CHAPTER I

INTRODUCTION

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INTRODUCTION

“To save man from the morass of propaganda, in my opinion is one of the chief aims of education. Education must enable one to sift and weigh evidence, to discern the true from the false, the real from the unreal, and the facts from the fiction”.

(Dr. Martin Luther King Junior, 1947)

1.1 Background of the Study

Education is a strong and potent tool to harness the menace of the society. Education helps a person to attain knowledge and wisdom, builds personality and character, helps to earn livelihood, recognize their rights and responsibilities, trains in maintaining national and international relationships, rescues from the perilous fist of superstitions and ultimately helps to become a complete person.

The 21st century has witnessed much scientific and technological advancement which has revolutionized the world itself. Through the application of computers and web technologies, people can meet their friends beyond the barriers of space and time, play games, plan trips, seek medical advice, chat with strangers, refer international libraries and even share their ideas with others. In the field of education also, computers and web technologies are used to store, disseminate and retrieve information. To Aggarwal & Bento (2000), “The web is a wonderful hammer, a tool with unprecedented, exciting possibilities for education that must be explored and expanded.” Through web technology an ocean of resources will be available at the finger tips. It can be used either as an instructional medium or as a learning resource to enhance learning. By using email, newsgroups, blogs, audios, video conferencing etc., virtual classrooms which are above the barriers of time and space can be created. Being teachers as well as facilitators of this information age one cannot ignore the potential of web technology in
providing global, democratic and interactive learning experiences. These technologies must be utilized to facilitate concrete, meaningful learning to the students to attain the real objectives of education.

One important human response to the wonder and awe of nature from the earliest times has been to observe the physical and biological environment carefully, look for any meaningful patterns and relations, make and use new tools to interact with nature and build conceptual models to understand the world. This human endeavor has led to modern Science (National Curriculum Framework, 2005). Science is a systematized body of knowledge as well as a continuous search for truth. It is self accumulating, self growing and also dynamic in nature as it revises even universally accepted laws or theories on the basis of new observations and experiments. Science is an important component of school curriculum. It has many functions to perform like intellectual, vocational, recreational, moral, social etc. It stimulates imagination, curiosity, nurtures skills like observation, experimentation, problem solving, decision making and above all liberates the human race from the vicious cycle of ignorance, curbing anti social customs, traditions and poverty. This liberating role make Science an inevitable part of school education. Moreover, in this technology driven society everybody should have some basic knowledge of Science to understand the world in which they live and thus to adjust themselves with the ever changing world.

Physics which is the study of the nature and properties of matter and energy is an indispensable part of Science. Physics generates fundamental knowledge needed for the future technological advances that will continue to drive the economic engines of the world (IUPAP, 1999). In everyday life also, immense practical applications of Physics can be found out. It improves academic knowledge, develops intellectual honesty, inculcates a spirit of inquiry in students and supplements the learning of other subjects. It opens exciting career opportunities also. So everybody should have a basic
knowledge of Physics for further study of modern Science and technology and to utilize this for human welfare.

1.2 Importance of Learning Astronomy

Astronomy, the oldest of Sciences, is the study of celestial objects and the various phenomena associated with it. It is a study rich in interesting personalities and exciting discoveries. Its long history and recent advances make it an excellent example of the progressive nature of Science (Koupelis, 2011). Astronomy is the study of the whole universe and the objects beyond it. Its application in the making of calendars, the explanation of concepts like day and night, seasons, eclipse, tides etc. cannot be ignored. It helped the navigators and thereby provided impetus for trade, commerce, cultural exchange as well as transmission of culture. Astronomy has been made a part of school curriculum due to these applications. Astronomy education eradicates superstitions and also opens exciting career opportunities in space-related research organizations.

Astronomy education has been made an inevitable part of school curriculum due to the following reasons.

1.2.1 Influence on History and Culture

The influence of Astronomy and its practical application is not a recent scientific development. It could be seen deep rooted in human history and culture. Ancient calendars were designed based on many astronomical observations. The traces of astronomical influence in many mythologies of ancient civilizations can be seen. To Estalella (2002), Astronomy is the Science that describes and explain our current knowledge of the environment of planet Earth; the universe. Astronomy as a Science explores the cosmic roots of man. It gives an idea about the existence, the place; time and space where humans dwell in and thereby teach about the vastness of this universe. It provides humans with the vital information about the origin and evolution of their home planet. Astronomy has influenced many writers and thinkers also. Critics discovered the influence of revolutionary astronomical theories of
Copernicus, Brahe and Galileo in the writings of Metaphysical poets. Thus it is clear that the complex theories about the mystery of universe have definitely created an impetus on the thought and interpretations of the scholars and great writers.

1.2.2 Influence on daily life

Astronomy is used for time keeping, making calendars and for understanding the daily, seasonal as well as long term changes in climatic conditions and also for navigation purposes. Now artificial satellites are used for weather forecasting, resources studies, transmitting radio and television signals, telecommunication, remote sensing as well as for educational purposes also. Unlike most Sciences, Astronomy can be enjoyed as a hobby. Amateur Astronomy or Backyard Astronomy is a fascinating pastime for many people and many amateur groups have been formed for this purpose. They conduct observations with unaided eyes or using portable telescopes.

1.2.3 Helps in Interdisciplinary approach

Astronomy is an interdisciplinary subject which can increase public awareness, understanding and appreciation of Science and technology (Percy, 2005). It has no existence without Physics and Mathematics. Many concepts, theories, laws etc. in Physics like gravitation, law of planetary motion, thermodynamics, theory of relativity, plasma physics, optics, statistical mechanics, cryogenics, and quantum mechanics all are applied in Astronomy. In the case of Mathematics, the application of complex series, Fourier series, derivates, logarithmic series etc. in the calculation of time period, velocity, Schwarzschild radius, Chandrasekhar limit etc., implies the relationship between Mathematics and Astronomy. History and Philosophy is also linked with Astronomy. Many philosophical theories were formed on the basis of changing concepts of the universe like Heliocentric and Geocentric views. Astrobiology is relatively a new subject in education which links Biology with Astronomy and evolution of man is always a matter of importance in Astronomy. Geography is also linked with Astronomy through its application
in Map making, Platonic theories, Big-Bang theory, Season determination, agricultural applications, navigation, time keeping etc. Many concepts in spectroscopy, reaction mechanisms etc. are common to both Astronomy and Chemistry. Many literary works and art forms like paintings; musical compositions were inspired by many astronomical objects.

1.2.4 **Develops Aesthetic Sense**

The blinking eyes of the stars, the dazzling moonlight, the spectacle of a comet or an eclipse always stimulates the aesthetic appeal of human beings. This has resulted in the creation of various art forms like architecture, design, fashion, drama, dance, films, music and many literary works.

1.2.5 **Arouses Scientific Attitude**

Astronomy attracts young people to Science and technology. It increases objectivity, curiosity, open mindedness, skepticism and above all eradicates superstitions from the society. Moreover, a person engaging in Astronomy related activities knowingly or unknowingly gets practiced in Scientific method also.

1.2.6 **Promotes Internationalization**

Astronomy knows no national frontiers; the sky is the same above all the Europe-and the teaching of Astronomy therefore contributes to international collaboration between students and teachers everywhere (Declaration on the teaching of Astronomy, Europe, 1994). The sky with the various celestial objects is not the property of any country. While doing astronomical experiments, the scientists of different countries have to work collaboratively. This will also promote internationalization.

Thus it is evident that Astronomy is included in the school curriculum to understand the history and culture, man’s place in the universe, how it supplement his daily life through its immense practical applications as well as aesthetic beauty and ultimately to find as well as understand the mystery of this vast, varied and beautiful universe.
1.3 Web Based Learning

“World Wide Web” or simply “Web” is an immense treasure of learning resources in the form of virtual libraries, videos, softwares, audios, blogs etc. which can be used to supplement learning in classroom. Moreover these resources can be accessed by any one at any time and any place. One cannot ignore this potential of Web technologies in storing, disseminating and retrieving information. The type of learning utilizing the attributes and resources of web constitutes Web Based Learning (WBL). It can be implemented in the classrooms in many ways. Either by showing the web resources in the classroom using a projector or a computer along with the traditional classroom instruction or by using web as an instructional medium itself. The necessary condition for Web Based Learning is that there should be one website or a number of websites incorporated in the learning either as learning resource or as learning medium.

For a subject like Astronomy for which providing first hand experiences is a difficult task, virtual experiences of Moon Phase, night sky, solar system, eclipses, star constellations etc. can be given by means of softwares like Moon Phase simulator, Stellarium, Solar system 3D simulator and some related videos and images available on web. By using these web resources virtual, meaningful experiences can be given to students which will engage them in learning and thus lead to effective learning.

1.4 Meaningful Engaged Learning

Meaningful Engaged Learning is a learning strategy in which students are engaged in meaningful, challenging, authentic, real life activities by grouping them into flexible, heterogeneous groups to satisfy the objectives of learning. This learning strategy is based on the theoretical constructs put forward by Dr. Mike Muir (2001), Director of Maine Centre for Meaningful Engaged Learning at the University of Maine at Farmington, USA. In this strategy, the students are self regulated and are responsible for their own learning.
In Meaningful Engaged Learning, the learning takes place in five stages namely (1) Providing Task (2) Accessing Data (3) Interpret and Produce Data (4) Communicate and (5) Evaluate. In the first stage, challenging, authentic tasks are provided using web resources like softwares, videos, images etc. After identifying the tasks as well as objectives of the lesson, students are asked to access data to solve it. In order to find answer, students are instructed to access data from more web resources provided to them in the second stage. They can even refer books also. In the third stage, students have to organize data, determine the reason and develop an explanation for the task in progress. In the fourth stage, they have to explain, describe and present their explanation. In the final stage students evaluate the conclusion reached by applying it to a new situation and if further data and explanation is needed they can go to the previous stage.

1.5 Need and Significance of the Study

No matter which era it is, human beings were always fascinated by the mystery of the universe. They tried to transmit the knowledge gathered through observations and experimentations to their future generation through books, artefacts, art forms, folklores etc. Meanwhile many misconceptions related to various astronomical objects were also created. Samarapungavan, Vosniadou & Brewer (1996) in their study reported that many Indian children have the idea that the Earth is supported by an ocean or a body of water from the folk cosmology.

Today, Astronomy has been made a compulsory part of Science/Physics education. It develops scientific literacy, critical thinking skills and Science process skills (Ucar & Demircioglu, 2011). As Astronomy is mainly an observational science, people gather much astronomical information from observation itself. Also they get information from their family, peers, society and media as it is a matter of public interest. In spite of all these types of Astronomy education, there are people who still believe that they can see different shapes of Gods in Moon, Solar eclipse is caused when Rahu (the cut –
off head of an asura (the evil) swallows the sun etc. In a study conducted by Padalkar and Ramadas (2008) it was found that Indian students have many misconceptions related to some basic Astronomy concepts. Also, in another study it was reported that, in Indian culture, as in most other traditional cultures, people believe that astronomical phenomena are associated with astrology (Raza et al., 2002). These misconceptions can be removed only through proper planning of Astronomy lessons in the formal educational system. But there are many problems which hinder Astronomy learning in the schools.

For all other major branches of Physics like Thermodynamics, Mechanics, Electronics etc., teachers can offer practical works to the pupils in the school itself. But in the case of Astronomy, the astronomical objects can clearly be seen only at night. “Stars come at night; the students do not” (Percy, 2005). This is a major hindrance in teaching this subject. Most of the schools are not ready to give practical night star gazing sessions at schools under the guidance of the teacher. Moreover, nobody can touch, smell or feel any of the astronomical objects. Thus students are devoid of concrete experiences which can make Astronomy learning more effective. Meanwhile these objects can be observed using telescope or some other similar instruments. But unfortunately some of schools cannot afford the expenses in purchasing and maintaining these instruments. As a remedy for this, the teachers can arrange trips to Planetariums. But this too creates financial burden to the school.

In the textbooks, there are diagrams and pictures depicting various Astronomical phenomena and objects. But these all are two dimensional (2D) representation of an actual three dimensional (3D) object. In a study conducted by Padalkar and Ramadas (2008) on Indian students’ understanding of Astronomy, it was found that, students learn the astronomical diagrams rotely and they do not connect it with the dynamic model of day and night. From this it can be said that these 2D diagrams are not able to provide 3D visual
experience to the students. This will create misconceptions in students about the astronomical objects.

Another major problem which hinders the Astronomy education is the light pollution of the major cities. In a study conducted by Cinzano et al. (2000), it was found that “In recent decades there has been a rapid increase in the brightness of the night sky in nearly all countries. This has degraded astronomical viewing conditions. This increase in night sky brightness is one of the most noticeable effects of light pollution”. This drastic increase in the brightness of the night sky due to light pollution hinders the observation of stars at night.

In the text books, Astronomy topics are included in the last few chapters. “February, with its clear skies, is one of the best months for astronomical observation in India” (Bappu, 1980). Due to this reason, Astronomy topics are included in the last portion of our Science/Physics textbooks. Usually these topics are covered during the months of January or February, which comes at the end of the academic year. So the teachers may not get much time in teaching Astronomy, while trying to complete the syllabus.

Apart from these reasons, there is no effective learning strategy which facilitates meaningful learning, utilizing the web resources on Astronomy. In order to counter these difficulties and facilitate Astronomy learning in the schools, innovative learning strategies which can give virtual experiences to the students should be adopted. In web, there are many resources like softwares, videos, animations, images etc. that can be used to visualize a night sky, moon phase, star constellations, galaxies and the like. If these resources can be incorporated with the classroom instruction with the help of projector or computer, a virtual experience of the “night sky” can be given in the classroom during daytime itself.

By linking these web resources with Meaningful Engaged Learning, a strategy can be developed for learning Astronomy at secondary school level.
Through this Strategy, students can be meaningfully engaged in learning activities through interaction with others, exploration and other worthwhile tasks and thus they will get virtual experiences and thereby help in learning Astronomy easily. Also, while surveying the related literature, the investigator found that very few studies were conducted in India regarding Astronomy education linked with Web technology. The investigator thus felt the need for developing Web Based Meaningful Engaged Learning Strategy for learning Astronomy at Secondary School level.

1.6 Statement of the Problem

In order to save mankind from superstitions and unwanted customs, education especially Astronomy education should be made an integral part of the curriculum. But due to many practical difficulties, Astronomy education is not fulfilling its real objectives. Educational practitioners should adopt innovative methods to make Astronomy an effective, meaningful and interesting experience and thereby equip our future generation with sufficient knowledge to understand the cosmic roots and feel the beauty of this universe.

The present study has been undertaken to develop Web Based Meaningful Engaged Learning Strategy for learning Astronomy at Secondary School level. Hence the study is entitled, “DEVELOPING WEB BASED MEANINGFUL ENGAGED LEARNING STRATEGY FOR LEARNING ASTRONOMY AT SECONDARY SCHOOL LEVEL”.

1.7 Operational Definition of Key Terms

Developing

Developing means “to grow or cause to grow, become more advanced, to expand or enlarge”. In this study, the word “developing” means “preparing Web Based Meaningful Engaged Learning Strategy for learning Astronomy at Secondary school level”.

Web Based

It means something based on the resources or documents available on World Wide Web. In this study, it means learning through a Web Based material prepared using PHP 6 (Hyper Text Pre-processor), Java Script and jQuery on the basis of resources related to Astronomy such as softwares, videos, animations, images etc. available on World Wide Web. This material (Web site) is developed offline and stored in CD ROM.

Meaningful Engaged Learning Strategy

It is a student centered learning strategy in which students are engaged in meaningful, challenging, authentic activities by grouping them into flexible, heterogeneous groups to satisfy the learning goals.

Astronomy

It is the study of celestial bodies. This science includes information about the planet we live on -Earth- and all the neighbors in space (Vancleave, 1995).

Secondary School Level

It is the third stage of School education. It covers Standard VIII, IX and X classes. In this study, Secondary School level refers to the Standard VIII and Standard X.

1.8 Objectives of the Study

The objectives of the study are,

1. To develop Web Based Meaningful Engaged Learning Strategy for learning Astronomy at Secondary school level.
2. To analyze the present status of teaching Astronomy at Secondary school level.
3. To find out the achievement in Astronomy of students at Secondary school level taught using Web Based Meaningful Engaged Learning Strategy and existing Activity Oriented Method.
4. To compare the achievement in Astronomy of students at Secondary school level taught using Web Based Meaningful Engaged Learning Strategy and
existing Activity Oriented Method for total sample and relevant subsamples.

5. To find out the Interest in Astronomy of students at Secondary school level taught using Web Based Meaningful Engaged Learning Strategy and existing Activity Oriented Method.

6. To compare the Interest in Astronomy of students at Secondary school level taught using Web Based Meaningful Engaged Learning Strategy and existing Activity Oriented Method.

7. To find out the Reasoning ability in Science of students at Secondary school level taught using Web Based Meaningful Engaged Learning Strategy and existing Activity Oriented Method.

8. To compare the Reasoning ability in Science of students at Secondary school level taught using Web Based Meaningful Engaged Learning Strategy and existing Activity Oriented Method.

9. To find out the Scientific Attitude of students at Secondary school level taught using Web Based Meaningful Engaged Learning Strategy and existing Activity Oriented Method.

10. To compare the Scientific Attitude of students at Secondary school level taught using Web Based Meaningful Engaged Learning Strategy and existing Activity Oriented Method.

11. To assess the retention of Achievement in Astronomy of students at Secondary school level taught using Web Based Meaningful Engaged Learning Strategy and existing Activity Oriented Method.

1.9 Hypotheses of the Study

The following hypotheses are formulated for this study.

1. The achievement in Astronomy of students taught using Web Based Meaningful Engaged Learning Strategy is significantly higher than that of those taught using existing Activity Oriented Method for total sample and relevant subsamples.
2. The Interest in Astronomy of students taught using Web Based Meaningful Engaged Learning Strategy is significantly higher than that of those taught using existing Activity Oriented Method.

3. The Reasoning Ability in Science of students taught using Web Based Meaningful Engaged Learning Strategy is significantly higher than that of those taught using existing Activity Oriented Method.

4. The Scientific Attitude of students taught using Web Based Meaningful Engaged Learning Strategy is significantly higher than that of those taught using existing Activity Oriented Method.

5. The retention of achievement in Astronomy of students taught using Web Based Meaningful Engaged Learning Strategy is significantly higher than that of those taught using existing Activity Oriented Method.

1.10 Methodology in Brief

The present study was intended to develop Web Based Meaningful Engaged Learning Strategy for learning Astronomy at Secondary School level. Before developing the strategy the investigator analyzed the present status of teaching Astronomy at secondary school level. For this, the investigator adopted Normative Survey method. In order to find out the effect of the developed strategy the investigator adopted experimental method. The design selected was pre-test post-test non-equivalent group design (Best & Kahn, 2007).

1.10.1 Sample selected for the Survey

For analyzing the present status of teaching Astronomy the investigator selected 120 Secondary school Physical Science teachers from four districts of Kerala selected through Random Sampling Method.

1.10.2 Sample selected for the Experiment

As Astronomy topics are included in the Standards VIII and X of Kerala State Secondary School Syllabus, the investigator selected the students of both Standards VIII and X as the population of the study. From this, the investigator
selected a total of 640 students from Standards VIII and X through Purposive Random sampling method.

- **Sample selected from Standard VIII**

  The investigator selected 320 students belonging to eight divisions of Standard VIII (four divisions from two higher secondary schools in Pathanamthitta district and four divisions from two higher secondary schools in Alappuzha district).

- **Sample selected from Standard X**

  The investigator selected 320 students belonging to eight divisions of Standard X (four divisions from two higher secondary schools in Pathanamthitta district and four divisions from two higher secondary schools in Alappuzha district).

  Of the schools selected, two were Government schools (Grama Panchayath Higher Secondary School, Kulanada and Government Model Higher Secondary School, Ambalapuzha) and the other two were Aided schools (SVGV Higher Secondary School, Kidanganoor and Devasom Board Higher Secondary School, Thakazhi). From each school, one division of Standards VIII and X, were taught using Web Based Meaningful Engaged Learning Strategy (Experimental Group) and another division of Standards VIII and X were taught using existing Activity Oriented Method (Control Group).

**The tools used were,**

1. Questionnaire on the Present Status of teaching Astronomy
2. Lesson transcripts based on Web Based Meaningful Engaged Learning Strategy (for Standards VIII and X) - Prepared by the Investigator
3. Lesson transcripts based on existing Activity Oriented Method (for Standards VIII and X ) - Prepared by the Investigator
4. Raven’s Standard Progressive Matrices
5. Achievement Tests in Astronomy (for Standards VIII and X) - Prepared by the Investigator
6. Astronomy Interest Inventory - Prepared by the Investigator
7. Test of Reasoning Ability in Science - Prepared by the Investigator
8. Scientific Attitude Scale - Prepared by the Investigator

**Procedure Adopted in the Study**

Primary discussions were conducted with Physical Science teachers at secondary school level. Based on that, a questionnaire was prepared and given to 120 Physical Science teachers at secondary school level to find out the present status of teaching Astronomy.

After comparing the previous achievement in Physics and General Mental Ability of Standards VIII and X students, the students were divided into two groups namely Experimental group and Control group for both Standards VIII and X. Before starting the experimental treatment, the investigator administered Achievement tests in Astronomy, Astronomy Interest Inventory, Test of Reasoning ability in Science and Scientific Attitude Scale as Pre-tests for both groups belonging to Standards VIII and X. Then the Experimental group was taught through Web Based Meaningful Engaged Learning Strategy and the Control group through existing Activity Oriented Method. Lesson transcripts for the whole units on Astronomy of Standards VIII and X were prepared and taught to two groups. The duration of each lesson was 40 minutes.

After the experimental treatment, the investigator administered the same Achievement tests in Astronomy, Astronomy Interest Inventory, Test of Reasoning ability in Science and Scientific Attitude Scale as Post-tests for both groups of Standards VIII and X. One month after the administration of Post tests, the Achievement test in Astronomy was again administered to both groups belonging to Standards VIII and X to understand the retention of achievement in Astronomy. The investigator tried to maintain same conditions with regard to the time allotted, instructions given during the test etc. for all the groups. The response sheets were collected back and scored.
Statistical Techniques Used

The scores obtained by the students in the Pre-test and Post-test were collected, tabulated and subjected to appropriate statistical techniques. The major statistical techniques used are ‘t’ test, ANOVA and ANCOVA.

1.11 Scope of the Study

The main objective of the study was to develop Web Based Meaningful Engaged Learning Strategy for learning Astronomy at Secondary School level. It is hoped that this strategy will help students to learn Astronomy more meaningfully and thereby make Astronomy learning an enjoyable task. This strategy will arouse interest in Astronomy as well as develop Reasoning Ability in Science. It will train students to use the web resources to enhance their learning. By using this strategy, students will be able to develop Scientific Attitude.

This strategy will help the teachers to give concrete, meaningful experiences to students for learning Astronomy which is always a Herculean task for teachers. It is expected that the findings of the study will inspire teachers to adopt new innovative learning strategies in their classroom. The findings of the study will help curriculum planners to introduce these types of innovative strategies which can give virtual experiences for learning Astronomy. It is hoped that this study will contribute towards new learning strategies and will be helpful for all those who are concerned with the field of Physics as well as Astronomy education.

1.12 Limitations of the Study

It is presumed that the procedure adopted for the present study is adequate enough to throw light on the problem under investigation. Despite all possible precautions take up to arrive at reliable results, certain limitations have crept into the study which is inevitable in the case of a study of this type. The limitations are,
Due to time limit, the study was confined to schools belonging to two districts of Kerala. Moreover, from each district only two schools were selected for the study. More generalized results would have been obtained if more districts and more schools from each district were taken in consideration.

All possible dependent variables, which can depend on this strategy, were not selected due to the constraints of time.

The sample was selected only from the schools which follow Kerala state syllabus as majority of the students in Kerala belongs to this syllabus.

As Astronomy topics are included only in the two Standards(VIII & X) of Kerala State Secondary school syllabus, the investigator selected sample from these two standards only.

With regard to the Astronomy topics, only one unit each is included in Standards VIII & X of Kerala State Secondary School syllabus. Hence only two units were selected for the study.

Despite these limitations, the investigator claims that the present study was conducted on proper lines with maximum possible degree of objectivity and precision.

1.13 Organization of the Report

The study has been reported in six chapters, the details of which are given below.

Chapter I: Introduction

This chapter was intended to throw flash upon the background of the study, the need and significance of the study, statement of the problem, operational definition of key terms, objectives, hypotheses, methodology in brief, scope and limitations of the study and organization of the report.
Chapter II: Theoretical Overview

This chapter gives light on the theoretical background of Astronomy Education, learning strategies, the nature of Web Based Learning and Meaningful Engaged Learning.

Chapter III: Review of Related Literature

A survey of related literature and result of studies conducted on Astronomy education, Modern instructional strategies, Web Based Learning and Meaningful Engaged Learning Strategy is presented here.

Chapter IV: Methodology

This chapter contains the description of the method adopted, design of the study, variables selected, tools employed, procedure adopted and the statistical techniques used for the study.

Chapter V: Analysis and Interpretation of Data

In this chapter, the details of the analysis and interpretation of the collected data using relevant statistical techniques are presented under appropriate heads.

Chapter VI: Summary and Conclusions

This chapter gives a summary of the study followed by major findings, conclusions, educational implications and suggestions made for further research.

The report is followed by a fairly exhaustive bibliography. The Bibliography is followed by a series of Appendices pertaining to the study.