions, as well as their relationships to achievement in statistics, were also studied. Significant correlations were found between students' attitudes and achievement, both at the beginning and end of the course. A low, but significant, correlation was found between positive attitudes toward statistics and accurate conceptions about statistics in the posttest but not in the pretest. Although it was found that there was no change in students' attitudes and correct conceptions than expected. Additionally, instructor interviews revealed that the most common technique employed to improve students' attitudes and conceptions was the use of real-world applications.

Nel (2007) conducted a research for Department Biostatistics to Nutrition and Physiotherapy students in their third year of study and forms part of an introductory course to research methodology. There were 53 students in the study. Since the beginning it was noticed that students were very apprehensive about the course and using a computer to do analysis. The aim of the project was to determine and describe the attitude of third year students of the school for Allied Health Professions, UFS, towards an introductory course in statistics. The Statistics Attitude Rating Scale

(SATS) consists of 28 items, grouped into 4 subscales namely affect, cognitive competence, value and difficulty. It was found that students had mixed views of the course as the subscales affect, cognitive competence and value tended to have lower values after the first semester test, although the students viewed the course statistically significant less difficult after the first test.

Yingkang (2007) investigated attitude towards statistical graphs among a large sample of Singapore secondary school students in 2003. Attitude Towards Statistical Graphs (ASG) was defined in terms of five aspects: enjoyment, confidence, usefulness, critical views and learning preferences. These students (13 to 15 years old) completed a Questionnaire of Attitude Towards Statistical Graphs (QASG). The results indicated that the students, irrespective of gender, did not particularly enjoy working with statistical graphs (were only moderately confident about their ability in statistical graphs), had positive view about the usefulness of these graphs, but seldom asked critical questions when they dealt with these graphs. Students who had worked with computers had more positive attitude than those who reported no experience with computers.

Lancaster (2008) studied preservice teachers' attitude toward their role as students of statistics and implications for future professional development in statistics. The variables investigated include preservice primary teachers' attitudes toward future professional development in statistics; current knowledge of statistics; current self efficacy; and current self efficacy to learn statistics in the future. The results suggested that current self efficacy to learn statistics in the future is a moderate predictor of preservice primary teacher beliefs that future professional development in statistics will help their classroom teaching, and current self efficacy to learn statistics in the future can vary for preservice primary teachers throughout their preparation program.

Mahmud (2009) identified learner's attitude towards statistics through the classification process of discriminate function. That multivariate technique method is used to profile the subjects' attitude into either positive or negative attitude towards statistics. The study had characterized each profile of learners by relating to his/her perceived attitudes toward statistics, types of learners, mode of study, programme structure, age, gender and learners' evaluation towards the statistics course. Learners' attitudes towards statistics were measured using the dimensions, namely, Affect, Cognitive Competence, Value and Difficulty. These variables are examined as predictors that discriminate learners with positive and negative attitudes toward statistics. The results indicate that learners with positive attitudes can be reliably distinguished from learners with negative attitudes toward statistics across the four ATS sub-scales, types of learners, mode of study and learner's evaluation towards the course.

Verhoeven (2009) studied changing students' attitude toward statistics at universities and

colleges. In order to meet the requirements of the college, they have to take the course. Besides, students find the course often difficult. Hence, statistics is not a popular course among students. These stereotypical attitudes put pressure on the teachers. So for them, it is important to know what the students' attitudes are at the start of the course or semester and to what extent the course can contribute to a positive-attitude change. The study revealed that the individual factors explain attitude changes and the effect on student achievement better than institutional factors. Main effects have been found from previous experience, self confidence, gender and age. Secondly, the Latent Change Method Effect Model provides a tool for measuring intra-individual effects, method effects and thus, changes from pre to posttest.

Coetzee and Merwe (2010) studied industrial psychology students' attitude towards statistics. The attitude of students toward statistics may influence their enrollment, achievement and motivation in the subject of Research and Industrial Psychology. A cross-sectional survey design was used and the SAT36 was administered to a sample of convenience consisting of 235 students enrolled in Industrial and Organizational Psychology at a large tertiary institution in South Africa. The aims of this study were to determine the reliability and validity of the survey of attitudes toward statistics (SATS-36) for a South Africa sample and to determine whether biographical variables influence students' attitudes. Results revealed that even though students perceive statistics to be technical, complicated and difficult to master, they are interested in the subject and believe statistics to be of value.

Bercerra et.al (2011) examined the extent of the relationship between self efficacy to learn statistics and statistics anxiety, attitude towards statistics, and social support of graduate students enrolled in programs within colleges of education. Insight into how this population response to statistics course and implications for educators as well as students are presented. The results showed that that graduate students who believed they were incapable of achieving success in a statistics course demonstrated higher level of anxiety. This anxiety was pervasive among the 75% to 80% of graduate students in the social sciences profession in previous research studies (Onwuegbuzie et al., 2000), as well as to the 53% of the graduate students in this study. Additionally, graduate students hold off from taking a statistics course due to their negative attitudes towards the subject matter. Teaching graduate students how to reduce their anxiety and improve their attitude will likely enhance their value of statistics and further encourage their professional development in the counseling profession.

Estrada et.al (2011) studied teachers' attitudes towards statistics. Attitude towards statistics might influence a person's statistical behavior inside and outside the classroom and their willingness

to attend statistics courses in the future. Attitudes collectively form an important psychological construct that is often used to understand and predict an individual's reaction to an object. This is particularly relevant in the preparation of teachers, since positive attitudes towards statistics would help them to understand that statistics is useful in their students' professional and personal lives, and that their students can be trained to understand and use statistics. Statistics teachers would be more likely to transmit to their students a positive view of statistics and an appreciation for the potential uses of statistics in future personal and professional life. The results suggested that teachers' attitudes towards statistics play a significant role in assuring success in implementing any new statistical curriculum.

After reviewing the above cited literature, it is concluded that various studies have been conducted on the concept of attitude towards statistics. The study have been conducted on teachers, graduate and undergraduate students, nutrition and physiotherapy students, industrial psychology students, social science students and psychology students. All these studies were conducted at international level. No such study so far has been conducted at the national stage to know the attitude of M.Ed students towards statistics. So, the investigator selected the present problem and conducted his/her study on M.Ed students studying in government aided educational institutions affiliated to Panjab University, Chandigarh.

METHOD AND PROCEDURE

The purpose of this chapter is to discuss the method and procedure employed in the study. It includes the design of the study, sample, tools used, data collected and statistical techniques applied.

DESIGN OF THE STUDY

A sample design refers to the techniques or the procedure the researchers would adopt in selecting items for the sample. It is a definite plan for obtaining a sample from a given population. Sample design is determined before data is collected. The researcher must select a sample design which should be reliable and appropriate for the research study.

The present study entitled, "Attitude of M.Ed students towards statistics", which aims at analyzing the statistics attitude of M.Ed students studying in different education colleges affiliated to Punjab University.

SAMPLE OF THE STUDY

It is difficult to study the whole population for studying any problem. Therefore, it is easy to pick up a sample out of the whole population proposed to be covered by the study. Hence, in sample

technique of collecting the data, some units are taken as the whole field and conclusions of these sample units are then extended to the whole field. There are different techniques which can be used for obtaining a sample, which represent the entire population. The adequacy of a sample depends upon our knowledge of population as well as method used in drawing the sample. Commonly used sampling methods are:

- Random Sampling
- Stratified Sampling
- Quota Sampling
- Purposive Sampling
- Multistage Sampling
- Extensive Sampling
- Convenient Sampling

Among these sampling methods, the investigator has selected the Random Sampling Method.

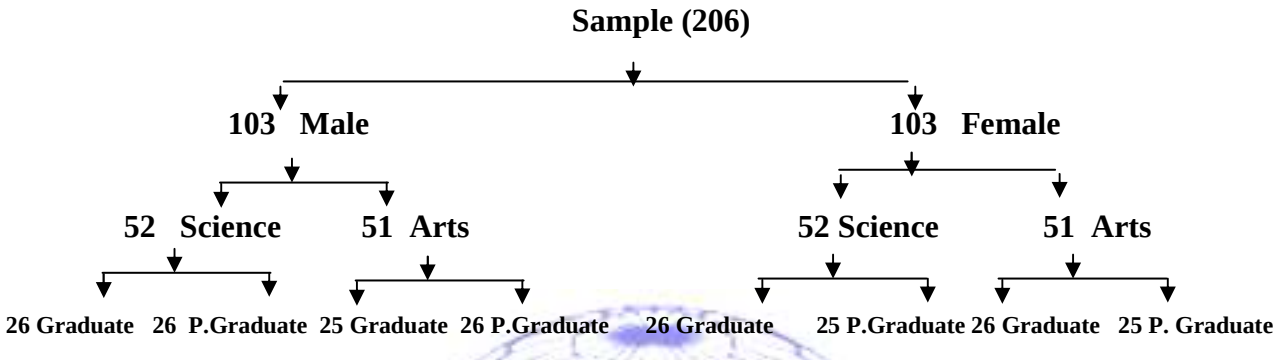
RANDOM SAMPLING

In this method, every item or unit has an equal opportunity for this selection and this selection is in no way influenced by personal bias. No item is selected on account of likes or dislikes of the investigator and the selection is left entirely to chance. This is the most popular, basic method of sampling.

In Random Sampling, every member of the sample is selected from the total population in such a manner that all members of the population have essentially the same probability of being selected.

The present study consists of a sample of 206 M.Ed students. For the selection of total sample of 206 M.Ed students, the investigator prepared a list of government aided education colleges affiliated to Panjab University, Chandigarh with the consultation of guide and sources available. From that list, about 6 educational colleges were randomly selected. These colleges were then visited one by one to collect the data taking into account the gender, subject stream and educational qualification. M.Ed students were given proper instruction before filling up the scale and were told that their results would be kept confidential.

SAMPLE STRUCTURE



TOOLS OF THE STUDY

For each and every type of research, we need certain instruments to gather new facts or to explore new fields. The instruments thus, employed as a mean called "tool of research". The selection of suitable tools or instruments is of vital importance for successful research. The major tools of research in education can be classified as:

- Schedule
- Checklist
- Score Card
- Attitude Scale
- Rating Scale
- Questionnaire

The investigator has used 'Attitude Scale' as a tool for collecting the data for the study

ATTITUDE SCALE

The inquiry form that attempts to assess the attitude or belief of an individual or a group of individuals towards some phenomenon is called as an Attitude Scale. It is the most commonly used tools. It contains list of statements which give expression to the attitudes of the person.

Attitude Scale as a sampling tool was selected by the investigator because it possesses unique advantage over other kinds of tools in throwing maximum possible light upon the attitudes of the individual. The study done with the help of questionnaire is simple. Questionnaires are easy to construct. The questionnaire has a facility to cover a large number of sample/population in a very short time without much expenditure.

PREPARATION OF THE ATTITUDE SCALE

Before preparing the scale, the investigator studied the qualities of a good scale from many books related to educational research and statistics. After that she also consulted many previously prepared scales measuring different types of attitudes. The investigator consulted various types of literature such as books, reference books, journals, encyclopedias related with statistics and prepared a statistics attitude scale of 30 items under the guidance of supervisor. While preparing these test items, guidance and consultation was also sort from college lecturers dealing with the subject.

On their recommendations and suggestions; and also with the guidance of the supervisor, the final format of the scale contained 30 test items.

COLLECTION OF DATA

The scale was distributed to a random sample of 206 M.Ed students studying in different government aided educational institutes affiliated to Panjab University, Chandigarh. Instructions were given regarding filling up of the scale. Students were assured that their responses would be kept confidential. The scale was distributed in 6 different colleges.

SCORING

Weightage was assigned to response of the test items as mentioned below:

Strongly agree	**5**
Agree	**4**
Neither Agree nor disagree	**3**
Disagree	**2**
Strongly disagree	**1**

STATISTICAL TECNIQUES USED

The statistical techniques are employed to get an exact picture of data. Statistics is a process by which data is gathered, described, organized and analyzed, in numerical terms. It not only enables to understand and compare data but also helps to test the hypotheses to bring objectivity in interpretation and leads to reliability in results. It makes the interpretation of data economical in terms of time because these are less time consuming. In this study, various techniques are used which are as under:

- **Mean:** Mean is a single expression representing the whole group in a selected way. It can be defined as sum total of separated scores or other measures divided by their number.

$$\textbf{Mean} = \frac{\sum X}{N}$$

Where X = Scores in a distribution

N = Total number of scores

$\sum$ = Sum total

- **Standard Deviation (S.D.):** It is the square root of arithmetic average of the square of deviations measures from assumed mean. It can be calculated by using the following formulae:

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}, \quad \text{where} \quad \mu = \frac{1}{N}\sum_{i=1}^{N} x_i.$$

4) Standard Error of Mean (S.EM): $\frac{\textbf{S.D}}{\textbf{N}}$

5) Standard error of difference (S.ED) = $\sqrt{\textbf{(S.EM1)}^2 + \textbf{(S.EM2)}^2}$

6) Degree of freedom (df): N-1

Where N= total number of scores

7) Critical Ratio: t-ratio or critical ratio is used to find out the significance of differences between various statistics to test the null hypothesis. It is denoted by 't'.

$$\textbf{t} = \frac{\textbf{D}}{\textbf{S.E}_{\textbf{D}}}$$

Where D = Actual Difference of Mean

$S.E_D$ = Standard Error of Differences

After applying suitable statistical techniques, the results were drawn and suitable interpretations were done and the data was analyzed and interpreted.

ANALYSIS AND INTERPRETATION

Analysis of data means studying the organized material in order to discover inherent facts. The data is studied from as many angles as possible to explore the new facts. Analysis requires an alert, flexible and open minded effort. It is worthwhile to prepare a plan of analysis before the actual collection of data. Analysis os survey involves estimating the values of unknown parameters of population and testing of hypotheses for drawing inferences.

The total data of 206 M.Ed students was properly scored and tabulated. Then mean, standard deviation and critical ratio were computed. On the basis of the computations following analysis and

interpretations are done.

The collected data was properly tabulated to analyze it suitably. The **St atistics Attitude Scale** contains 30 items having five responses each. The total score of the scale is 150. On the basis of this score, the investigator divided the total score into five levels.

Table-I Norm Table for Statistics Attitude

SCORE RANGE	INTERPRETATION
121-150	Highly Favourable
91-120	Favourable
61-90	Average
31-60	Unfavourable
0-30	Highly Unfavourable

The mean of the total sample (N=206) was drawn out. The hypotheses set for the study were then tested one by one.

Hypothesis –1 The attitude of M.Ed students towards statistics is average.

Table –II Mean of Sample (N=206)

Category	N	Mean
M.Ed students	99.95	Favourable

Table- II depicts that the mean score of 206 M.Ed students is 99.95. On comparing the score with Table- I, it is found that score fall in favourable category and not in average category. Therefore, hypothesis - 1 is rejected.

Hypothesis- 2 there will be no significant difference in the attitude of M.Ed students towards statistics in relation to gender.

Table- III Comparison of Attitude of Male and Female M.Ed. Students.

Variable	Number	Mean	S.D.	$S.E_M$	$S.E_D$	C.R	Level of Significance
Male	77	101.03	14.84	1.69			Not
					1.89	0.72	significant at
Female	129	100.67	9.49	0.84			both levels

Table –III depicts that the mean of 77 male and 129 female M.Ed students is 101.03 and 100.67

respectively. The standard deviation of male and female M.Ed students is 14.84 and 9.49 respectively. The calculated C.R is 0.72 which is not significant at 0.05 and 0.01 level. Hence , the hypothesis-2 is accepted.

Graph 1 shows the mean of male and female M.Ed students and Graph 2 shows the graphical representation of standard deviation of male and female M.Ed students.

Hypothesis- 3 there will be no significant difference in the attitude of M.Ed students towards statistics in relation to subject stream.

Table- IV Arts and Science M.Ed students

Variable	Number	Mean	S.D.	S.EM	S.ED	C.R.	Level of Significance
Arts	123	99.89	9.64	0.87			Not Significant
					1.79	0.45	
Science	83	100.69	14.21	1.56			At both the levels

Table- IV depicts that the mean of arts students in M.Ed which comes out to be 99.89 and the mean of science students in M.Ed is 100.69. The standard deviation of arts students is 9.64 and those of science students is 14.21. The critical ratio comes out to be 0.45 which is not significant at 0.05 level as well as 0.01 level. Hence, the hypothesis-3 is accepted.

Graph- 3 shows the graphical representation of mean of arts and science M.Ed students. Graph- 4 shows the graphical representation of standard deviation of arts and science M.Ed students.

Hypothesis-4 There will be no significant difference in the attitude of M.Ed students towards statistics in relation to educational qualification.

Variable	Number	Mean	S.D.	S.EM	S.ED	C.R.	Level of Significance
Graduates	92	100.9	10.55	1.09			Not Significant
					1.61	0.94	
Post Graduate	114	99.41	12.56	1.78			At both levels

Table –V Graduate and post graduate M.Ed students

Table- V depicts the mean of graduate M.Ed students which comes out to be 100.93 and those of post graduate M.Ed students which comes out to be 99.41. Standard deviation of graduate M.Ed students comes out to be 10.55 and those of post graduate M.Ed students is 12.56. the critical ratio comes out to be 0.94 which is not significant at 0.05 and 0.01 level of significance. Therefore, the hypothesis- 4 is accepted.

After analyzing & interpreting, the results conclusions were drawn.

CONCLUSIONS,DISCUSSIONS,SUGGESTIONS AND EDUCATIONAL IMPLICATIONS

After analyzing and interpreting the data following conclusions and discussions were made:

1. M.Ed students studying in government aided educational institutions affiliated to Panjab University, Chandigarh have favorable statistics attitude. The reason behind it is that the teachers have positive attitude towards statistics. They guide their students regarding statistics very well.
2. Gender (i.e. male and female) does not affect the statistics attitude of M.Ed students studying in government aided educational institutions affiliated to Punjab University, Chandigarh. The probable reason for equal statistics attitude in male and female M.Ed students can be due to the fact that equal educational provisions and opportunities are available to them. They study together in the same teaching learning environment in the educational institutes. They acquire same knowledge about the statistics. Even the government policies have been equally implemented for both the genders in the field of education.
3. Course stream (i.e. arts and science) does not affect the statistics attitude of M.Ed students studying in government aided educational institutions affiliated to Panjab University, Chandigarh. The reason behind it is that both arts and science subjects deals with the same type of statistical of topics. The statistics formulas remain same whether they belong to art or science stream.
4. Academic Qualification (i.e. graduate and post graduate) does not effect the statistics attitude of M.Ed students studying in government aided educational institutions affiliated to Panjab University, Chandigarh. One of the reason for equal statistics attitude in both graduate and post graduate M.Ed students may be attributed to the fact that the development of statistics attitude depends to a large extent on having knowledge about statistics. All the M.Ed students whether graduate or post graduate, study the same course content during their B.Ed course and thus, have exposure to various statistics methods.

SUGGESTIONS FOR THE FURTHER STUDY

The present study deals with very important factor i.e. statistics attitude, but this study was essentially delimited and of tentative character and the investigator is inclined to suggest following things for further investigation:

1. In the present investigation, conclusions are based on the study of only 206 M.Ed students studying in government aided educational institutions affiliated to Panjab University, Chandigarh. The present study should be replicated on a wider sample.
2. Not only the study needs to be replicated on a wider sample, it should also give adequate

representation to M.Ed students studying in various educational institutions affiliated to other Universities.

3. Study may be replicated by involving more variables namely marital status, socio-economic status etc.
4. This type of study may be conducted on teachers.
5. A comparative study on students and teachers regarding their statistics attitude can be conducted.
6. The study can be carried by taking sample of M.Ed students studying through distance education.
7. A comparative study on students studying regular and through distance education mode can be conducted.
8. A comparative study on students of different universities can be conducted.

EDUCATIONAL IMPLICATIONS

The colleges of education are considered more conducive plan for the cultivation of certain desirable attitudes that are needed in the present day competitive world. Therefore, a favorable statistics attitude will enable them to solve various educational problems related with curriculum, management, policy making, administration etc. not only a favorable statistics attitude of students is the need of the hour but also efficient and effective teachers or supervisors with favorable statistics attitude will bring glory to the nation by passing on their knowledge and experiences to the future generation.

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