CHAPTER 1

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INTRODUCTION

Education is responsible for the holistic health of an individual in terms of physical, social, mental, emotional, intellectual and spiritual development. Development in the field of education has provided human beings with countless means of ways to improve the quality of life. Education instills in an individual all those competencies through which he or she can occupy a suitable place in the society. It makes an individual worthy of himself, his family and the society as a whole.

Owing to the vital role of education in the economic, cultural, scientific and social development of a nation, it is treated as national responsibility. While the primary and secondary education stages are considered to be foundation stones in child’s life, higher education acts as a carrier of knowledge across different sections of life, dealing more prominently with various developmental tasks.

The instruction and assessment practices of the nation’s schools have come under criticism because of their perceived focus on the rote memorization of factual information. Teachers want to motivate learners to become fine men and women. Scientists want to study human behaviour to gain greater understanding of human nature, educators attempt to improve the behaviour of children, adolescents and adults (Crow & Crow, 2008).
There is unanimous agreement among educationists today that the quality of elementary education in almost all parts of the country is questionable. The large-scale expansion of primary education facilities across the country has lead to varying quality not only among students passing out but also in terms of institutional infrastructure and teaching–learning process.

It is yet another challenge to construct instructional theories, which attempt to prescribe teaching methods, to create the best conditions to help learners to acquire new knowledge and capabilities. Decades of work in the cognitive and developmental sciences has provided the foundation for an emerging science of learning. This offers conceptions of learning processes and the development of competent performance that can help teachers to support their students in the acquisition of knowledge, that is the province of formal education.

Societies of today have been recognized as information societies due to the impact of information and communication technologies in all aspects of human life. Technology has revolutionized the way of our work and is now set to transform education. It has the potential to promote equity and access to education and bridge the gap of digital divide. The teachers and students have to be trained in order to enable them to take full advantage of the potential technology. Undoubtedly, the development of information and communication technology will have a profound impact on the teaching and
learning processes which concerns most of us in the field of education and training.

1.1 SCIENCE AND THE MODERN WORLD

The vast changes during the modern age in all spheres of life are mainly the products of Science and Technology. The development of Science and Technology has greatly influenced the modern age and its wonders are perceptible all around. Bernard Shaw (1912) said, “The reasonable man adapts to the world; the unreasonable man attempt to adapt the world to himself. Therefore, all progress depends on the unreasonable man.” Science and technology like the unreasonable man, frequently, and often violently move to change the world.

Science develops thinking ability, reasoning ability, curiosity, creativity, open-mindedness, positive attitude and problem solving approach. These are the abilities and qualities that must be developed in every citizen of the world. This needs the development of basic knowledge and understanding of science in all global citizens. Science is a special way of knowing and investigating and the only way of appreciating the process is to do it. “It is science alone that can solve the problems of hunger and poverty, of insanitation and illiteracy, of superstition and deadening custom and tradition, of vast resources running to waste, of a rich country inhabited by starving people” (Nehru, 1960).
1.2 SCIENCE IN THE SCHOOL CURRICULUM

The onslaught of information and communication technology and the effects of globalization have initiated new perspectives in science education. The study of science fires pupils’ curiosity about phenomena in the world around them and offers opportunities to find explanations. It engages the learners at many levels, linking direct practical experience with scientific ideas. In the modern world, the importance of highly specialized scientific and technical education is well recognized.

Introducing children to the culture of science – its types of reasoning, tools of observation and measurement, and standards of evidence, as well as the values and beliefs underlying the production of scientific knowledge – is a major instructional challenge. Science curriculum aims at both promoting understanding of the concepts and scientific processes and preparing students with skills of critical analysis and synthesis, application and transfer of knowledge. Such a curriculum recognizes learning progressions in school science and ensures a solid core knowledge in science content and scientific process. It also aims to strengthen students’ understanding of the tightly coupled relationship between science, technology, society and the environment on local and global scales.
1.3 TEACHING OF SCIENCE

One of the most general educational objective is to learn about how socio-scientific issues are handled and evaluated within society to understand and to be able to act as a responsible citizen in future. Thus, a stronger social orientation in science teaching remains a key demand for contemporary science education.

The science teacher is responsible for addressing issues other than the straightforward teaching of the body of knowledge that has been classified as science. There is an implicit belief that the development of the higher-level skills that science can hopefully develop in children can be used in wider work place. That is the challenge to you as a new science teacher in the coming decade and beyond (Liversidge, 2010).

Science curriculum and instruction should enable students to utilize prior experiences and knowledge and help students to advance their thinking to ever-increasing abstraction in their scientific conceptualization. Quality instruction will lead students to new experiences, new experiments and a deeper understanding of science.

1.4 ROLE OF MEDIA IN INSTRUCTION

The process of learning is extended throughout one’s life span. It brings desirable changes and modifications in his behaviours through
spontaneous and arranged experiences – direct and indirect. Every teacher, experienced or inexperienced, has an inherent desire that his teaching should be as effective as possible. What he teaches should be carefully attended, clearly understood, grasped and fixed in the minds of his students. He must get maximum success in terms of his output by putting minimum energy and spending less time. Surely it depends upon the types of learning experiences and the ways in which they are provided to the learners (Mangal, 1991).

The developments in information and communication technologies have changed not only the way the human resources interact among themselves, but also the material resources that are used in a teaching learning setting. The advances in ICT have enabled new forms of access to information and is becoming more central to the infrastructure of all types of educational institutions.

Multi-Media and CD-ROM technologies represent a significant wave in educational technology, exploiting full advantage of technology developments in computers and tele-communications. They prove to be a useful tool of instruction and learning for the teacher. Multimedia tools enhance comprehension and learning by involving more than one sensory channel in the learners and thus obtain a higher domain of learning.
1.5 GRAPHICS AND ANIMATIONS IN TEACHING

As the goals of education begin to change to reflect new social and educational needs, teaching strategies also change. Technology-based resources include an enormous amount of useful instructional materials and constitute an exciting new medium that stimulates students to think about concepts rather than just follow procedures. The use of graphics in education has a long history. A wide variety of graphics – from photographs, pictures, and cartoons, to charts, maps, diagrams and outlines, often described as static visuals, is common today in most teaching strategies.

The use of graphic aids in the classroom has become an important teaching strategy in education. As educators learn more about how to reach all types of learners, the use of graphic aids assist in differentiating instruction, giving students greater access to content, and helping students to achieve greater comprehension of new information. After introducing a new concept or skill, graphic aids can be used to facilitate greater comprehension of the material. They allow students to spend more time with the content and solidifies understanding. When students work together on graphic aids, there is a scaffolding of information and an exchange of ideas. This experience, along with the use of the graphic aids, helps students to become master in the content area and increase their confidence in their ability.
An integrated computer-mediated instruction enters the mainstream of instructional development at all levels of education and training. Exploration of the design efficiency, as well as of learning efficiency, has the potential to provide programmers and instructional designers with a theoretical and practical basis from which they have to select the appropriate medium for individual learning objectives.

Computers provide innovative and efficient means for teaching students. As a result, various forms of computer-based instruction and multimedia instruction provide a viable mode for teaching the content. One particular promising capability provided is the ability to integrate animation as part of instruction. Animation is the rapid display of a sequence of images of 2D or 3D artwork or model positions in order to create an illusion of motion due to the phenomenon of persistence of vision, and can be created and demonstrated in a number of ways. The most common method of presenting animation is as motion picture or video programme, although several other forms of presenting animation also exist.

1.6 NEED AND SIGNIFICANCE OF THE STUDY

The primary objective of science teaching is to give knowledge and information about the world around and to live as an efficient member in the modern society. Science education should contribute to create men who are capable of doing new things, not simply of repeating what other generations
have done – men who are creative, inventive and discoverers. Science and technology is used to promote the establishment and furtherance of the community of man to the community of nations. Today’s people live in a scientific and technological age and no citizen can function effectively in a developed society without a basic scientific literacy and certain elementary scientific skills.

The primary education is a very crucial stage in the life of a child. The child’s spontaneity, curiosity, creativity and activity, in general, should not be restricted by a rigid and unattractive method of teaching and environment for learning. Science if studied properly, develops power of thinking, reasoning, curiosity, open-mindedness, and ultimately develops scientific attitude or scientific temper.

An environment–based, child centered approach, which is based on activities and projects is necessary for the inculcation of proper attitudes and values. Usually children pick up much more from the media than from their teachers. To make it a real instrument of change, the programmes need to be specific as well as attractive, so that they draw the attention of local problems and also advice what activities are possible to overcome these drawbacks.

Elementary education forms the very foundation on which society, its values and its characters are built. More emphasis should be given to the comprehension of the fundamentals of science as against memorization. This
implies that a basic aim of science teaching, especially at the elementary level, is to supply fundamental knowledge of science which may be brought into use in the daily environment through the study and application of science. Nowadays, students are learning facts, concepts and skills with the aid of pictures, television, cartoons, recorded words, computer graphics, programmed lessons and other media.

There is virtually no area in which graphical displays cannot be used to some advantage, and so it is not surprising to found that the use of computer graphics so widespread. Today computer graphics used routinely in such diverse areas as science, engineering, medicine, business, industry, government, art, entertainment, advertising, education and training. Static graphics and computer aided graphic animation are excellent media for creating scientific awareness in elementary school children. It is important to represent scientific issues as topical, controversial and exciting, with plenty of graphics to catch youngster’s imaginations and this will satisfy their intellectual curiosity about scientific processes.

Without empowerment, participation and skills of communication, progress can be difficult for young pupils who wish to work for a technologically sound, science based future. The conventional method of teaching is mainly based on the text book and is not sufficient for the better learning of Basic Science. Thus, a study is envisaged to avoid the monotony
of science teaching and the investigator himself felt that elementary school children are very much interested in viewing animations and cartoons. In this context, the investigator thinks that teaching with animated and static visuals can help the elementary school pupils to get more awareness about the scientific concepts, as they are more interested in their immediate environment and like to see things, plants and animals in motion. Extensive reading in the area and discussions with experts in the field, directed the investigator to study the effectiveness of animated and static visuals based instructional strategies in the learning of basic science at upper primary level.

1.7 STATEMENT OF THE PROBLEM

The present study is undertaken with the objective to find out the effectiveness of animated and static visuals based instructional strategies on achievement in Basic Science of upper primary students.

The problem under investigation is entitled “EFFECTIVENESS OF ANIMATED AND STATIC VISUALS BASED INSTRUCTIONAL STRATEGIES ON ACHIEVEMENT IN BASIC SCIENCE OF STUDENTS AT UPPER PRIMARY LEVEL”.
1.8 DEFINITION OF KEY TERMS

**Effectiveness:** The term ‘effectiveness’ stands for the outcome of the study, when influence of a factor or condition is dependent on the presence or absence of another factor or condition (Good, 1973).

**Animated Visuals:** Visuals exhibiting apparent movement, produced by sequential recording of a series of still drawings, three dimensional objects or computer generated images.

**Static Visuals:** Still items like charts, still models, cartoons, comics, diagrams, photographs, pictures and graphs.

**Instructional Strategy:** The art of cleverly managing the act of providing activities, materials and guidance that facilitate teaching/learning in either formal or informal situations to promote the attainment of particular type of objectives (Heinich, 1989).

**Basic Science:** The science syllabus prescribed for the Standards V to VII, by the government of Kerala.

**Students at Upper Primary Level:** This means the students who are studying in Standard V to VII in the schools of Kerala, following Kerala State Syllabus. For the present study, the investigator selected the students studying in Standard VII.
1.9 OBJECTIVES OF THE STUDY

The major objectives of the study were:

1. To find out the effectiveness of Animated and Static Visuals based Instructional Strategy, Static Visuals based Instructional Strategy and Conventional Activity Oriented Method on Achievement in Basic Science of students at Upper Primary Level.

2. To compare the effectiveness of Animated and Static Visuals Based instructional Strategy, Static Visuals based Instructional Strategy and Conventional Activity Oriented Method on Achievement in Basic Science of students at Upper Primary Level.

3. To find out the effectiveness of Animated and Static Visuals based Instructional Strategy, Static Visuals based Instructional Strategy and Conventional Activity Oriented Method on Achievement in Basic Science of students at Upper Primary Level with regard to the categories of objectives- Knowledge, Understanding, Application, Analysis, Synthesis, and Evaluation.

4. To compare the effectiveness of Animated and Static Visuals based Instructional Strategy, Static Visuals based Instructional Strategy and Conventional Activity Oriented Method on Achievement in Basic Science of students at Upper Primary Level with regard to the

5. To find out the effectiveness of Animated and Static Visuals based Instructional Strategy, Static Visuals based Instructional Strategy and Conventional Activity Oriented Method in developing Attitude towards Science of students at Upper Primary Level.

6. To compare the effectiveness of Animated and Static Visuals based Instructional Strategy, Static Visuals based Instructional Strategy and Conventional Activity Oriented Method in developing Attitude towards Science of students at Upper Primary Level.

7. To find out the effectiveness of Animated and Static Visuals based Instructional Strategy, Static Visuals based Instructional Strategy and Conventional Activity Oriented Method in developing Interest in Science of students at Upper Primary Level.

8. To compare the effectiveness of Animated and Static Visuals based Instructional Strategy, Static Visuals based Instructional Strategy and Conventional Activity Oriented Method in developing Interest in Science of students at Upper Primary Level.

9. To find out the effectiveness of Animated and Static Visuals based Instructional Strategy, Static Visuals based Instructional Strategy and
Conventional Activity Oriented Method on retention of Achievement in Basic Science of students at Upper Primary Level.

10. To compare the effectiveness of Animated and Static Visuals based Instructional Strategy, Static Visuals based Instructional Strategy and Conventional Activity Oriented Method on retention of Achievement in Basic Science of students at Upper Primary Level.

1.10 HYPOTHESES OF THE STUDY

The following hypotheses were formulated for the study:

1. The achievement in Basic Science of Students at Upper Primary Level taught using Animated and Static Visuals based Instructional Strategy is significantly higher than that of Students taught using Conventional Activity Oriented Method.

2. The achievement in Basic Science of Students at Upper Primary Level taught using Static Visuals based Instructional Strategy is significantly higher than that of Students taught using Conventional Activity Oriented Method.

3. The achievement in Basic Science of Students at Upper Primary Level taught using Animated and Static Visuals based Instructional Strategy is significantly higher than that of Students taught using Static Visuals based Instructional Strategy.
4. The achievement in Basic Science of Students at Upper Primary Level taught using Animated and Static Visuals based Instructional Strategy is significantly higher than that of Students taught using Conventional Activity Oriented Method with regard to the categories of objectives-Knowledge, Understanding, Application, Analysis, Synthesis, and Evaluation.

5. The achievement in Basic Science of Students at Upper Primary Level taught using Static Visuals based Instructional Strategy is significantly higher than that of Students taught using Conventional Activity Oriented Method with regard to the categories of objectives-Knowledge, Understanding, Application, Analysis, Synthesis, and Evaluation.

6. The achievement in Basic Science of Students at Upper Primary Level taught using Animated and Static Visuals based Instructional Strategy is significantly higher than that of Students taught using Static Visuals based Instructional Strategy with regard to the categories of objectives-Knowledge, Understanding, Application, Analysis, Synthesis, and Evaluation.

7. The attitude towards Science of students at Upper Primary Level taught using Animated and Static Visuals based Instructional Strategy
is significantly higher than that of students taught using Conventional Activity Oriented Method.

8. The attitude towards Science of students at Upper Primary Level taught using Static Visuals based Instructional Strategy is significantly higher than that of students taught using Conventional Activity Oriented Method.

9. The attitude towards Science of students at Upper Primary Level taught using Animated and Static Visuals based Instructional Strategy is significantly higher than that of students taught using Static Visuals based Instructional Strategy.

10. The Interest in Science of Students at Upper Primary Level taught using Animated and Static Visuals based Instructional Strategy is significantly higher than that of students taught using Conventional Activity Oriented Method.

11. The Interest in Science of Students at Upper Primary Level taught using Static Visuals based Instructional Strategy is significantly higher than that of students taught using Conventional Activity Oriented Method.

12. The Interest in Science of Students at Upper Primary Level taught using Animated and Static Visuals based Instructional Strategy is
significantly higher than that of students taught using Static Visuals based Instructional Strategy.

13. The retention of Achievement in Basic Science of Students at Upper Primary Level taught using Animated and Static Visuals based Instructional Strategy is significantly higher than that of students taught using Conventional Activity Oriented Method.

14. The retention of Achievement in Basic Science of Students at Upper Primary Level taught using Static visuals based Instructional Strategy is significantly higher than that of students taught using Conventional Activity Oriented Method.

15. The retention of Achievement in Basic Science of Students at Upper Primary Level taught using Animated and Static visuals based Instructional Strategy is significantly higher than that of students taught using Static Visuals based Instructional Strategy.

1.11 METHODOLOGY IN BRIEF

Experimental method was used to conduct the present study. The design selected was pre-test post-test non-equivalent group design (Best & Khan, 2011).
Sample selected for the study

The sample for the study were selected from Manjathul Aitham Orphanage U.P.S. (M.A.O.U.P.S), Elayur, Malappuram District. The study was conducted on a final sample of 159 students belonged to three divisions of Standard VII (N = 53 in each group).

Tools used in the study

The tools used in the study for the collection of data were:

i. Lesson transcripts on Animated and Static Visuals based Instructional Strategy.

ii. Lesson transcripts on Static Visuals based Instructional Strategy.

iii. Lesson transcripts on Conventional Activity Oriented Method.

iv. Achievement test in Basic Science.


vi. Science Interest Inventory.

vii. Non-Verbal Intelligence Test.

Procedure Adopted in the Study

Since the intention of the study was to find out the effectiveness of Animated and Static Visuals based Instructional Strategies for teaching Basic Science, experimental method was found to be the best method to conduct the research. The previous achievement in Basic Science and General Intelligence
of the total sample were compared before starting the experimental treatments. Out of the three groups selected for the study, two groups were considered as Experimental Groups and the third one as the Control Group. Before the experimentation, an Achievement test in Basic Science, Science Attitude Scale and Science Interest Inventory were administered in all the groups as pre-tests. Then the groups were subjected to the experimental procedures and the Experimental Group I was taught using Animated and Static Visuals based Instructional Strategy, Experimental Group II by using Static Visuals based Instructional Strategy and the Control Group was taught in the Conventional Activity Oriented Method. When the experiment was over, the same Achievement test, Science Attitude Scale and Science Interest Inventory were again administered to all the groups as post-tests. The pre-test and post-test scores were subjected to analysis by using appropriate statistical techniques. Finally, a delayed achievement test was used as the retention test. Here the same Achievement test was used, but the questions were reworded and rearranged. It was administered one month after the post test.

1.12 SCOPE OF THE STUDY

The present study is an attempt to examine the Effectiveness of Animated and Static Visuals based Instructional Strategies on Achievement in Basic Science of students at Upper Primary Level. It is hoped that the findings of the study will be useful for the learners, teachers, curriculum constructors and educational planners.
The study is expected to promote the development and utilization of static graphics and animated visuals in the field of elementary science teaching. Animated and Static Visuals based Instructional Strategy can help students to understand and appreciate scientific facts and concepts in a meaningful and effective way and make classroom learning live and more vivid.

It will bring to light the impact of static and dynamic visualizations in science teaching and will encourage the teachers to follow multisensory approach in teaching.

It is hoped that the findings of the study will encourage science teachers to use this strategy for better achievement in Basic Science, to develop proper attitude towards science and to increase the interest of students in science.

The findings of the study is expected to induce the authorities to organize orientation classes, refresher courses, workshops and seminars for teachers, to acquaint them with the Animated and Static Visuals based Instructional Strategy.

In overcrowded classrooms this strategy do not work well. The investigator hopes that the authorities will take initiative to revise the teacher-pupil ratio by reducing the number of students in the class.
The investigator also hopes that the authorities will take initiative to provide adequate multimedia facilities including computers, internet facilities, projectors etc. to the Upper Primary Schools of the state.

1.13 LIMITATIONS OF THE STUDY

The investigator has made every effort to make the study a perfect one. But due to the constraints of time and resources, certain unavoidable limitations have crept into the study.

i. The study was confined to samples selected from a single school of Malappuram District. Due to administrative difficulties, the investigator could not conduct the experiment in all Upper Primary Schools in Kerala.

ii. Only 45 lesson transcripts (15 for each strategy) based on three units in Basic Science of Standard VII were prepared due to huge expense in terms of money for the production of animation programmes.

iii. The investigator prepared 2D animations for the study. If 3D animations were employed instead of 2D animations, this strategy could have more influence on student’s achievement in Basic Science.

iv. Only the students of standard VII in the Upper Primary Schools of Kerala form the population of the study. Due to time limit, the investigator could not conduct experiment in all the standards in the Upper Primary Level.
Despite the above mentioned facts, all possible attempts have been made to make the study reliable and objective, as far as possible. It is hoped that the results of the present study would be helpful in finding new frontiers in the field of science teaching.

1.14 ORGANIZATION OF THE REPORT

The report of the study has been presented in six chapters.

Chapter I

This chapter contains a brief description of the rationale for selecting the present problem, its significance, statement of the problem, definition of key terms, objectives of the study, hypotheses formulated, methodology in brief, scope and limitations of the study.

Chapter II

This chapter presents the conceptual background of computer graphics and animations and the other forms of multimedia presentations in learning.

Chapter III

This chapter contains a detailed review of selected literature from areas of multimedia learning, static and animated visualizations, and other forms of computer assisted instruction.
Chapter IV

This chapter describes the methodology of the study in detail, variables of the study, design, tools used, samples selected, the experimental procedure adopted and the statistical techniques employed.

Chapter V

The analysis of the data taken up for the study and its interpretations are presented in this chapter, in detail.

Chapter VI

This chapter contains the summary of procedures adopted, major findings of the study, tenability of hypotheses followed by conclusions based on the findings and suggestions for further research.