

A Critical Evaluation of NCERT Mathematics Textbook of Senior Secondary Stage



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ABSTRACT: The aim of the mathematics curriculum at the senior secondary stage is to provide students with an appreciation of the wide variety of the application of mathematics and equip them with the basic tools that enable such application. A careful choice between the often conflicting demands of depth versus breadth needs to be made at this stage. The rapid explosion of mathematics as a discipline, and of its range of application, favors an increase in the breadth of coverage. Such an increase must be dictated by mathematical considerations of the importance of topics to be included. Topics that are more naturally the province of other disciplines may be left out of the mathematics curriculum. The treatment of topics must have an objective, that is, the communication of mathematical insights and concepts, which naturally arouse the interest and curiosity of students.

On the basis of her long experience as a Mathematics School teacher as well as a teacher educator, the author observed that the mathematics curriculum at Class XI includes many interesting topics like sets, relations & functions, sequences and series, linear inequalities, and many more interesting topics. These topics can give good mathematical insight to students but these are typically short shrift. Whereas mathematics curriculum at Class XII is largely dominated by differential and integral calculus just because Board Examinations are conducted on the basis of Class XII syllabus and this acquires great importance among students and teachers. Thus, the author feels the need to conduct a study to understand the relationship between different topics of mathematics in classes XI and XII. In the present paper she tries to find the answers to the following questions:

- Have the same topics been covered from Class XI to XII?
- Is there continuous development of concepts from Class XI to XII?
- Is there a gradual increase in the concepts, illustrations, and exercises at Class XI and XII?
- What are the different opinions of the teachers regarding NCERT Mathematics textbooks of Class XI and XII?
- What are the different opinions of the students regarding NCERT Mathematics textbooks of Class XI and XII?

KEYWORDS: Textbook, Evaluation, Mathematics,

INTRODUCTION

In our daily life mathematics plays a very important role. It helps us to deal with our daily needs. We all understand what mathematics is but we are unable to define the word mathematics. Mathematics is a very important subject. Therefore, it is important to understand first that “What is Mathematics?”

MEANING AND IMPORTANCE OF MATHEMATICS

Mathematics is the science of numbers and their operations. Mathematics is the only subject, which has its own language. It involves different processes namely problem solving, reasoning and proving, reflecting, etc. Webster’s dictionary defines mathematics as “the science of numbers and their operations, interrelations, combinations, generalizations, and abstractions and of space configurations and their structure, measurement, transformation, and generalizations. According to the Oxford dictionary, “Mathematics is the science of measurement, quantity, and magnitude.” There are many definitions of mathematics but no one definition of mathematics is universally accepted. In a simple way, we can say that mathematics has originated from numbers, and the number system is a special field of it, from which other branches of mathematics are developed. It is a systematized, organized, and exact branch of science.

In India, the practice of mathematics education was a well-established phenomenon. It is a highly valued subject in Indian culture and is viewed as a measure of one’s intellectual ability. Arithmetic and astronomy were core components of the course of study. With the arrival of the British, the system of education underwent a major change. The present system of education was introduced and founded by the British in the 20th century, by the recommendations of Macaulay. However; much of the

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curriculum development in mathematics has taken place during the past forty years. This is because of the new technological revolution which has an impact on society as great as the industrial revolution.

School mathematics is basic to undergraduate, postgraduate, and research mathematics; it is also fundamental for the growth of science and technology in the country. One cannot do without the use of basic processes of mathematics in daily life. The knowledge of its fundamental processes and the skill to use them are the preliminary requirements of a human being these days. Due to its very nature mathematics also develops reasoning and thinking powers. Mathematics, when taught well, is a subject of beauty and elegance, exciting in its logic and coherence. It trains the mind to be analytic providing the foundation for intelligent and precise thinking.

Its usefulness makes mathematics a necessary subject at the school level. In post-independent India, great emphasis has been placed on mathematics teaching and learning. In 1937, when Gandhi propounded the idea of basic education, the Zakir Husain committee was appointed to elaborate on this idea. It recommended, "Knowledge of mathematics is an essential part of any curriculum. Every child is expected to work out the ordinary calculations required in the course of his craftwork or his personal and community concerns and activities." The Secondary Education Commission appointed in 1952 also emphasized the need for mathematics as a compulsory subject in the schools. The Indian Education Commission has known as the Kothari Commission (1964-1966) recommended mathematics as a compulsory subject for students at the school level. It has pointed out, 'we cannot overstress the importance of mathematics in relation to science, education, and research. This has always been so, but at no time has the significance of mathematics been greater than today. It is important that deliberate effort is made to place India on the world map of mathematics within the next two decades or so.' Even today the above statement holds true, in spite of the different changes in the content matter of mathematics taught over the past decades. The effectiveness of mathematics as a compulsory subject remains constant. The Commission points out that, 'In the teaching of mathematics emphasis should be more on the understanding of basic principles than on the mechanical teaching of mathematical computations. The National Policy on Education 1986 went on to state that mathematics should be visualized as the vehicle to train a child to think, reason, analyze, and articulate logically. Apart from being a specific subject, it should be treated as associated with any subject involving analysis and reasoning.

Starting from the elementary concepts of addition, multiplication, subtraction, and division school level mathematics prepares the preliminary ground for higher-level studies in the same subject. The National Curriculum Framework for School Education (NCFSE-2000) has reiterated that the study of mathematics contributes to the development of precision, rational and analytical thinking, reasoning, and aesthetic sense among children. The National Curriculum Framework (NCF 2005) also places due emphasis on mathematics. Succeeding in mathematics should be the right of every child. It is recommended that mathematics should enhance the child's ability to think and reason, visualize and handle abstractions and formulate and solve problems. Continuity from one level to the next, inter-disciplinary and thematic linkages between topics listed for different school subjects, the linkage between school and college syllabi are some major considerations of the NCF-2005. A high-quality mathematics program is essential for all students and provides every student with the opportunity to choose among the full range of future career paths.

As such the importance of a sound foundation in mathematics cannot be underestimated. The pivotal role of mathematics is seen as a subject essential for later learning and later life yet difficult for most pupils to master at the school stage. There is a definite lacking among the majority of the school children in the proper understanding of the subject. This becomes a handicap as they go on to pursue the subject at the college level. The difficulty arises because mathematics is a continuous discipline requiring sound knowledge of basic concepts.

For this, the mathematics curriculum should be one that gives students ample scope in terms of problems from real-life starting with simple counting and measurement to applications in business, science, and daily life. Mathematics projects which are purposeful and a mathematics laboratory can promote learning of both skills and concepts.

Mathematics, when taught well, is a subject of beauty and elegance, exciting in its logic and coherence. It trains the mind to be analytic providing the foundation for intelligent and precise thinking. Research in mathematics education has shown that to teach well, substantial mathematical understanding is necessary; even to teach whole-number arithmetic. Prospective teachers need a solid understanding of mathematics so that they can teach it as a coherent, reasoned activity and communicate its elegance and power.

Thus it is very important that school children receive a high-quality grounding in this subject. In view of the importance of mathematics in society and in schools, the efficacy of mathematics teaching and learning demands continued and sustained scrutiny. This study seeks to find out the importance, effectiveness, and development of mathematical concepts in NCERT Mathematics textbooks of senior secondary classes.

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WHAT IS A TEXTBOOK?

Most of us have seen and read a textbook. We unconsciously understand what a textbook is. Yet it may be difficult for us to define it precisely. People have given different definitions of the textbook. According to the American Textbook Publishers Institute, A true textbook, is one specially prepared for the use of pupils and teachers in a school or a class, presenting a course of study in a single subject, or closely related subjects.

Webster's dictionary defines the textbook as a...manual of instruction, a book containing a presentation of the principles of the subject used as a basis of instruction.

A more comprehensive definition is given in the third edition of the Encyclopedia of Educational Research. It states, In the modern sense, and, as commonly understood, the textbook is a learning instrument usually employed in schools and colleges to support a program of instruction. In ordinary usage, the textbook is printed, it is non-consumable, it is hardbound, it serves an avowed instructional purpose, and it is placed in the hands of the learner.

NCERT (National Council of Educational Research and Training) is an organization set up by the Government of India to assist and advise the central and state governments on academic matters related to school education. It was established in 1961. NCERT publishes books that are used in government and private schools across India that follow the CBSE curriculum.

ROLE AND PURPOSE OF TEXTBOOKS IN EDUCATION

In a fast-changing age, everything is changing so fast that it has become very necessary to evaluate the whole process of education. Education is a process in which the teacher's guide the process of learning for their pupils at every stage. To do this, the teachers ascertain the rate, direction, and extent of previous development. In modern times when educational opportunities are fast expanding, the curriculum, textbooks, teacher education, and learning process need a continuous evaluation. In the absence of a continuous evaluation, the whole teaching-learning process will become a meaningless activity. Hence the learning materials, evaluation techniques, teaching materials, and the type of textbooks need to be evaluated from time to time.

The teaching-learning material includes textbooks, reference books, monuments, dictionaries, encyclopedias, and teaching aids. The teaching material is useful in teaching and learning or in the process of imparting education to the youth of the country. The teaching material should be of high quality and up to date so that it may fulfill the need of inquiring minds. Besides the importance of other teaching material, the role of the textbooks cannot be neglected in shaping the young minds of society.

Textbooks command attention because they not only provide the source of school instruction but also transmit culture, reflect values, and serve as a springboard for the intellectual development of individuals and the nation. Providing the source of ninety percent of instruction textbooks has a powerful influence both cognitive and affective upon individuals, families, communities, and the nation. Historically, textbooks have changed in response to prevailing educational philosophy and curriculum reform movements of the times, as well as to pressure from both liberal and right-wing elements of society and from vocal minorities.

No individual can neglect the importance of textbooks in the educational system. Recent search has made it quite clear that the textbook is one of the most important and vital elements conducive to effective and efficient teaching and learning process. Textbooks remain an essential tool for preserving and diffusing the world's storehouse of knowledge and wisdom.

Kothari Commission (1964-66) said that in more than a decade of the recommendations made by the Mudaliar Commission, the quality of textbooks remained poor. "Unfortunately, textbooks writing and production have not received the attention they deserve. In most school subjects there is a proliferation of low quality, substandard and badly produced books, particularly in the regional languages".

The Education Commission further recommended that

1. The Ministry of Education should set up autonomous organizations for the production and publication of textbooks.
2. The levels, aspirations of the pupils must be kept in mind.
3. Efforts must be made at the National as well as State levels to publish quality books.
4. Continuous evaluation of books should be made from time to time.

On the basis of the above recommendations, the process of nationalization of textbooks came into existence.

The National Council of Educational Research and Training (NCERT) were established on September 1, 1961, under the direct control of the Union Ministry of Education, Government of India. Initially, NCERT was assigned the job of providing educational training to teachers. But later it was also assigned the job of publishing, printing, and distributing textbooks and to provide a leadership role to the state in the matters of education. There are other organizations, which undertake the printing and publishing of textbooks for schools. These organizations also work under the direct control of the Central Government, under the Ministry of Human Resource Development. The main function of these organizations is to provide quality textbooks.

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A very important activity of the council is the publication of textbooks, workbooks, teacher's guides and other instructional material for teachers, research monographs, journals, etc., NCERT textbooks are generally prescribed in the schools run by various autonomous organizations like Central School Organizations, Army Schools, Navodaya Vidyalayas and the schools affiliated to CBSE.

EVALUATION OF TEXTBOOKS

Evaluation can be defined as, a systematic, rigorous, and meticulous application of scientific methods to assess the design, implementation, improvement, or outcomes of a program. It is a resource-intensive process, frequently requiring resources, such as evaluate expertise, labor, time, and a sizable budget. The critical assessment, in as objective a manner as possible, of the degree to which a service or its component part fulfills the stated goal (St Leger and Wordsworth-Bell). The focus of this definition is on attaining objective knowledge, and scientifically or quantitatively measuring predetermined and external concepts.

In the words of Shuffleboard, A study designed to assist some audience to assess an object's merit and worth. In this definition, the focus is on facts as well as value-laden judgments of the program's outcomes and worth.

Evaluation of textbooks is an essential ingredient of the textbook development program, especially in the case of nationalized textbooks.

In a fast-changing world, everything is changing so fast that it has become very necessary to evaluate the whole process of education. Education is a process in which the teacher guides the process of learning for his pupils at every stage. To do this, the teacher ascertains the rate, direction, and extent of previous development. In modern times when educational opportunities are fast expanding, the curriculum, textbooks, teacher education, and learning processes need a continuous evaluation.

Evaluation of textbooks is an essential ingredient of the textbook development program, especially in the case of nationalized textbooks. Evaluation of textbooks is also an important field in education. A constant evaluation of textbooks is very necessary for updating both qualitative as well as quantitative aspects of textbooks.

Evaluation of textbooks is a judgment regarding the use of textbooks as an effective tool of instruction in the teaching-learning process. It consists of assessing the desirable characteristics of textbooks and assigning values to these characteristics.

The textbooks on mathematics should not only convey the scientific and mathematical knowledge but also give important exercises to the students. Modern science and mathematics are progressing more rapidly than any other aspect of knowledge. Thus, the pupils of today should be provided mathematical concepts in a logical sequence as well as in an interesting and scientific manner supported by a proper number of exercises.

Textbooks in mathematics should be prepared on the basis of the needs and requirements of curricula and previous knowledge of learners. Each concept should be introduced by assessing various activities. There should be a connection between the topics covered in two different classes say, XI and XII. The basic necessary terminology should be given at the beginning of each chapter. The theorems and definitions should be stated clearly and on the basis of examples. The students should be made realized the need of learning mathematics as part of general education.

In this study, the investigator is critically evaluating the NCERT mathematics textbooks of senior secondary school i.e. classes XI and XII.

NEED FOR THE STUDY

Keeping in view the importance of mathematics as a subject, educational issues in mathematics assumed a great significance. A great emphasis was placed on mathematics teaching and learning. Mathematics has been an inseparable part of school education since the beginning of formal education and it has paid a predominant role not only in the advancement of civilization but also in the development of physical sciences and other disciplines.

The senior secondary stage is crucial in many ways. It is the stage of the maximum challenge. While the students in this age group are passing through the critical phase of their lives – transition from their adolescence to youth, they have to take important decisions concerning their future. In fact, more than they need and aptitude, it is awareness and performance of the students at this stage that ultimately determines their future. At this stage, students choose subjects according to the needs of his/her career choice. By this time, the student's interests and aptitude have been largely determined, and mathematics education in these two years can help in sharpening their abilities.

The aim of the mathematics curriculum at the senior secondary stage is to provide students with an appreciation of the wide variety of the application of mathematics and equip them with the basic tools that enable such application. A careful choice between the often conflicting demands of depth versus breadth needs to be made at this stage. The rapid explosion of mathematics as a discipline, and of its range of application, favors an increase in the breadth of coverage. Such an increase must be dictated by mathematical considerations of the importance of topics to be included. Topics that are more naturally the province of other

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disciplines may be left out of the mathematics curriculum. The treatment of topics must have an objective, that is, the communication of mathematical insights and concepts, which naturally arouse the interest and curiosity of students

When we choose breadth, we not only need to decide which themes to develop but also how far we want to go in developing those themes. In this regard, we suggest that the decision is dictated by mathematical consideration. For instance, introducing projective geometry can be more important for mathematics as a discipline than projectile motion (which can be well studied in physics). Similarly, the length of treatment should dictate by whether mathematical objectives are met. For instance, if the objective of introducing complex numbers is to show that the enriched system allows for solutions to all polynomial equations, the theme should be developed until the student can at least get an idea of how this is possible. If there is no space for such a treatment, it is best that the theme not be introduced; showing operations on complex numbers and representations without any understanding of why such a study is relevant is unhelpful.

On the basis of their long experience as Mathematics School teachers as well as Teacher educators, the author observed that the mathematics curriculum at Class XI includes many interesting topics like sets, relations & functions, sequences and series, linear inequalities, and many more interesting topics. These topics can give good mathematical insight to students but these are typically short shrift. Whereas mathematics curriculum at Class XII is largely dominated by differential and integral calculus just because Board Examinations are conducted on the basis of Class XII syllabus and this acquires great importance among students and teachers. Therefore, the author chooses this topic of study i.e., A Critical Evaluation of NCERT Mathematics Textbook of Senior Secondary Stage. She has some questions in her mind, with the help of this study she tries to find out the answers to these questions. Hence the research questions of the study are;

RESEARCH QUESTIONS OF THE STUDY

The study will answer the following questions:

- Have the same topics been covered from Class XI to XII?
- Is there continuous development of concepts from Class XI to XII?
- Is there a gradual increase in the concepts, illustrations, and exercises at Class XI and XII?
- What are the different opinions of the teachers regarding NCERT Mathematics textbooks of Class XI and XII?
- What are the different opinions of the students regarding NCERT Mathematics textbooks of Class XI and XII?

OBJECTIVES OF THE STUDY

The scope of the study envisages the following objectives:

1. To analyze the chapters/ concepts included NCERT Mathematics textbooks of Class XI and XII.
2. To find the relationships between the chapters/ concepts included in Class XI and XII NCERT Mathematics textbook.
3. To find the suitability of the chapters/ concepts included in NCERT Mathematics textbooks of Class XI and XII.

DELIMITATION OF THE STUDY

Being handicapped by the limitation of time, only NCERT Mathematics textbooks of the senior secondary stage, that is, Class XI and XII could be considered for critical evaluation. Due to the same reason, only 10 PGT Mathematics from the public schools of West Delhi are contacted for giving their sincere opinions, which were easily available. The investigator has included both government and private schools but no. of samples from government schools is less because many government schools don't have mathematics as a subject to students in class XI and XII therefore they don't have PGT mathematics. Variables such as age, sex, etc. have not been considered.

Only 30 students of Class XII, who are studying Mathematics in the public schools of West Delhi, are contacted for giving their sincere opinions, which were easily available. The investigator has included both government and private schools but no. of samples from government schools is less because many government schools don't have mathematics as a subject to students in classes XI and XII. Variables such as age, sex, stream, etc. have not been considered.

METHODOLOGY

In research work, the importance of methodology cannot be underestimated. It is the proper methodology that gives weight to research findings. The study has been divided into four phases.

1. In the first phase, the investigator analyzed the content of NCERT Mathematics textbooks of Class XI and XII. In order to fulfill the first objective, the investigator will analyze the content and try to find out the relationship between each and every chapters included in the textbook. And also the investigator will try to find out the need of including those chapters and their suitability.

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2. In the second phase, the investigator will construct a questionnaire for the PGT mathematics and distribute it to the selected sample of PGT mathematics to know their opinion and views about the textbooks and their relevance. The sample size of the teachers is 10.
3. In the third phase, the investigator will construct the questionnaire for the students of class XII who had studied mathematics and distribute it to the selected sample of students to know their opinion and views about the textbooks and their relevance. The sample size of the students is 30.
4. And in the fourth phase, the investigator will do the data analysis in which she will analyze the opinions and views of teachers and students according to the objectives of the study and relate them to the study made in the first phase and conclude the whole study accordingly.
For collecting the data the investigator has gone to a number of schools so that the investigator can get a variety of responses.

POPULATION

The population for the present study consisted of all the class XII students and PGT mathematics of all the government, public, and government-aided senior secondary schools situated in the state of Delhi.

SAMPLE

The sample for the study consisted of:

- Ten (10) Mathematics teachers of government and public schools teaching at the senior secondary level.
- Thirty (30) students of government and public schools studying in class XII who had studied mathematics in class XI and class XII.

TOOLS AND TECHNIQUES ADOPTED FOR THE STUDY

A textbook is one of the most useful tools an instructor possesses and as well as for the students. The suitability and reliability of the textbooks need to be verified. There is also a need to investigate the relationship between concepts and the suitability of the concepts covered in the textbooks. So the investigator chooses to study “A Critical Evaluation of NCERT Mathematics Textbooks of Senior Secondary Stage”. The question before the investigator was that how she should choose a tool that could fulfill her needs and requirements. Since the books are used by both teachers and students. So the main requirement of the situation was to get more comprehensive and needful knowledge from both groups. The design of the study necessitated the use of questionnaires for collecting relevant data from the students and teachers. It was decided that two separate questionnaires should be prepared, one for the teachers and the other for the students. So that the views and opinions of both the groups could be recognized and comprehensive information could be received from both groups.

CONSTRUCTION OF THE QUESTIONNAIRE

Two questionnaires were developed by the investigator one for the teachers and the other for the students, keeping in view the characteristics of a good questionnaire and objectives of the study. The construction of the questionnaire was done to collect the information about the relationship between the concepts/chapters and the suitability of the concepts/chapters included in the textbook. The questionnaires were framed so that maximum information from the respondents could be obtained. There were fifteen questions in the questionnaire for teachers and ten questions in the questionnaire for students. The questionnaires consisted of both open-ended, and closed-ended questions. Both the questionnaires were shown to 4 teacher educators and six PGT, of Mathematics for validity purposes.

PROCEDURE FOR DATA COLLECTION

To collect information about the book the questionnaires were distributed to the PGT mathematics of various public schools selected as samples. The investigator has included both government and private schools but the number of samples from government schools is less because many government schools don't provide mathematics as a subject to students in class XI and XII therefore they don't have PGT mathematics. Also, the investigator distributed the questionnaire to the students of class XII who had studied mathematics in class XI and XII of various public schools selected as samples. The collection of completed questionnaires was hundred percent and all the questionnaires were considered as a sample.

ANALYSIS OF DATA

Proper analysis of data is very necessary for the trustworthy and accurate interpretation of results. The data is obtained from three sources (i) Data obtained after analyzing the class XI and XII NCERT mathematics textbooks, (ii) Data obtained after administering the questionnaire on the selected samples of teachers, and (iii) Data obtained after administering the questionnaire on the selected samples of students. Therefore, the data collected was analyzed qualitatively and quantitatively.

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Findings

After analyzing the data collected by the investigator following findings were made according to the objectives.

- 1. Analysis of the Chapters:** In the analysis of the chapters, the investigator found that the textbooks are constructed properly and contain all the essential features required at the senior secondary level. Each chapter contains the following:
 - Introduction: Highlighting the importance of the topic; connection with earlier studied topics; brief mention about the new concepts to be discussed in the chapter.
 - Chapters are organized into sections comprising one or more concepts/sub-concepts.
 - Illustrations have been provided wherever possible to help the students.
 - Applications of mathematical concepts have also been integrated with allied subjects like science and social sciences.
 - For refocusing and strengthening the understanding and skill of problem-solving and applicabilities, miscellaneous types of examples and exercises have been provided involving two or more sub-concepts at a time at the end of the chapters.
 - For the motivational purpose, brief historical background of topics has been provided at the end of the chapter, and at the beginning of each chapter relevant quotations and photographs of an eminent mathematician who has contributed significantly to the development of the topic undertaken, are also provided.
 - For direct recapitulation of main concepts, formulas, and results, brief summary of the chapter has also been provided.
- 2. Relationships between the Chapters:** In finding the relationships between the chapters included in the NCERT mathematics textbooks of class XI and XII, the investigator come to know that the chapters included in the textbook of class XI are related to the chapters included in the textbook of class XII in some or another way. For example:
 - The knowledge of “Sets” given in class XI is helpful in the teaching of “Relation and Functions”, “Sequences and Series”, “Probability”, etc. in class XII.
 - The knowledge of “Trigonometric Functions” given in class XI is helpful in teaching “Inverse Trigonometric Functions” in class XII
 - The knowledge of “Introduction to Three Dimensional Geometry” given in class XI is helpful in teaching “Vector Algebra” and “Three Dimensional Geometry” in class XII.

There are many more relationships between the chapters included in the textbooks of class XI and XII.

- 3. Suitability of the Chapters:** In finding the suitability of the chapters included in the NCERT mathematics textbooks of class XI and XII, the investigator came to know that each chapter has its own importance and suitability. For example:
 - The concept of set serves as a fundamental part of present-day mathematics. This concept is being used to define almost every branch of mathematics.
 - Trigonometry is used in many areas such as the science of seismology, designing electric circuits, describing the state of an atom, predicting the heights of tides in oceans, analyzing a musical tone, and in many other areas.
 - The study of inequalities is very useful in solving problems in the field of science, mathematics, statistics, optimization problems, economics, psychology, etc.
 - The concept of matrices is used in different areas of business and science like budgeting, sales projection, cost estimation, analyzing the results of an experiment, etc.
 - The definite integral is used as a practical tool for science and engineering. The definite integral is also used to solve many interesting problems from various disciplines like economics, finance, and probability.Although all the chapters included in the NCERT mathematics textbooks of class XI and XII has their own importance and suitability. But some chapter needs serious attention and need to be introduced in class XI. The majority of teachers and students feel that “Integrals” need to be introduced in class XI because students are burdened with integration in class XII.

CONCLUSION

The above findings make one believe that there are certain areas in the mathematics textbooks at a senior secondary stage that require serious attention to make the learning interesting, joyful, and meaningful as to develop the critical and logical minds in the country. The study reports basic weaknesses in the presentation of content e.g. integration is such a big topic that needs to be introduced in class XI. In this area, appropriate action needs to be taken by NCERT. Besides the above drawbacks, the importance of the NCERT mathematics textbooks cannot be underestimated. These are well-designed and improved textbooks prepared after incorporating useful comments and suggestions from teachers. It was concluded by the investigator after analyzing the collected data that these textbooks will become more helpful and productive in learning if NCERT eliminates all weaknesses.

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SUGGESTIONS

On the basis of the data collected, analyzed and inferences reached the investigator presents the following suggestions to bring improvement in the textbooks.

1. There is no doubt that NCERT books have their own reputation but regarding the presentation of the content, there are suggestions from the respondents that it must be improved.
2. The topics introduced in the textbook of class XII may be made more interesting and easy by introducing them in the textbook of class XI. This will create more interest among the students regarding these textbooks.
3. It is said that in this world nothing is perfect; there is always a possibility of making a thing better. These textbooks are not an exception also. It may be more interesting and effective by introducing more illustrations and different types of sums in the textbook.

SUGGESTIONS FOR FURTHER STUDIES

On the basis of the need for research in this area the present investigator suggests the following suggestions for further studies:

1. The qualitative analysis may be tried on a large sample representative of all zones of the Directorate of Education, Delhi.
2. The mathematics textbook of NCERT for classes IX and X may be evaluated both qualitatively and quantitatively.

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