1.1. Introduction

Education is the principal tool for human development. Whatever broadens our horizons, deepens our insight, refines our reactions and stimulates thought and feelings, educates us. It includes all influences-cultural domestic economic, geographical, political, religious, social and spiritual. Even the climate, soil, and surroundings educate us. All experience is said to be educative. The bite of a mosquito, the taste of watermelon, the experience of falling in love, of flying in an aeroplane, of being in a storm in a small boat- all such experiences have a direct educative effect on us. The child educates the parents, the pupil educate his teachers. Everything we say, think or do educate us no less than what is said or done to us by other beings, animate or inanimate. In the wider sense, life is education and education is life. Every environment, surrounding or activity helps to shape the human being. A human soul is in constant interaction with his environment. The interaction results in the modification of human behaviour or education.

Education has an important role to play in the process of changing society. This is clearly laid out by the UNESCO for the Decade of Education for Sustainable Development (UNDP, 2005) to promote an education in solidarity capable of generating responsible attitudes and commitments, and that prepares citizens to make well-founded decisions aimed at achieving culturally plural, socially just, and environmentally sustainable development, i.e. a profoundly humanistic education that will ensure the consolidation of these principles. According to Robottom (2000), this change of model requires diverse measures and instruments to transform our attitudes, lifestyles, patterns
of social participation, and conceptions on how politics is done. They see that the challenge for environmental education and for educational research is to address a broad range of diagnostics in order to set objectives for progress and to evaluate results in the short, medium, and long terms.

Educational Technology encompasses the entire process of setting the goal, the continuous renewal of curriculum, the trying out and using of new materials and methods, the evaluation of the system as a whole and resetting of goals in the view of changing circumstances. The National Policy on Education, 1986 and revised version in 1992 have laid great stress on the application of Educational Technology in all aspects and stages of education. Engaging students in changing learning environments of the modern era has become a challenge for teachers as well as instructional planners and designers. The teaching learning community will have to realise this changing environment if they are to make best and most effective available resources for providing authentic learning experiences.

The new Information and Communication Technologies have profoundly affected our society which is now knowledge based, technology driven and fast changing. To compete and survive in the competitive world of education, it is essential to create, adopt and utilize new technologies which will allow efficient flow of data, voice and images to all those who want to remain updated in the fast changing world. With the present infrastructure, class size, availability of teachers, quality and training of teachers, it is difficult to achieve all the objectives of the teaching process. Therefore the use of new media in the educational process is of vital importance today. With the help of the new ICT’s education will cross borders and will change the world into a global village. It
changes the way the teacher teaches and the students learn. It increases productivity in
terms of learning outcomes and provides course wares and learning packages which
makes learning more easier, effective and enjoyable. The styles of learning now a day go
far beyond traditional pedagogic comfort within the four walls of the classroom.
Therefore it is necessary to present a verity of strategies for maximizing of learning to
heterogeneous groups mostly with the notion of constructivist learning which lead to a
shift in the use of information technology in the classroom: from using ICT as
 instructional tools to enhance conventional teaching to using ICT as cognitive tools to
promote meaningful learning that is active, constructive, intentional, authentic and
cooperative (Jonassen, Peck & Willson, 1999; Reeves, 1998).

The engaging benefits of traditional instructor-led teaching with the
advantages brought by the new technologies have evolved to what we call as ‘Blended
Learning’. Teachers have been using versions of it all the time, mostly used in a variety
of terms like Hybrid Learning, Combined Resource Teaching, etc. As such this strategy
identifies the use of several delivery modes for teaching and learning with the aim of
optimizing instruction in terms of both its process and product. Examples of Blended
Learning would be the combination of technology based resources and traditional print
materials, group or individual study; or even structured pace study and self paced study.
But with today’s prevalence of high technology, Blended Learning is mostly understood
as the use of resources which combine e-learning with other educational resources. It now
denotes the blending of traditional teaching approaches and the latest learning
technologies using the internet.
Blended Learning is viewed as “the integrated combination of traditional learning with web based on line approaches, the combination of media and tools employed in an e-learning environment and the combination of a number of pedagogic approaches irrespective of learning technology used” (Whitelock & Jefts, 2003). It combines multiple delivery media that are designed to complement each other and promote learning and application-learned behavior. Blended learning programs may include several forms of learning tools, such as real-time virtual/collaboration software, self-paced Web-based courses, electronic performance support systems (EPSS) embedded within the job-task environment, and knowledge management systems. Blended learning mixes various event-based activities, including face-to-face classrooms, live e-learning, and self-paced learning. This often is a mix of traditional instructor-led training; synchronous online conferencing or training, asynchronous self-paced study, and structured on-the-job training from an experienced worker or mentor. The original use of the phrase “blended learning” was often associated with simply linking traditional classroom training to e-learning activities, such as asynchronous work (typically accessed by learners outside the class at their own time and pace). However, the term has evolved to encompass a much richer set of learning strategies or “dimensions.” The concept of blended learning is rooted in the idea that learning is not just a one-time event and that it is a continuous process. Blending provides various benefits over using any single learning delivery medium alone.
1.2. Need and Significance of the Study

Concern for the environment has become increasingly prominent in the past few decades. More recently, there has been significant interest in promoting students’ awareness of environmental concerns and what are commonly accepted as friendly environmental practices. Consistent with that interest environmental awareness activities are often incorporated into curricula for students at different stages of school education through different disciplines. Biology is the only discipline that can show us how to survive and how to live more abundantly in this thin and fragile biosphere on this small and precious planet in the centuries ahead. Biology education is needed not only for creating biologically literate citizens but also ecologically sensitive human beings. The impact of human activities on the environment and the evolution of new monstrous diseases and other calamities can be controlled by making use of the knowledge of Biology judiciously.

Environmental concepts that are included in the biology curricula aims to equip students with awareness, knowledge, skills, attitudes and commitment to protect natural resources and conserve bio-diversity. This capability is provided by environmental education which is a life long process necessary to understand and appreciate the inter-relation of man with his natural surroundings. Human beings should tackle their environment every day for their survival and well-being. A proper understanding of the environment is inevitable in order to cope with the problems caused by industrial revolution, urbanization and modernization. For the proper utilization and conservation of the environment, teachers, students and the common man should be made aware of the environment and the importance of its components. By the significant
change in attitude of humans through this type of education, the environment can be improved for the survival of human life and the normal existence of the world biome. In the global scenario no single strategy or method is earmarked for ensuring the expected behavioral outcomes especially in the realm of learning Biology in accordance with these new perspectives. Hence the need for combining many practices especially online approaches and live classroom methods which come under the umbrella of blended-in-practice is essential. Such a practice will definitely help the learner to develop learning excellence and thereby navigate an array of internal mental events, excellent references and the like to analyze the present and face the future challenges especially related to developing a favorable environmental and social attitude.

Blended learning programmes use many different forms of e-learning perhaps complimented with instructor led training and other live formats (Bersin, 2004). As a combination of multiple approaches to teaching Biology with a view to enhance the social and environmental attitude of pupils self paced, collaborative and inquiry based activities are incorporated in the present study. These include blending of technology based resources with face-to-face situations between teacher and students like e-learning, self paced online learning using CD-ROMS, formal discussion groups, field visits and development of commonalties of practice as well as simple knowledge acquisition.

Studies have found that blended learning can improve learning/teaching (Brown, 2003; Graham, 2005; Osguthorpe & Graham, 2003); efficient in delivering instruction to the target learners (Nagel, 2009); increases learners’ interest and motivation (Burgon & Williams, 2003); increases attitudes (Al-Saai, Al-Kaabi, & Al-Muftah, 2011), Alseweed (2013). Akkoyunlu and Soylu (2008), Drzid et al. (2012), Hirata and Hirata (2008),
and Terry, Owens, and Macy (2001) concluded that students preferred blended learning
over traditional learning. Studies by Mac Donald & McAfeer (2003) studied generic
tutoring strategies and described factors influencing use of media in Blended Learning
environments. "Increasingly, organizations are recognizing the importance of tailoring
learning to the individual rather than applying a 'one-size-fits-all' approach." (Thorne,
2003) Of course, common needs exist, but blended learning allows the teacher to look for
creative ways and use a variety of media to address the specific needs of his students.

To prepare our pupils to be citizens of the twenty-first century, it is important to
search for exemplary practical proposals in which environmental and social education is
integrated into the science curriculum. This requires a form of teaching in which the
pupils acquire the courage, commitment, and desire to participate in social activities
relating to environmental issues, thus learning to be active citizens. A key aspect then
would be the acquisition of skills for alternative actions in which the pupils can choose
whether or not to participate in issues both related to life and environment as well. The
impact of human activities on the environment as well as society and the evolution of
new monstrous diseases and several other calamities can be controlled by making use of
the knowledge of Biology judiciously. Biology education is needed not only for creating
biologically literate citizens but also ecologically and socially sensitive human beings.

Even though the academic community, including curriculum planners,
educationists and teachers are quite aware of the significance of constructive pedagogy
utilizing multiple approaches, teaching/learning through Blended learning in Biology has
neglected till recently. Globally there is a growing environmental awareness among all
segments of society, but research on the effect of Biology in shaping the social and environmental attitude of students using Blended Learning strategy is lacking. At this juncture, the investigator feels it reasonable to adopt Blended Learning for select topics in the syllabus of Biology at secondary school level in order to improve achievement and enhance social and environmental attitude of pupils. As secondary school stage is a crucial point in the educational career of individual, attitudinal determinants towards environment and society would be effective along with academic accomplishments.

It was assumed that a study of this nature would give some base line data for curriculum planners and educationists to develop suitable Blended Learning lessons in Biology at school level catering to neo-millennial learning style incorporating technology, encouraging learning through networks and fostering favorable attitude towards Nature in general and life in particular. Moreover it denotes a series of e-learning events facilitated by a mix of face-to-face modes and ICT based delivery mechanisms which can be used both on and off the campus. The aim of this blended approach therefore will be to offer potential to reconstruct learning environments around specific learning styles with sufficient interactions and communication among learners involved in the learning process as well as behaving positively towards the environment as well as the society to which they belong to. Thus, the present study might also contribute expanded understanding to the way of blending the learning environments, and contribute additional understanding to the knowledge base about the implementation of blended learning for teaching Biology. Finally, it is hoped that this study might contribute to the growing body of knowledge of blended delivery and blended learning in secondary education.
1.3. Statement of the problem

Learning requirements and preferences of each learner tend to be different. Combining different delivery modes has the potential to balance out and optimize the learning program development and deployment costs and time. If technological advances are used expeditiously and teachers are less shackled by the need to provide students with access to knowledge, their skills in pedagogy can be directed towards higher level thinking abilities, and developing a climate of positive, enthusiastic learning contexts in which rigorous intellectual work can flourish. This in turn will enhance students’ self-image as effective learners. The present study aims at preparing Blended Learning Lessons in Biology in order to enhance the achievement of secondary school pupils in Biology, improve the Environmental Attitude and promote Social Attitude of secondary school students. The study is thus entitled as “EFFECT OF BLENDED LEARNING STRATEGY ON ACHIEVEMENT IN BIOLOGY AND SOCIAL AND ENVIRONMENTAL ATTITUDE OF STUDENTS AT SECONDARY LEVEL”

1.4. Definition of key terms

The key terms used in the study are explained below for the sake of clarity:

**Blended Learning:** ‘Learning that is facilitated by the effective combination of different modes of delivery, models of teaching and styles of learning, and is based on transparent communication amongst all parties involved with a course.’ (Heinze and Procter, 2004) In this study Blended Learning denotes the use of mixed delivery modes (Synchronous and Asynchronous); Learning Architectures (Guided Discovery and Exploratory Learning); Instructional Methods (Media, Tasks and Learning Events); and
Social Learning Dynamics (Collaboration and Cooperation) to increase learning opportunities through the blending of multiple approaches to learning like e-learning, face-to-face learning, inquiry based learning.

**Blended Learning Strategy:** In the present study Blended Learning Strategy is conceived as a pedagogical approach that combines the effectiveness and socialization opportunities of the classroom with the technologically enhanced active learning possibilities of the online environment through the elements namely: Live Events, Self-paced Learning, Collaboration, Performance Support Materials and Assessment; and with the best features of classroom interaction and live instruction to personalize learning, allow thoughtful reflection, and differentiate instruction from student to student across a diverse group of learners.

**Achievement in Biology:** Accomplishment or proficiency of performance in that branch of Science which deals with the study of living things. In this study we use the achievements scores in biology of secondary school students

**Social Attitude:** In this study social attitude is the behavioral pattern and predisposition to specific adjustment to designated social situations, as well as conditioned response to social situations based on the components namely Co-operation, Responsibility, Democratic Living, Empathy and Independence.

**Environmental Attitude:** A learned predisposition to respond consistently in a favorable or unfavorable manner with respect to the environment. In this study environmental attitudes is studied based on the components namely Regard for Life and Environment, Environmental issues, Equitable and judicious use of Resources,

**Students at Secondary Level:** Students belonging to 8th and 9th standards.

1.5. **Hypotheses formulated for the study**

The hypotheses formulated for the study are as follows:

- Blended Learning strategy is an effective means for enhancing achievement in Biology of secondary school students.

- Blended Learning is effective in improving Environmental Attitude of secondary school students.

- Blended Learning is effective for promoting Social Attitude of secondary school students.

1.6 **Objectives of the study**

The study has the following specific objectives in view:

- To construct and validate an Environmental Attitude Scale for secondary school students.

- To construct and validate a Social Attitude Scale for secondary school students.

- To identify the Environmental Attitude of secondary school students.

- To identify the Social Attitude of secondary school students.

- To design a Blended Learning strategy for learning Biology at secondary level.
To find the Achievement in Biology of secondary school students using Blended Learning strategy developed.

To find the effect of Blended learning on achievement in Biology of secondary school students.

To find the effect of Blended learning on Environmental Attitude of secondary school students.

To find the effect of Blended learning on Social Attitude of secondary school students.

To identify the relation between Achievement in Biology through Blended Learning and Environmental Attitude of secondary school students.

To identify the relation between Achievement in Biology through Blended Learning and Social Attitude of secondary school students.

To identify the relation between Environmental Attitude and Social Attitude of secondary school students.

To analyze the ratings of teachers regarding the effectiveness of Blended Learning in Science at secondary level.

To identify the views of students regarding the beneficial and practical aspects of Blended Learning.
1.7 Methodology in brief

1.7.1. Method adopted for the study

The purpose of the present study was to develop a blended learning strategy for learning Biology and to find out its effect on achievement in Biology, environmental attitude and social attitude of secondary school students of Kerala. Hence the investigator adopted experimental cum survey method for the present investigation. The survey method was used to identify the environmental and social attitudes of students as a preliminary step of the study. It was also used to collect the responses of teachers and students regarding the beneficial and practical aspects of the blended learning strategy in science instruction.

The experimental method was used to study the effect of Blended Learning for enhancing achievement in biology of secondary school students as well as in improving their environmental and social attitude. The basic experimental design adopted in the present investigation was Pre-test Post-test Non-equivalent Group Design. Two groups were taken for the experimental study namely the experimental group and control group. The independent variables selected for the present study are Blended Learning strategy and Direct Instruction Method. The dependent variables are Achievement in Biology, Environmental Attitude and Social Attitude of secondary school students.

1.7.2 Sample selected for the study

The population for the present study comprised of secondary school students of Kerala. Here a sample of 450 secondary school students of representative districts in Kerala had been selected for the survey. Stratified random sampling technique was used for selecting the sample giving due representation to gender, locality and type of school.
Experimental method was used to determine the effect of Blended learning on the achievement in Biology of secondary school pupils. For the experimental study the researcher selected two groups of 84 students (42 as experimental group and 42 as control group) from among the 450 students identified for the study. The opinions regarding the beneficial and practical aspects of blended learning were collected from the experimental group and 50 teachers selected for the study.

1.7.3. Tools used for the study

The following tools developed by the researcher were used for collecting data:

1. Lesson Transcripts in Biology based on Blended Learning on the topic ‘Biodiversity and its Conservation’
2. Lesson transcripts for Direct Instruction on the topic ‘Biodiversity and its Conservation’
3. Achievement Test on the topic ‘Biodiversity and its Conservation’
4. Environmental Attitude Scale
5. Social Attitude Scale
6. Evaluation Schedule for Teachers
7. Questionnaire for Students

1.7.4. Procedure adopted for the study

As a preliminary step of the study the environmental and social attitude of secondary school students using attitude scales viz., Social Attitude Scale and Environmental Attitude Scale developed and standardized by the investigator were identified using survey method. The topic ‘Biodiversity and its Conservation’ from Biology was identified for learning through the Blended Learning Strategy developed and
the lessons were prepared. Blended Learning Strategy was developed taking into consideration the theoretical and practical aspects of blended learning viz., theories of constructivism, experiential learning and use of instructional technologies for self-paced learning.

The experimental group of students was subjected to Blended Learning using the prepared lessons based on the Blended learning Strategy developed. These lessons were taught at secondary level to find out whether they are suitable for enhancing the achievement of students. The achievement in Biology of the students was assessed quantitatively and qualitatively using the achievement test and the rubrics prepared. The environmental and social attitude of students was also found out. The effect of Blended Learning on achievement in Biology, social attitude and environmental attitude was analysed. For this the pre test and post test scores of achievement as well as environmental attitude and social attitude obtained were subjected to appropriate statistical analyses. The opinions of teachers and students regarding the benefits of Blended Learning Strategy for learning Biology and developing desirable outcomes were also collected and analyzed.

1.7.5. Statistical techniques used

The data collected were analyzed using appropriate statistical techniques like Computation of mean scores, t- Test for testing the significant difference and Analysis of Covariance. The entire statistical processing was done using the statistical software SPSS.
1.8. Scope and Limitations of the study

The present study is intended to prepare lessons incorporating Blended Learning in Biology with a view to improve achievement and enhance Social and Environmental Attitude of Secondary School students. As Blended Learning describes learning events or activities where e-learning is integrated into traditional forms of teaching, it allows the utilization of many methods and resources that are derived from multiple information sources. The unstructured learning environment, which characterizes Blended Learning, allows students to learn in the way that best suits them. Attempts were made to make the study precise and as objective as possible. The study is confined to a few topics in Biology. Blended Learning strategy is also limited to a few dimensions. Due to many practical difficulties that may encounter in the conducting of Blended Learning lessons, the study was confined to limited sample

1.9 Format of the research report

The content of the research work is summarized under six chapters.

**Chapter I** contains a brief introduction discussing the need and significance of the study undertaken followed by the statement of the problem, hypotheses formulated, specific objectives, a brief discussion of the methodology and scope and limitations of the study.

**Chapter II** gives the theoretical overview of the nature, characteristics and dimensions of Blended Learning and the steps involved in the design and development of Blended learning strategy.

**Chapter III** highlights the review of related literature pertaining to the research topic.
Chapter IV gives a detailed description of the method adopted for the study, the sample, tools and techniques used, administration of the tool, scoring and consolidation of data and a short account of the statistical techniques used for the analysis of the data.

Chapter V presents the analysis and interpretation of data in detail.

Chapter VI includes a summary of the procedures, major findings of the study and conclusions along with certain suggestions for further research.
References


