

**OPINION TOWARDS BLENDED LEARNING AMONG  
SECONDARY STUDENTS AT PERAMBALUR DISTRICT**

**RESEARCH PROJECT**

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Signature of the Principal

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**DECLARATION**

I hereby declare that the research entitled “Opinion towards Blended Learning among Secondary Students at Perambalur District” is a record of original research work done by me as per the SCERT research guidelines and it is not a portion of any other research source, published or unpublished without acknowledgement.

Place: Padalur

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## **CERTIFICATE**

This is to certify that the Research entitled “Opinion towards Blended Learning among Secondary Students at Perambalur District” is the record of original research work done by K. THILAGAM, Lecturer, District Institute of Education and training, Padalur, Perambalur District- 621109 as per the SCERT Action Research Guide lines and it is not a portion of any other research source, published or unpublished without acknowledgement.

**Place: Padalur**

**Principal**

**Date:**

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# CHAPTER I

## CONCEPTUAL FRAMEWORK

*“Education is the creation of sound mind in a sound body.”*

**-Aristotle**

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### 1.1 INTRODUCTION

The rapid advancement in information technology (IT) has made remarkable changes in the traditional educational systems. It adopts modern technology and pedagogical techniques in teaching-learning process and creates a learning environment that motivates the students for better learning. Such a system of learning is mainly based on internet services which facilitate active learning. It disseminates different types of information needed for the holistic development of an individual. Blended learning has emerged as an effect

tive method of learning to meet the needs of students’ learning style. The growth of blended learning environments in education has emphasized the need for better ways of describing and recognizing good teaching that promotes students learning in this environment. Blended learning combines online components with the conventional face-to-face components that optimize best practices in teaching and learning through synchronous and asynchronous learning environments.

“Education is not the amount of information that is put into your brain

and runs riots, then undigested all your life. We must here life building man making and character making assimilation of ideas.”

**-swami Vivekananda**

### **1.1.1 DEFINITION OF EDUCATION**

A famous lawyer, Nani Palkawala pointed out that, “animals can be trained, only human can be Educated”. Education requires personal participation and transformation. It cannot be given by one it must be inwardly appropriated it involves cultivation of the mind not merely with a view to offering it as a commodity for sale in the market place Education, as everyone understands is one of the basic necessities of life. Unless the people in this country are educated, the objectives set out in the preamble of the constitution cannot be achieved. The state thus cannot deprive a person of his right to life with basic human dignity, which includes education.

“Education as a process in which and by which knowledge, character and behavior of the young are shaped and moulded - **Drever**

“Education is the consciously controlled process whereby changes in behavior are produced in the person and through the person within the group”  
**-Brown**

“Education may be defined as a systematic process of determining the extent in instructional objectives is achieved by pupils”  
**-John W.Best**

“Education is the most powerful weapon which you can use to change the world.”  
**-NelsonMandela**

“The function of education is to teach one to think intensively and to think critically”  
**-Martin Luther King, Jr.**

### **1.1.2 AIMS OF EDUCATION**

Education is one of the basic activities of people in all walks of life. In every walk of life, aims are of unique importance. Without fixing up aims, the work that we take up remains dull and cheerless. In fact, it makes the process lively, and they also provide satisfaction at the end. The field of education is powerful and planned activity. It makes a man quite fit for the society. Therefore, we should try to fix up aims in advance and then make effort to achieve them.

An aim is that predetermined goal which stimulates human activities to achieve it.

“An aim is a foreseen end that gives direction to an activity or motivates behavior”  
**-John Dewey.**

“Good aims are related to real situations of life. They grow out of these situations, and they can be achieved only under these situations”

**-John Dewey.**

### **1.2 NEED OF EDUCATION**

The newborn infant is a helpless human being. He has neither any friend nor an enemy. He is not aware of the social customs and traditions. Not only this, but he is also influenced by the informal and formal agencies of education. But as he grows older, he is influenced by the informal and formal agencies of education. In this way, he develops a sense of responsibility like successfully. In short, education can instill in the child a sense of maturity and responsibility by bringing in him the desired

changes according to his needs and demands of ever-changing society of which he is an integral part.

### **1.3. IMPORTANCE OF EDUCATION**

Education reflects a good civilization. Human civilization has progressed by innovation in education since periods. It spreads awareness in society about how we can be a good social being and help others in our daily life. Also, it removes blanket of ignorance and help people in knowing them their fundamental rights. It helps in imparting moral values which is missing in our youth and needs to be addressed carefully for creating a good society.

### **1.4 BLENDED LEARNING**

Blended Learning is a term increasingly used to describe the way e-learning is being combined with traditional classroom methods and independent study to create a new, hybrid teaching methodology. It represents a much greater change in basic technique than simply adding computers to classrooms; it represents, in many cases, a fundamental change in the way of teachers and students approach in learning experience. It has already produced an offshoot – the flipped classroom – that has quickly become a distinct approach of its shown.

Blended learning (BL) or hybrid learning describes a learning environment that either combines teaching methods, delivery methods, media formats or a mixture of all these. It also refers to the integrated learning activities such as a mixture of online and face-to-face learning. In other words, BL is a mixture of e-learning and traditional types of learning. It is mentioned as the integrated combination of traditional learning with web-based online approaches, the combination of media and tools deployed in an e-learning environment and the combination of several pedagogical approaches. Among the benefits of BL reported by recent research were

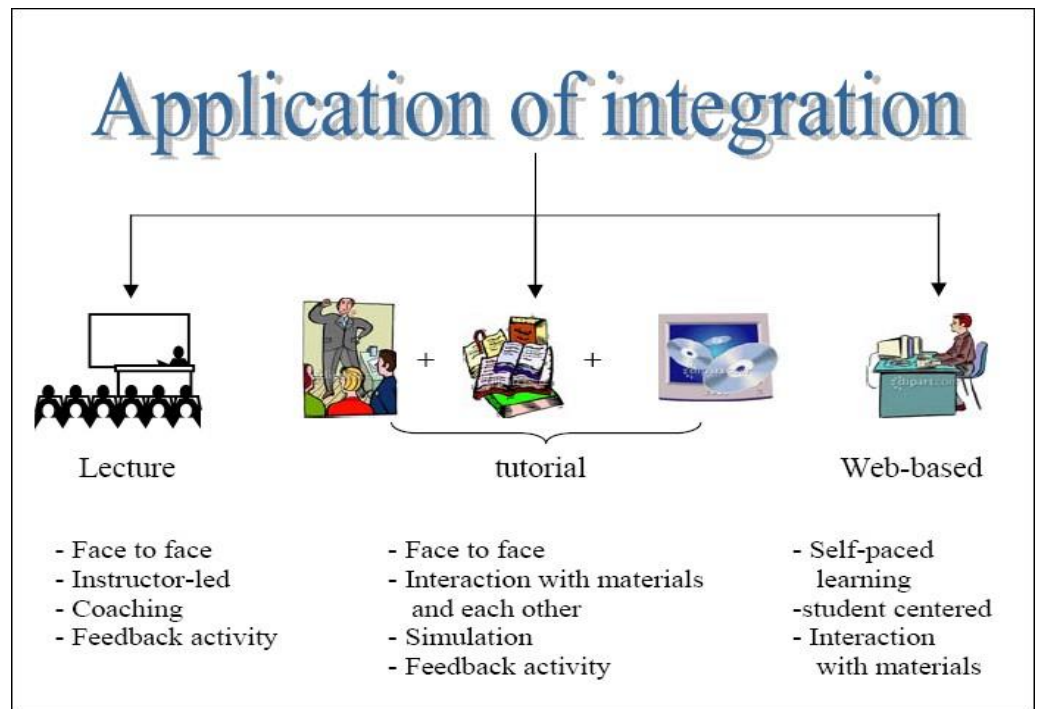
(i) provide students with more control over learning; (ii) help foster critical thinking; (iii) effectiveness of online assessment system and computer tutorials.

#### **1.4.1 OBJECTIVES OF BLENDED LEARNING PROGRAM**

There are varieties of objective for implementing a blended learning program, as follows.

1. To improve the learning effectively, over either pure traditional classroom learning or pure e-learning.
2. To increase the convenience (time, place and so on).
3. Cost savings: The cost savings may result from perhaps reducing the number of instructors.
4. Classroom space savings for the school: The e-learning component of a blended learning program can help ease the classroom space needs by having students learn more from outside the classrooms. The freed-up classroom space can potentially be used for other purposes.
5. To reduce the traffic and parking jamming on the campus.

Figure -1



#### 1.4.2 CHARACTERISTICS OF BLENDED LEARNING

H-learning means that learning requires students to meet for face-to-face classes while providing much of the learning content and interaction online via delivery software and instructional tools. The main characteristics of H-learning can be concluded as:

- **Mixed Mode:** H-learning combines the socialization, group learning and hands-on opportunities of the classroom (face to face) with the learning possibilities of the online environment (U-learning).
- **Student Centered:** Learning shifts from lecture to student-centered instruction.
- **Communications Important:** The key element behind a hybrid learning environment is the scope and nature of the communication channels provided to support learners.

- **Access flexibility:** Blending is used to provide a balance between flexible learning options and knowledge access.
- **Cost-effectiveness:** Hybrid learning provides an opportunity for reaching a large, globally dispersed audience in a short period of time with consistent, semi-personal content delivery.

### **1.4.3 ELEMENTS IN BLENDED LEARNING**

Blended learning includes a combination of computer-based and/or on-line and face-to-face elements, and a mix of formats, media, and methods, so the most appropriate and effective approach can be used for each part of the learning experience.

#### **Formats**

- ✓ You may work face-to-face with students, or they may work independently in a self-paced way.
- ✓ Your conference place could be something like a classroom, community center room, conference hall, computer lab, etc.
- ✓ You and/or your students may work some of the time in a computer lab.
- ✓ You may suggest learners join on-line learning communities and discussions.
- ✓ You may suggest learners attempt Web-based tutorials or activities.

#### **Media**

- ✓ You may utilize CDs, videotapes, audio tapes, books, newspapers, television, radio, on-line chat, computers, Web sites, and games.
- ✓ Some of these media (for example, newspapers or games) are available or usable on-line or as a physical resource.

## **Methods**

- ✓ You may work one-on-one with students.
- ✓ You may set up group projects.
- ✓ You may put different groups together to work on similar topics or projects.

### **1.4.4 DIMENSIONS OF THE BLEND**

The original use of the phrase “Blended Learning” was often associated with simply linking traditional classroom training to e-Learning activities. However, the term has evolved to encompass a much richer set of learning strategy “dimensions.” Today a blended learning program may combine one or more of the following dimensions, although many of these have over-lapping attributes.

**Blending Offline and Online Learning:** At the simplest level, a blended learning experience combines offline and online forms of learning where the online learning usually means “over the Internet or intranet,” and offline learning happens in a more traditional classroom setting. We assume that even the offline learning offerings are managed through an online learning system. An example of this type of blending may include a learning program that provides study materials and research resources over the Web while providing instructor-led, classroom training sessions as the main medium of instruction.

**Blending Self-Paced and Live, Collaborative Learning:** Self-paced learning implies solitary, on-demand learning at a pace that is managed or controlled by the learner. Collaborative learning on the other hand implies a more dynamic communication among many learners that brings about knowledge sharing. The blending of self-paced and collaborative learning may include review of important literature on a regulatory change or new product followed by a moderated; live online,

peer-to-peer discussion of the material's application to the learner's job and customers.

**Blending Structured and Unstructured Learning:** Not all forms of learning imply a pre-meditated, structured or formal learning program with organized content in specific sequence like chapters in a textbook. In fact, most learning in the workplace occurs in an unstructured form such as meetings, hallway conversations, and e-mail. A blended program design may look to capture active conversations and documents from unstructured learning events into knowledge repositories available on-demand, supporting the way knowledge-workers collaborate and work.

**Blending Custom Content with Off-the-Shelf Content:** Off-the-shelf content is generic – unaware of your organization's unique context and requirements. However, generic content is much less expensive to buy and frequently has higher production values than custom content you build yourself. Generic, self-paced content can be customized today with a blend of live experiences (classroom or online) or through content customization. Industry standards such as SCORM (Shareable Courseware Object Reference Model) open the door to greater flexibility in blending off-the-shelf and custom content – improving the user experience while minimizing cost.

**Blending Work and Learning:** Ultimately, the true success and effectiveness of learning in organizations is believed to be associated with the paradigm where work (such as business applications) and learning are inseparable, and where learning is embedded in business processes such as hiring, sales, or product development. Work becomes a source of learning content to be shared and more learning content becomes accessible on-demand and in the context of the user's workplace need.

### 1.4.5 Categories of Blended Learning Systems

There are three categories of blended learning program, as follows.

**Enabling Blends:** Primarily focus on addressing issues of access and convenience—for example, blends that are intended to provide additional flexibility to the learners or blends that attempt to provide the same opportunities or learning experience but through a different modality.

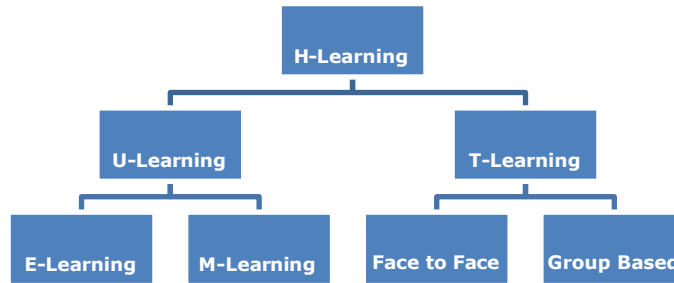
**Enhancing Blends:** Allow incremental changes to the pedagogy but do not radically change the way teaching and learning occur. This can occur at both ends of the spectrum. For example, in a traditional face-to-face learning environment, additional resources and perhaps some supplementary materials may be included online.

**Transforming Blends:** Blends that allow a essential transformation of the pedagogy—for example, a change from a model where learners are just receivers of information to a model where learners actively construct knowledge through dynamic interactions. These types of blends enable intellectual activity that was not practically possible without the technology.

### 1.4.6 ASSOCIATION BETWEEN U-LEARNING AND H-LEARNING

Hybrid learning is a mixture of online and face-to-face learning using a variety of learning resources and communications options available to students and lecturers. In other words, hybrid learning mixes u-learning with traditional type (T-learning: Classroom-based) of learning.

**Figure – II**  
**Description of H-Learning**



Traditional learning (T-Learning) type is classroom-based and offers the learner face-to-face contact and support, in which the major learning modes are instructor-led and group-based. Ubiquitous learning (U-Learning), which can be delivered anywhere, anytime through mobile and handheld devices, provides the online program or resources for learners, in which the main learning modes are self-paced and peer-to-peer. Of course, ubiquitous learning also has the affects that learners may feel isolated that sometimes may affect motivation and student retention. Hybrid learning offers some of the best of both worlds: face-to-face tutor support and contact with peers through the ability of online mobile communication. By practicing hybrid, the conveniences of online courses and mobile learning are gained without the loss of face-to-face contact. So, a learning environment is created that is richer than either a traditional face-to-face environment or a fully online environment. However, it is important to establish the equilibrium between face-to-face education and online mobile environments during the process of organizing hybrid learning environments.

### 1.4.7 Principles of Hybrid Learning

The following seven pedagogical goals for constructivist hybrid learning environments.

1. **Provide experience with the knowledge construction process:** Students created rather than used a multimedia learning environment. They were supposed to collect information from a variety of sources. Relevant information had to be selected, analyzed, and related to their individual prior knowledge. This had then to be structured and edited in accordance with the demands of a web-based learning environment.
2. **Provides experience in appreciation for multiple perspectives:** As students had to acquire declarative knowledge and prepare and edit learning material, they experienced being both in the roles of learners and instructional designers. Furthermore, the media created had to be presented and evaluated in class.
3. **Embed learning in realistic and relevant contexts:** The course dealt with realistic and authentic situations for psychology and education students. Not only did they write a theoretical learning text for the web-based learning environment, but they also had to come forward with practical examples and exercises for their particular topic. The applied principles of instructional design were especially relevant for their future work in schools and other educational institutions.
4. **Encourage ownership and voice in the learning process:** All participants of the course took responsibility for the project. Personal contributions had to be presented and defended in class. Thus, the degree of individual achievement was made apparent during production and at the end, when the learning environment was put online.
5. **Embed learning in social experience:** The project was planned, run, evaluated and modified within an active dialogue in class as well as in small

working groups. Aspects concerning the entity of the web-based learning environment (e.g., the structure and layout of the learning environment) were negotiated in class.

6. **Encourage the use of multiple modes of representation:** Students had to design various learning media: learning texts, different modes of exercises including informative feedback, practical examples, slides, as well as commented links to Internet resources. The specific demands that arise from the character of a certain medium had to be recognized.
7. **Encourage self-awareness in the knowledge construction process:** The process of creating a web-based learning environment was articulated and reflected during the complete period of course. This included continuously working on the personal contributions in small working groups and continuously evaluating the contributions already presented in class. Results of the class evaluations were used to revise the presented contributions.

We expected that pursuing these goals in a hybrid learning course would enable students to engage in active, mindful, and purposeful knowledge acquisition and reflection as well as in the development of critical thinking skills.

#### **1.4.8 DIFFICULTIES TO BLENDED LEARNING**

Despite the advantages, there are some difficulties with blended learning. These can be reduced or overcome. To avoid these points might reduce the quality of teaching in this mode. These might include:

- **Bias:** Some people have difficulty using or accepting teaching methods that are unfamiliar or unconventional. In the case of computer mediated learning, some people cannot use computers well or prefer to avoid using them. Blended learning can be adapted to suit not only the learners but also the teachers.
- **Faculty difficulties:** Faculty compensation and initial difficulties to cope up with the learning requirement to teach in this mode. Not all instructors are as effective in teaching blended courses.

- **Lack of means:** One may not have enough time, money, equipment, etc. E-learning classes cannot function if instructors and students cannot operate the necessary hardware and software. Some schools may not have enough computer rooms for every teacher to use one, a school may not even have computers at all, or a teacher may not have the time or skills to create computer activities for lessons. Lack of time to train on various technological tools.
- **Poor mixes:** Learning methods and tools need to be used well in conjunction with each other. Careful thought needs to go into making a good blend.
- **Computer difficulties:** Students might have different computers with different bandwidth capabilities. Different speed of computers used by the students.

#### **1.5 STATEMENT OF THE PROBLEM:**

The concept of blended learning has been with us for some time and really builds on the good practice of blending teaching and learning styles for the benefit of the learner. The potential of new technologies can be maximized when you see how best to blend e-learning with existing program to the benefit of learners. A present study is entitled **“OPINION TOWARDS BLENDED LEARNING AMONG SECONDARY STUDENTS AT PERAMBALUR DISTRICT.”**

### 1.5.1 OPERATIONAL DEFINITION OF KEY TERMS

- **Opinion:** An Attitude, View, or Outlook about something is generally referred as Opinion
- **Blended Learning:** Blended learning environment integrates the advantages of blended learning method with some advantageous aspects of traditional method, such as face-to-face interaction. Blended learning brings traditional physical classes with elements of virtual education together. The integration of e-learning environment and traditional learning environment may combine ideally the useful aspects of both methods. E- learning environments ensure the flexibility and efficacy which cannot be found in a classroom environment whereas face-to-face learning environment provides the social interaction which is required for learning.

### 1.6 OBJECTIVES OF THE STUDY

The present study is framed with selected objectives, and they are presented below:

- To measure the level opinion towards blended learning among secondary students at perambalur district.
- To find out the significant difference between the mean values of opinion towards blended learning among secondary students based on their gender.
- To find out the significant difference between the mean values of opinion towards blended learning among secondary students based on their locality of the school.
- To find out the significant difference between the mean values of opinion towards blended learning among secondary students based on their parent's income.

## **1.7 HYPOTHESES OF THE STUDY**

Keeping in view the objectivities of the study the following hypotheses have framed as follows:

- The level of opinion towards blended learning among the secondary students at Perambalur district.
- There is no significant difference between the opinion towards blended learning among the secondary students based on their gender.
- There is no significant difference between the opinion towards blended learning among the secondary students based on their locality of the school.
- There is no significant difference between the opinion towards blended learning among the secondary students based on their parent's income.

blende

## **1.8 NEED AND SIGNIFICANCE OF THE STUDY**

Most of the traditional classroom teaching-learning process fails to engage the young learners actively to construct the knowledge. The knowledge is transferred monotonously, and their needs, interests and attitude have never taken into account.

With the advancement of technology, it is possible to revolutionize the way people learn and to present the information to them. Most of the traditional instruction, students learn from the instructor-led approach. Usually in a

traditional classroom setting, students have access to the experts, involved in questions and discussion, exposed to social interaction, and can learn from others. Some students prefer an individualized or less structured environment. In other words, they need self-paced learning material. At the same time, educators are now facing with the challenges of integrating traditional and emerging technology as to balance various students learning styles.

Teachers experience difficulties in teaching their students since they must understand the interest and mood of the students. In certain cases, they need to visualize the picture when applying some hard subject matters. Studies have shown that attitude to be one of other reasons why teaching in traditional method is so difficult. Most of these experimental methods of teaching have not shown that traditional methods can affect students'

attitude towards learning various subjects. It also mentioned that technological aids such as computers have improvement effects on students' attitudes towards education. With the help of the technology, blended learning (BL) makes it easy for students to study and be able to change their attitude towards education. So, the investigator is selected the topic "Opinion towards Blended Learning among Teacher Educators at Perambalur District".

### **1.9 SCOPE OF THE STUDY**

The main scope is to find out the level of opinion of secondary students towards blended learning. The investigator hopes that the findings of the study will provide information about the opinion towards blended learning in each subject among secondary students.

### **1.10 LIMITATION OF THE STUDY**

Even though every attempt has been made to make the study more precise & objective as possible, the investigator in the present study noted a few limitations. The following are the important limitation.

1. The present study was restricted to secondary students of Perambalur District
2. The study was conducted among the secondary school students and not extended to other levels.
3. Even though, teaching being a complex phenomenon, involving a variety of variables, the study had been limited to a few selected variables such as Gender, Locality of the School and Parent's Income.

The next chapter deals about the Review of Related Literature

## **CHAPTER – II**

## **CHAPTER II**

### **REVIEW OF RELATED LITERATURE**

I cannot choose the best, the best chooses me.

- Tagore

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#### **2.1. INTRODUCTION**

The review of related literature is a significant part of research study. This helps the research worker to gather the data and information about what has been done in the area on which she intends to study.

Review of related studies further avoids duplication of effort that has already been done and it helps the investigator to go further deep into the problem in hand. It also helps to study the different facets of the problem. It provides the opportunity of giving an insight into the methods, measures and various other parameters adopted by others which would lead to the improvement of the research design significantly. It is a valuable guide in defining the problem, recognizing its significance, suggesting the promising data gathering devices, appropriate study design and source of data. Hence a review of previous studies in the relevant areas of the present study is attempted here.

**Mouly** (1964) says “Review of related literature avoids the risk of duplications, provides theories, ideas, explanations or hypothesis valuable in formulating the problem and contributes to the general scholarship of the investigator”. The purpose of this chapter is to briefly record the findings of a few research studies conducted in India and abroad on topics that are related to the problem under study. Inferences of the review of related literature also find its place at the end of this chapter.

## **2.2. PURPOSE OF THE REVIEW OF RELATED LITERATURE**

The review of related literature is not without purpose. The following are some of the purposes of the review of related literature.

1. Complete survey of the related literature gives the research necessary insight into the problem. It enables him to put forth vigorously the rationale for the study.
2. It becomes an important part of the introductory part of the thesis.
3. It helps to orient the readers with types of research that have been conducted in the field previously.
4. It widens the horizon of the research.
5. It suggests appropriate method to take the problem under study.
6. It helps in avoiding unnecessary duplication of research by spot lighting the solution of the problem that the researcher desires to undertake.
7. It contributes to the basis for formulating valuable hypothesis.
8. It helps to locate data that can be used in comparative interpretation of results.

## **2.3 CLASSIFICATION OF THE STUDY**

The investigator reviewed forty-two studies out of which eighteen are Indian and twenty-three are foreign studies. In these reviewed studies quasi-experimental and equivalent experimental design were used.

### 2.3.1 RESEARCH STUDIES CONDUCTED IN INDIA

Qasem and Viswanathappa (2016) made a study on entail a positive perception of teachers with the notion of ICT integration using blended learning instruction. With the rapid development of technology-based teaching delivery, it can be argued that the findings of the study showed teachers' satisfaction in terms of experiencing professional development training through blended learning approach. In the context of virtual classroom, learners could access the learning materials regardless of time and space. Thus, the literature discusses that teachers and students are being mediated with ICT through the notion of blended-based instruction. This implies that teachers and students, in blended learning, are both part of the virtual classroom irrespective of geographical separation (Lalima & Dangwal, 2017) and face-to-face classroom meeting.

**Kanchan V. Joshi & Pritesh R. Wadhe (2014)** conducted a study on “Effectiveness of Blended ICT in teaching Science Method to B. Ed. Students”, On the basis of the gained results and personal discussion in the meeting of science method teaches it is concluded that blended ICT teaching is most effective in teaching science method as new web based softwares and high technologies like animation software and photoshop can easily gain by colleges and institutions which can also helps student in understandings various aspects of science method.

**Bright (2014)** conducted a study on the topic “Attitude of perspective Teachers towards Blended Learning”, results that 1. The prospective teachers showed more favorable attitude toward blended learning 2. There existed significant difference in the mean Attitude scores of prospective teachers on the basic of locale, medium of learning and their educational qualification. 3. Female prospective teachers possessed more favorable

attitude towards blended learning that their male counterparts. 4. Urban prospective teachers possessed more favorable attitude that their rural counterparts. 5. Prospective teachers who belong to science subject possessed more favorable attitude that their Arts counterparts. 6. Undergraduates and Post graduates prospective teachers do not differ significantly in their attitude towards blended learning.

**Suman Dalal (2013)** conducted a study on Blended Learning: A New Concept in Education ;Blended Learning offerings are gaining momentum, with good reason. But the issue arises in deciding the balance between online and face-to-face components. There is no unique model and the difficulty resides in identification of the balance point. The balance varies from course to course depending on their instructional goals, student characteristics, instructor background and access to online resources. Therefore it demands high attention on the part of teacher to design learning environment with appropriate ingredients in correct proportion. It is the responsibility of authorities to provide necessary learning support in providing access to online learning so that our student's become 'blended learners' with self-regulatory authentic learning experiences.

**Smith, Judith; Hu, Ran (2010)** conducted a study on "Rethinking Teacher Education: Synchronizing Eastern and Western Views of Teaching and Learning to Promote 21st Century Skills and Global Perspectives". The purpose of the study was to share findings with educators across disciplines of how to incorporate an eastern and western blended philosophy of teaching and learning to promote 21st century skills and global perspectives. Drawing from a previous self-study of their views of teaching and learning between Chinese and American cultures, the two assistant professors investigated how their blended philosophies affected teaching and learning to promote 21st century skills. They found that studying their

own philosophies of teaching and learning heightened awareness of the necessity to incorporate new knowledge of best practices from other cultures.

**Senthil kumar (2008)** conducted study on effectiveness of puzzles and riddles approach in teaching mathematics among VIII standard students in Dindigul District. The major findings were: 1. a) There is a significant difference between pre-test and post-test scores of control group trainees. b) There is a significant difference between pre-test and post-test scores of experimental group trainees. 2. There is no significant difference between pre-test scores of control and experimental group trainees in attainment of knowledge, understanding and application objectives. 3. There is a significant difference between post-test scores of control and experimental group trainees in attainment of knowledge, understanding and application objectives. 4. There is a significant difference between pre-test and post-test scores of the control group trainees in their attainment of knowledge, understanding and application objectives.

**Muralidharan.E (2008)** conducted to study on Attitude towards e-learning among Post Graduate students of Thanjavur District. Survey Research method was adopted in the study. 250 samples were collected randomly from post graduate students of Thanjavur District. The following are the some of the findings of the study; a) the postgraduate students have favorable attitude towards e-learning. b) There is a significant difference between below 23 and above 23 age group of student's attitude towards e-learning. The above 23 age group of students have more favorable attitude towards e-learning then bellow 23 age group of students. c) There is a significant difference between male and female students attitude towards e-learning. The male students have more favorable attitude towards e-

learning than female students. d) There is a significant difference between I year students and II year student's attitude towards e-learning. The II year students have more favorable attitude towards e-learning than I year students. e) There is no significant difference between the arts and science student's attitude towards e-learning. f) There is no significant difference between the rural and urban area students' attitude towards e-learning.

**Porter, Lance J. (2006)** investigated that the instructional utility of a web based progress monitoring system. Objective: This study investigated the effects of a web based progress monitoring system on teacher planning in languages arts and mathematics. Methods: Seventy four teachers in grades 1-8 in mathematics and grades in languages arts participated in the study. The teachers were located in 10 elementary, 3 middle and 2 high schools in a small southeastern school district that serves approximately 11000 students. Teachers were randomly assigned to either a diagnostic feedback or a no diagnostic feedback condition. During an in service, teachers wrote lesson plans for their students for the upcoming week. Teachers with diagnostic feedback had access to class and selected individual student performance data from the web based progress monitoring system. Findings: (1) Results suggest that the diagnostic feedback contained in the web based progress monitoring system may affect teacher planning for modified instruction for individual students. (2) No differences were noted for whole-class planning.

**Thiyagu.K (2006)** conducted a study on the effectiveness of web-based instruction in learning mathematics education among teacher trainees. The major findings were: There is significant difference in mean achievement scores between the students taught through traditional method and by taught through web-based instruction. Web based instruction has brought about positive impact on learning out comes. There is no significant

difference in achievement scores between the experimental boys and control boys. And there is significant difference in achievement scores between the experimental girls and control girls. Hence the experimental girls have higher mean scores than the control group girls. There is no significant difference in achievement scores between the experimental and control group students based on their age below 25. and there is significant difference in achievement scores between the experimental and control group students based on their age above 25. There is no significant difference in achievement scores between the experimental arts students and control arts students.

**Hantis and Amal R.A (2002)** investigated on computer assisted Instruction on Achievement in Science” Vol.40. Indian Education Abstracts Vol.5 Jan and July 2005. Objectives: To find out the effect of computer Assisted Instructions (CAI) on achievement in four units in Bio (Zoology) among Higher secondary students. Methodology: The study was an experimental research the design of the study was the pre-post equivalent group one. The study used purposive Random sampling, out of the two Government Higher secondary schools in Krishnagiri. One was selected as control group and another experimental group. Sample: The control group and another the experimental group was 34 and 31 students respectively. All the students studying in Bio (Zoology) at class XI level were selected as the sample for the study. Tools: Percentage correlation and t-test were calculated to analyze the data. Findings: CAI students scored significantly higher marks over the control group students.

**Tatana M. Olson and Robbert A. Wisner (2002)** studied the effectiveness of web based instruction: An initial inquiry. The study revealed that as the use of web based instruction increases in the educational and training domains many people have recognized the

importance of evaluating its effects on student outcomes such as learning, performance, and satisfaction. Objection: To compare to those of conventional classroom instruction in order to determine which method is better. Method: Major differences in technology and presentation rather than instructional content can obscure the true relationship between web-based instruction and these outcomes. Computer based instruction with more features similar to web based instruction may be more appropriate benchmark than conventional classroom instruction. Finding: A tabulation of the documented findings into eight characteristics is offered along with their assessments of experimental designs, effect sizes and the degree to which the evaluations incorporated features unique to web based instruction.

**Wallace and Tary L, (2002)** examined reducing face-to-face instructor contact time with web based and web enhanced instruction: An examination of achievement and attitudes of undergraduate students in a pre-service teacher education course. Objective: To examine the differences in achievement and attitudes between groups experiencing either traditional instructional class time or reduced class time supported by web delivered instruction. Method: The research hypothesis tested was that no difference in achievement or attitudes will be observed between students receiving reduced class time with web delivered instruction and those receiving traditional instructional class times. University professors, in advancing their carriers, are evaluated with respect to teaching, research, and service activities. Concerns or accountability focus attention on the quality of instruction, and student's ratings are often used in evaluating classroom instruction. Professors must deliver quality instruction to retain their position in the faculty while at the same time conducting research that will merit publication or financial grants for the institution and support their candidacy for tenure.

**Thomas Janicki and Jens O.Liegle, (2001)** studied Development and Evaluation of a framework for creating web based learning modules: A pedagogical and systems perspective. Objective: To merge theories from the instructional design and web-based design researchers in a framework for more effective web-based tutorials. Method: To test the effectiveness of this model, a prototype computer system is developed. This system named WeBTAS (web-Based Tutoring Authoring System) is reviewed by two different panels of educators. Finding: These panels report that the prototype system does promote five different learning principles as part of the authoring process.

**Oblender (2001)** Today's high school student often has the maturity and technical expertise necessary to participate in e-learning experiences. However, students of this age frequently require the support of a teacher in a classroom. Blended learning combines the best of both worlds for high school students: the fluidity of using Internet resources and the reassurance of face-to-face experiences. It extends learning beyond the classroom, and expands the breadth of courses offerings, while providing the personal support and encouragement from a teacher still necessary for many students. The following paragraphs describe the effectiveness of blended learning, how to successfully achieve blended learning in a high school environment and provide specific examples for teachers.

### 2.3.2 RESEARCH STUDIES CONDUCTED ABROAD

**Holmes and Prieto-Rodriguez (2018)** conducted a study , where mix research method was employed to examine the perceptions of academic staff and students on various Learning Management System (LMS) in terms of effectiveness in teaching and learning, and the affordances it can bring, such as accessibility and interactivity. Findings revealed that the most effective element of LMS in course learning for teachers are: access to course materials; recorded face-to-face lectures; course blogs or wikis; and online discussion. These mean that the results for LMS effectiveness in terms of accessibility in teaching and learning revealed a statistically different response for academic staff and students. However, there is no significant difference in relation to LMS interactivity. The results provide a significant understanding in terms of faculty and student perceptions towards blended learning. The use of mix methods in this study allows to integrate the data of inquiry to provide a visual picture both in quantitative and qualitative research method (Creswell, 2014).

**Albiladi & Alshareef, 2019;** studies have shown that not all faculty members are inclined towards blended-based instruction (**Benson et al., 2011**). Some still considered the use of ICT as “time-consuming” (**Benson et al., 2011, p.148**). For example, it was revealed that preparations for lecture or teaching materials design and development on web-based platform require more time than face-to-face interaction. Some believe that the use of hybrid approach is more rigorous when it comes to teaching and learning preparations. This explains the idea presented by Ma'arop and Embi (2016) where they described blended learning as a burden, both physically and cognitively. Meaning, educators see the need to spend more time like designing the course platform, uploading of instructional

materials, answering queries and evaluating students' online outputs. Thus, it increases their workload, such as the time required (Alebaikan & Troudi, 2010).

**Oliver, Kevin M.; Stallings, Dallas T. Jan (2014)** conducted research on the topic "Preparing Teachers for Emerging Blended Learning Environments". Blended learning environments that merge learning strategies, resources, and modes have been implemented in higher education settings for nearly two decades, and research has identified many positive effects. More recently, K-12 traditional and charter schools have begun to experiment with blended learning, but to date, research on the effects of and issues related to blending in these settings has been limited, and the results less clear. In this article, we draw from relevant published research, reports, and book chapters from higher education and K-12 to discuss what K-12 teachers should know about blended learning environments. This review suggests that effective teacher preparation for blended instruction must integrate three broad components--"contextual," "instructional," and "technological"--each of which is closely aligned with common instructional design processes familiar to most teachers.

**Yang, Yu-Fen (2014)** conducted a study on "Preparing Language Teachers for Blended Teaching of Summary Writing" Research on preparing language teachers for blended teaching of summary writing; a mix of on-site and online instruction for college students to grasp the gist of the texts is scarce in higher education. The findings of this study are based on content analyses of the teachers' interview transcripts, the teachers' observation of college students' progress in on-site and online instruction, and the interactions among the students recorded in the log files of the online

system. The results show that the language teachers' problems in blended teaching of summary writing fell into three categories: instructional processes, community concerns, and technical issues. The four main themes that emerged from the three categories include the following: (1) the changing roles of the teachers and students, (2) little sense of community building, (3) lack of training in blended teaching of summary writing, and (4) an unfamiliarity with the new systems or technologies. The language teachers' perspectives on solving these problems were to (1) distinguish the significant differences between on-site and online language teaching contexts, (2) identify strategies and techniques to facilitate students' blended learning in summary writing, and (3) develop community building skills to encourage teachers and students to actively participate in collaborative learning. These solutions shed light on the preparation of language teachers in blended teaching of summary writing.

**Bicen, Hüseyin; Ozdamli, Fezile; Uzunboylu, Hüseyin (2013)** conducted a research on the topic “Online and Blended Learning Approach on Instructional Multimedia Development Courses in Teacher Education”. In this study, an e-learning environment was designed for teacher candidates. Teacher candidates developed multimedia-based projects by means of multimedia tools. This research aims to determine the effects of online and blended learning approaches on the success level of multimedia projects and the teacher candidates' attitudes, opinions and perceptions on e-learning. This study used a combination of qualitative and quantitative methods. There were two different groups in the study: online and blended groups. The online and the blended groups consisted of 30 and 32 teacher candidates, respectively. Teacher candidates in the blended group developed multimedia-based projects and shared information communicating in a WiziQ and Facebook environment with their peers and

instructors when they were not at school. On the other hand, the teacher candidates in the online group communicated with their instructors and peers only in a WiziQ and Facebook environment. The results showed that the blended learning approach was more effective than the online learning approach. The usability of online learning and blended learning in higher education is addressed in recommendations for future research and practice.

**Torris-Steele & Geraldine (2012)** The Literature landscape of Blended learning higher education: The Need of better understanding of academic blended practice: If we are to realize the potential of blended learning in higher education, then further research into academic practice and relevant academic development is essential.

**Napier, Nannette P.; Dekhane, Sonal and Smith, Stella (2011)** conducted a study on “Transitioning to Blended Learning: Understanding Student and Faculty Perceptions”, This paper describes the conversion of an introductory computing course to the blended learning model at a small, public liberal arts college. Blended learning significantly reduces face-to-face instruction by incorporating rich, online learning experiences. To assess the impact of blended learning on students, survey data was collected at the midpoint and end of semester, and student performance on the final exam was compared in traditional and blended learning sections. To capture faculty perspectives on teaching blended learning courses, written reflections and discussions from faculty teaching blended learning sections were analyzed. Results indicate that student performance in the traditional and blended learning sections of the course were comparable and that students reported high levels of interaction with their instructor. Faculty teaching the course share insights on transitioning to the blended learning format.

**Lopez-Perez, M. Victoria; Rodriguez-Ariza and Lazaro, (2011)** conducted a study on “Blended Learning in Higher Education: Students' Perceptions and Their Relation to Outcomes, innovative learning environment to stimulate and enhance the teaching and learning process”. In this context, novel educational concepts such as blended learning are being developed. In the present paper, we present the results obtained from a blended learning experience carried out at the University of Granada. A total of 17 groups took part, with 1431 students registered for the 2009-2010 academic year. In this study, we use objective outcomes and the students' perceptions regarding the blended learning activities performed. The study shows that the use of blended learning has a positive effect in reducing dropout rates and in improving exam marks. Moreover, the students' perceptions on blended learning are interrelated, with their final marks depending on the blended learning activities, and on the students' age, background and class attendance rate.

**Kocoglu, Zeynep; Ozek, Yesim; Kesli, Yesim (2011)** conducted a study on “Although the benefits of blended learning have been well documented in educational research, relatively few studies have examined blended learning in language teacher education. This study discusses a blended learning approach for a teacher training program designed for in-service English language teachers, and investigates its effectiveness by comparing with a face to face MA Program in English Language teaching. The research involved 39 in-service English language teachers, with 12 studying in a blended course (i.e., they received face to face instruction in the classroom and used web-based materials) and 27 in a traditional classroom. Results indicated that there was no difference in content knowledge acquisition between teachers receiving blended instruction and teachers receiving face to face instruction.

**Wu, Jen-Her and Tennyson, Robert D.; Hsia and Tzyh-Lih (2010)** conducted a study on “A Study of Student Satisfaction in a Blended E-Learning System Environment”, This study proposes a research model that examines the determinants of student learning satisfaction in a blended e-learning system (BELS) environment, based on social cognitive theory. The research model is tested using a questionnaire survey of 212 participants. Confirmatory factor analysis (CFA) was performed to test the reliability and validity of the measurements. The partial least squares (PLS) method was used to validate the measurement and hypotheses. The empirical findings indicate that computer self-efficacy, performance expectations, system functionality, content feature, interaction, and learning climate are the primary determinants of student learning satisfaction with BELS. The results also show that learning climate and performance expectations significantly affect learning satisfaction. Computer self-efficacy, system functionality, content feature and interaction significantly affect performance expectations. Interaction has a significant effect on learning climate. The findings provide insight into those factors that are likely significant antecedents for planning and implementing a blended e-learning system to enhance student learning satisfaction.

**Shroff, Ronnie H.; Vogel and Douglas R. (2010)** conducted a study on “An Investigation on Individual Students' Perceptions of Interest Utilizing a Blended Learning Approach, learning and academic achievement”. However, little is known about the impact of a blended learning approach on individual student interest and whether combinations of online and face-to-face learning activities significantly enhance student interest. This paper assesses the effect of blended learning on perceived individual student interest, utilizing a blend of online and face-to-face discussions. The study employed a quasi-experimental design consisting of two different treatment

groups, online discussions versus face-to-face discussions. Data were analyzed using the t-test technique. Results from the study suggest that there was no statistical difference in subjects' perception of interest in both the online and face-to-face discussions. However, from observation, subjects in the online discussions were eager to engage in textual dialogue and therefore, participated more in the discussions compared to the face-to-face discussions.

**Shaw and Joanna G. (2010)** conducted a study on “A Study of Students' Perceptions of Blended Learning Environments at a State-Supported Postsecondary Institution”, The purpose of this study was to conduct exploratory research regarding students' perceptions of blended learning environments at a state supported postsecondary institution. Specifically investigated were students' overall perceptions of blended learning environments, the reasons they chose to take a blended course, and whether generational differences existed in students' affected perceptions. An electronic survey was distributed to students enrolled in blended learning courses at the end of the spring 2009 term.

**Pape and Liz (2009)** conducted a study on “Blended Teaching and Learning”, "Blended learning" is using online tools to communicate, collaborate, and publish, to extend the school day or year and to develop the 21st-century skills students need. With blended learning, teachers can use online tools and resources as part of their daily classroom instruction. Using many of the online tools and resources students already are using for social networking, blended teaching helps teachers find an approach that is more engaging for this generation of students. The benefits of blended learning include giving students a variety of ways to demonstrate their knowledge while appealing to diverse learning styles and fostering independent learning and self-directed learning skills in students, a critical

capacity for lifelong learners. Blended learning incorporates online tools into students' toolkits, which in the past have consisted of notebooks, paper assignments, and "stand and deliver" classroom presentations. This expanded toolkit helps students better develop their higher education and workforce skills. Blended learning extends teaching and learning beyond the classroom walls, developing critical thinking, problem solving, communication, collaboration, and global awareness. In this article, the author identifies the approaches and the benefits of blended instruction.

**Van Rosmalen, P., (2008)** explained that the introduction of e-Learning often leads to an increase in the time staff spends on tutoring. To alleviate the workload of staff tutors, we developed a model for organizing and supporting learner-related interactions in e-Learning systems. It makes use of the knowledge and experience of peers and builds on the assumption that (lifelong) learner, when instructed and assisted carefully, should be able to assist each other. The model operates at two levels. At level 1, prospective peer tutors are identified, based on a combination of workload and competency indicators. At level 2, the thus identified prospective peer tutors become the actual tutors; this is performed by empowering them with tools and guidelines for the task at hand. The article will situate the model in networks for lifelong learning. For one kind of interactions, answering content-related questions, we will review a set of existing approaches and emerging technologies and describe our model. Finally, we will describe and discuss the results of a simulation of a prototype of the model and discuss to what extent it matches our requirements.

**So, Hyo-Jeong; Brush and Thomas A. (2008)** conducted a study on "Student Perceptions of Collaborative Learning, Social Presence and Satisfaction in a Blended Learning Environment: Relationships and Critical Factors", The purpose of this study was to examine the relationships of the

students' perceived levels of collaborative learning, social presence and overall satisfaction in a blended learning environment. This research studied the relationship of these three variables and identified critical factors related to them. The participants were 48 graduate students who took a blended-format course in health education and worked on a collaborative group project related to the development of a comprehensive HIV-AIDS prevention plan. Data was collected from the Student Perception Questionnaire and face-to-face interviews. The analysis of quantitative data indicated that student perceptions of collaborative learning have statistically positive relationships with perceptions of social presence and satisfaction. This means that students who perceived high levels of collaborative learning tended to be more satisfied with their distance course than those who perceived low levels of collaborative learning. Similarly, students with high perceptions of collaborative learning perceived high levels of social presence as well. Surprisingly, the relationship between social presence and overall satisfaction was positive but not statistically significant.

**Mouzak and Charalambos(2008)** conducted a study on “Teachers' Perceptions of the Effectiveness of a Blended Learning Approach for ICT Teacher Training”, effectiveness of the European Pedagogic ICT License pilot test in Greece. A total of 51 primary and secondary education teachers participated in the study, immediately following the blended training course. Data were gathered using both quantitative and qualitative research techniques such as a questionnaire, a semi-constructed interview, and a focus group discussion. Five main scales, based on the current online and blended learning literature, were identified to assess the effectiveness of the blended training process. These scales were (a) the learning process, (b) the facilitator's support, (c) the material, (d) the collaboration, and (e) the technology. In addition, a scale of satisfaction was included to measure the

overall teachers' perception of the course effectiveness. The findings indicated that the teachers were satisfied with both their participation to the course and the knowledge they acquired from the training. The results also emerged a number of issues that would improve the effectiveness of the EPICT course.

**Blankson, Joseph; Kyei-Blankson and Lydia (2008)** conducted a study on “Non-traditional Students' Perception of a Blended Course: Integrating Synchronous Online Discussion and Face-to-Face Instruction”, Nontraditional students are rapidly becoming the majority group on campuses across America. These students are often hard pressed for time and in order to provide them with equal learning opportunities many universities and colleges are currently responding by offering classes using a variety of delivery methods and formats. In this study, synchronous online discussions were integrated with traditional face-to-face instruction in an undergraduate educational psychology course offered mostly to nontraditional students. The purpose of the study was to examine nontraditional students' perception of this "blended" course. Specifically, the study sought to find out the extent to which students' were satisfied with their learning experience. Students' perception was assessed by way of a survey that consisted of Likert-scale and open-ended items. Results generated from the surveys suggest that students were generally satisfied with the course format. For nontraditional students, synchronous online discussions may enhance interaction, collaboration, active learning as well as equal learning opportunities. Furthermore, combining online and face-to-face discussions could ensure more productive use of class time for higher education courses scheduled for short durations.

**Lee, Chun-Hsiung; Yeh, Dowming; Kung, Regina J.; Hsu and Chin-Shan (2007)** conducted a study on “The Influences of Learning Portfolios

and Attitudes on Learning Effects in Blended E-Learning for Mathematics’, This study mainly investigates the factors affecting the learning effects in a blended e-Learning course for Mathematics. The research targets of this study are 48 junior high school students. After they had received traditional lessons in class as well as the accompanied e-Learning lessons, the influences of their learning portfolios and learning attitude on the examination scores were studied. Multiple linear regression analysis is employed to conduct data analysis. From the standardized regression model, it is discovered that the main factors affecting the examination scores of students in their learning portfolios are online test, number of hours of reading, and the learning attitude. Moreover, no significant difference is found between male and female students in the aspects of their examination scores, learning attitudes, and learning portfolios. The findings can be helpful for teachers to improve the instruction strategies in Blended e-Learning.

**Lam, Paul and Carmel (2007)** describes the evaluation of purpose-built course websites for university-level teaching and learning developed by a funded project (e3Learning, e3L) in Hong Kong, which was designed to support teachers in three universities to supplement classroom teaching with e-Learning. Previous articles on the e3L project have described the customized, flexible nature of the large number of evaluations conducted in the period 2003-2005. This article concentrates on the procedural mechanisms and management strategies that have considerably facilitated the process and guaranteed the continued quality of the evaluations. The mechanisms and strategies incorporated have ensured externally good communication between the evaluation team and the teachers, and internally a smooth-running workflow in which the responsibility of each member in the evaluation team is well defined. Evidence is presented of the benefits of this model of, and strategies for, evaluation.

**Sinclair, Margaret; Owston and Ron,(2006)** conducted a study on “Teacher Professional Development in Mathematics and Science: A Blended Learning Approach”, Blended learning is a promising model for supporting teacher professional development that combines the advantages of traditional face-to-face interaction with the flexibility of online learning. In this study, we examine the impact of two one-year blended learning programs on teachers' attitudes, knowledge, and classroom practices. These professional development programs were designed to enhance middle school teachers' subject matter knowledge and pedagogical skills in mathematics and science/technology. Our results indicate that the programs positively affected teacher attitudes and content knowledge in these curricular areas and motivated many teachers to transform their classroom practices. Increased teacher collaboration and involvement at the school level suggest that the experiences contributed to the emergence of fledgling communities of practice. At the same time, the lack of cohesion in online groups and the drop off in participation suggest the need to rethink some aspects of the design of blended learning environments.

**Bassoppo-Moyo and Temba (2006)** examines e-Learning from three related perspectives: (1) Current and recommended front-end approaches to improving online instruction; (2) The planning, implementation and administration of online courses; (3) The reliable and valid approaches to online measurement and testing methods that are designed to eliminate such problems as plagiarism, technical problems associated with access, matching learners' and instructors' technical skill levels, learner isolation, and the impersonality of computerized assessment. The study also examines how instructors and instructional designers can maximize control over assessment conditions, and yet at the same time increase online instruments validity and reliability and address issues that are administrative in nature. Future cutting edge assessment of learning

outcomes techniques are discussed in regard to how they may affect online, instructional design and technology application strategies. The second part of this paper examines the assessment and evaluation of learning outcomes in an e-Learning environment.

**Innes, Anthea., (2006)** explores the opportunities and drawbacks of e-Learning from the viewpoints of educators and learners. A postgraduate dementia studies programme provides the basis for reflection on the use of a blended learning approach utilizing web-based learning. Those who register for the programme are employed in different health and social care settings and have varied roles, but all have a desire to improve their knowledge and skills within a field where continuing professional development is currently limited. The paper outlines the main debates around e-Learning and describes the programme itself. It then focuses on three key themes. First the challenges for educators, in terms of cost and quality, in developing and delivering an online curriculum. Second the flexibility of the structure and learning methods for students. Third how student support was developed using the concept of a learning community. It concludes by summarizing the strengths and challenges of this mode of learning for students and the key lessons learned by the educators.

**Challis and Di (2005)** discusses the advances in computer based technologies and the emergence of e-Learning, there are unprecedented opportunities to reconsider assessment of learning (and, axiomatically, of teaching) and how this can be undertaken. One approach is adaptive assessment. Although it has existed in the tertiary environment since the time of the oral examination, advanced technologies allow much fuller exploitation of the possibilities inherent in a dynamic system of testing that responds to the user. Having described the characteristics of adaptive assessment, this paper considers how it can achieve significant pedagogical aims within the sector. The paper differentiates between adaptive

assessment to assist learning and adaptive assessment to assess achievement. How adaptive assessment can be put in place and salient issues, such as security and system integrity, when such assessment is used for credit, are then discussed. The paper concludes that the capability exists but it has yet to be exploited within higher education as a viable approach to assessment and as a contributor to quality learning.

**Kurubacak and Gulsun (2005)** studied that in the 21st century, there is a new paradigms shift from traditional distance education approaches to network -based e-Learning understandings in universities and colleges. Therefore, economy (cost effectiveness and efficiency), technology (communication technologies) and equity (gender, accessibility, minority, language, religion etc.) are vital issues in distance education systems. Moreover, how faculty-learners equally share knowledge for educational purposes and how they can enhance their partnerships are major concerns in online learning at higher education. The main purpose of this study is to define and analyze the online experiences of faculty and learners toward sharing knowledge in open and distance learning milieus to create a virtual community in Colleges. Therefore, it will be investigated their positive and negative experiences in virtual educational milieus.

**Kurubacak, Gulsun and Yuzer (2004)** explain that in the 21st century, there is new paradigms shift from traditional distance education approaches to network-based e-Learning understandings. In considering how best to optimize distance education systems, economy (cost effectiveness and efficiency), technology (communication technologies) and equity (gender, accessibility, minority, language, religion etc.) are vital issues in any distance education systems. Kurubacak and Yuzer strongly emphasize that interactive radio programs, a forgotten educational media, with a little cost can effectively integrate in any distance education systems. Therefore, the

main purpose of this paper is to focus on interactive radio programs to build critical and creative knowledge networks among diverse learners in distance education systems.

**Morales, Romelia V.; Anderson, Hal; McGowan, and John (2003)** conducted a study on Mathematics Pedagogy and Content in a Blended Teacher Education Program. Recently, the Department of Teacher Education and the Liberal Studies Program in the School of Education at California State University, Dominguez Hills (CSUDH) collaborated in developing a Blended Liberal Studies/Teacher Education Program (BLTEP) for upper division transfer students interested in completing an elementary credential. The BLTEP curriculum blends the regular Liberal Studies Program with the elementary credential program. Students take both subject matter and pedagogy courses concurrently, as well as a set of blended content and pedagogy courses in science, social science, and mathematics. This article details the curriculum development process of the blended mathematics course, "LBS 360 Math Content and Methods." The content in this course combines the study of real numbers and problem solving with pedagogy for teaching math content to elementary-aged students. The blending of content and pedagogy is described, along with a discussion of specific issues related to blending of disciplinary and professional studies in a teacher preparation program. The idea for the blended math course came about as a result of a collaborative effort of a professor in the Mathematics Department at CSUDH, a professor in the Teacher Education Multiple Subject Credential program, and the coordinator of the BLTEP. The motivation for blending the mathematics content and methods courses came from the instructors' belief that learning mathematics content while at the same time learning how to teach it would deepen prospective teachers' understanding of content and alert prospective.

teachers to those aspects of mathematics that may be confusing to the elementary students they will eventually teach.

**Fox, Seamus and Kay (2003)** explain that while numerous claims have been made for the pedagogical benefits of e-Learning, these claims are rarely subjected to rigorous empirical evaluation. Moreover, there are indications that e-Learning is more expensive to deliver than conventional distance teaching. One component of this extra cost arises from the greater time input required of teachers/tutors in e-Learning environments. This article evaluates a number of online pedagogical techniques which offer the potential to enhance student learning of higher-order cognitive skills while limiting demands on tutor time. The online techniques tested were resources/debates and peer-tutoring. Evaluation of the learning of higher-order skills was carried out through analysis of students' contributions to a series of online discussions. This evaluation suggests that, given the appropriate pedagogical design, students can develop effective ways of conducting online discussions which display evidence of engaging in higher-order learning. In addition, the online pedagogical techniques did not appear to make excessive demands on tutor time. However, further work is required before a more definitive statement can be made about the potential of e-Learning to enhance higher-order learning with reasonable levels of tutor input. The conclusions of the article will include an outline of the directions of this further work.

**Keegan and Desmond (2002)** said that the future of electronic learning was explored in an analysis that viewed the provision of learning at a distance as a continuum and traced the evolution from distance learning to electronic learning to mobile learning in Europe and elsewhere. Special attention was paid to the following topics: (1) the impact of the industrial revolution, the electronics revolution of the 1980s, and the mobile

revolution of the late 20th century on education and training; (2) the distance education strategies and techniques that constitute the foundation for the success of mobile learning; (3) the worldwide spread of electronic learning and arrival of mobile learning; (4) mobile learning initiatives and attempts to provide theoretical constructs for mobile learning; (5) mobile learning on screen phones, on personal digital assistants (PDAs), smart phones, and wireless application protocol (WAP) telephones; and (6) student use of mobile learning. The differences between individual students' acceptance of the new electronic technologies were generally related to their different learning styles and study preferences. Mobile learning, especially mobile learning involving mobile telephony was seen as becoming a new sector of education and training provision whose future depends on solving the problems inherent in presenting training scenarios on mobile telephones.

**Muhlhauser, Max and Trompler Christoph (2002)** explained that in the transition from traditional teaching and learning to e-Learning, the authors advocate avoiding disruptive approaches. The authors claim that many virtual university and corporate university efforts worldwide try to showcase big leaps forward, yet lack sustainability, suffer from in-vitro conditions, and leave behind the big mass of teachers. The Digital Lecture Halls (DLH) project accommodates traditional teaching and learning styles, making them digitally available for computer assistance. It also reaches out to a large variety of computer-assisted methods and to accompanying new organizational and business models. Apart from this non-disruptive approach, DLH also focuses on large venues. In contrast to known electronic classroom efforts that are limited to about 25 local participants, audiences without size limits are supported in DLH. The first implementations support 150 and 1000 participants. The paper describes

the general DLH approach and architecture as well as details of the learners-in-the-loop components.

**Ryan, Malcolm and Hall, Lynda (2001)** explained that although it has yet to make a major impact on education and training in the United Kingdom, interest in e-Learning is growing. To facilitate e-Learning, a Virtual Learning Environment (VLE) is usually employed containing four main elements: courseware (self study learning materials, simulations, multimedia components); supporting materials (reference materials such as articles, case studies, books, World Wide Web links); online assessment (both formative and summative tests, quizzes and assignments); online support (via e-mail, computer mediated communication, chat rooms, bulletin boards).

#### **2.4 CRITICAL REVIEW**

In the present study the investigator has reviewed nearly forty-two studies in which most of the studies were based on web-based education and learning through Blended Learning. The outcome of most of the studies shows that learning situations in web-based and blended learning is higher than the learning outcome of traditional methods.

The next chapter deals with the Methodology.

## **CHAPTER III**

### **METHODOLOGY**

#### **3.1 INTRODUCTION**

“A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure.”

**-Claire Selltiz**

In this information age, computers are used as personal productivity tools and for entertainment. The information age has also brought us a new way of “knowing, responding, and using” the various academic disciplines that we study in school. It has shrunk our world and is helping to create a global village. It has change business, industry, government, and education. The computer’s role as a “mind” tool has further fueled change in the information Age. The information age has challenged our educational system. It has complicated the functions of teacher education and curriculum development. Our educational system is massive institution deeply rooted in the history and traditions of our nation, and thus, it is slow to change. It was not designed to deal with the rapid and continued pace of change in educational technology.

This chapter describes in detail the design of the study, tools used for the study, nature and the selection of sample and brief description of the procedure adopted for the collection of data for its scoring and classification is dealt with. Choosing a design for a study basically involves selecting the most appropriate methods of techniques to solve the problem under investigation. Finally, the proposed statistical treatment of the data for testing the hypotheses that were formulated is explained.

### 3.2 RESEARCH DESIGN OF THE STUDY

In this study of differential research design and correlation design are used to investigate the “OPINION TOWARDS BLENDED LEARNING AMONG SECONDARY STUDENTS AT PERAMBALUR DISTRICT”. The detailed schematic representation of design of the study is tabulated below.

**Table 3.1**  
**SCHEMATIC REPRESENTATION OF THE SURVEY DESIGN**

| S.NO | CLASSIFICATION                   | DESCRIPTION  |
|------|----------------------------------|--|
| 1    | Nature of the study              | Survey Study   |
| 2    | Sampling<br>a).Design<br>b).Size | a).Random Sampling Technique<br>b). 100 Secondary students                     |
| 3    | Tool Used                        | The tool “Opinion Towards Blended Learning” was developed by the investigator. |
| 4    | Variables                        | a. Gender<br>b. Locality of the school<br>c. Parent’s Income                   |
| 5    | Statistical techniques used      | a. Mean<br>b. Standard deviation<br>c. ‘t’ test                                |

### **3.3 OBJECTIVES OF THE STUDY**

The objectives of the study are given below:

- To measure the level of opinion towards blended learning among secondary students at Perambalur district.
- To find out the significant difference between the mean values of opinion towards blended learning among secondary students based on their gender.
- To find out the significant difference between the mean values of opinion towards blended learning among secondary students based on their locality of the school.
- To find out the significant difference between the mean values of opinion towards blended learning among secondary students based on their parent's income.

### **3.4 HYPOTHESES OF THE STUDY**

Keeping in view the objectivities of the study the following hypotheses have framed as follows:

- The level of opinion towards blended learning among the secondary students at Perambalur district.
- There is no significant difference between the opinion towards blended learning among secondary students based on their gender.
- There is no significant difference between the opinion towards blended learning among secondary students based on their locality of the school.

- There is no significant difference between the opinion towards blended learning among secondary students based on their parent's income.

### **3.5 METHOD ADOPTED IN THE PRESENT STUDY**

**Best (1989)** defines the survey method as one that is concerned with the conditions or relationship that exists. Practices, that prevail views on attitudes that are held; process that, are going on: effects that are being felt: or trends that are developed. The survey research gives maximum contribution when it organized from a problem existing with the framework of theory and when it is oriented towards the identification of factors and relationships worthy of investigations under controlled conditions.

In the present study, the investigator has employed the 'survey method'. Survey method is a method for collecting and analyzing data, obtained from large number of respondents representing a specific population collected through highly structured and detailed questionnaire or other techniques. This method is useful for developmental studies where the current problems are described, as at present.

#### **3.5.1. Characteristics of Survey**

- It deals with a representative sample of a population. Sample selection must be conducted in such a way that the data collected in the survey will enable us to describe and generalize about the entire population. The sample must be selected in such a way that every member of the population has an equal chance of being selected. The only we can say the sample is unbiased.

- It seeks the responses directly from the respondents. There is always a direct interaction between respondents and instruments.
- Sincere survey usually is based on representative sample of population.
- Survey is conducted in the natural setting.

### **3.6. SAMPLE SELECTED FOR THE STUDY**

#### **3.6.1 POPULATION OF THE STUDY**

In this study, the secondary students those who studied in GHS and GHSS schools located in Perambalur District, Tamil Nadu have been taken as the population for the study. The overall population of secondary students at Perambalur district is more than **5000**. It is impossible to collect details from all the secondary students. For present study the investigator has collected details from 100 secondary students through Random sampling method.

### **3.6.2 SAMPLE DESIGN AND SIZE**

A sample is a small proportion of a population selected for observation and analysis. According to **Sukhia et al;** (1966) "A good sample of population is the one within which restriction imposed by its size will produced that characteristics of the population with the greatest possible accuracy". It is not only difficult, but rather impossible to utilize the entire population for the study; therefore, a sample of the whole population is taken for research studies. The validity and reliability of the findings of a study is determined largely by the selection of the sample on which the tool(s) for data collection are administered. The sample selected should represent the population in all its divertible. A good sample must be representative of the entire population for this study, samples has been collected using random sampling technique. The investigator was selected 100 secondary students for the present study.

### **3.7 SAMPLING TECHNIQUE USED**

The present study is adopted with the Random Sampling Technique. Random Sampling is generally the best and simplest way to draw a sample from a population. This method of sampling comes under the probabilistic approach. This method is a subset of individuals (a sample) that are chosen from a larger set (a population).

### **3.7 VARIABLES:**

A variable is a measurable characteristic that varies. It may change from group to group, person to person, or even within one person over time. The sample wise distribution of variables selected is listed below.

Table 3.3

**CLASSIFICATION OF SAMPLES BASED ON VARIABLES**

| <b>S.NO</b> | <b>VARIABLES</b>          |               | <b>NUMBERS</b> | <b>TOTAL</b> |
|-------------|---------------------------|---------------|----------------|--------------|
| 01          | Gender                    | Female        | 50             | 100          |
|             |                           | Male          | 50             |              |
| 02          | Locality Of<br>The school | Rural         | 44             | 100          |
|             |                           | Urban         | 56             |              |
|             |                           | Above 5 Years | 51             |              |
| 03          | Parent's<br>Income        | Below 10,000  | 38             | 100          |
|             |                           | Above 10,000  | 62             |              |

**3.8 TOOL USED FOR THE STUDY**

Tool used to collect the necessary data to achieve the objective of the study “Opinion towards Blended learning among secondary students” developed by the investigator. This test includes 50 statements with regards related to Gender, Locality of the school and Parent’s Income.

**3.8.1 SCORING PROCEDURE**

The tool used to investigate the opinion towards blended learning among secondary students consist of 50 questions which is constructed in four points. The values given for the positive and negative questions are given below:

- Positive score : 4,3,2,1
- Negative score :1,2,3,4

The maximum possible score was 189 and minimum was 132.

**Table 3.4**

**SERIAL NUMBER OF POSITIVE AND NEGATIVE**

| <b>S.NO</b> | <b>Nature of the statement</b> | <b>Item numbers</b>   | <b>Total items</b> |
|-------------|--------------------------------|---|--------------------|
| 1           | Positive statement             | 1,2,4,5,6,7,8,9,10,12,13,14,15,16,18,19,21,22,23,24,29,31,32,34,35,37,38,40,43,44,46,47,48,49 | 34                 |
| 2           | Negative statement             | 3,11,17,20,25,26,27,28,30,33,36,39,41,42,45,50  | 16                 |
| Total       |                                |   | 50                 |

**3.8.2 DATA COLLECTION PROCEDURE**

Collection of data involves the collection of relevant data to the problem under study. For the present study, the investigator collected the data from GHS and GHSS ( Co- education, Boys and Girls school) of Permabalur District. Using the tool developed to find out their opinion towards Blended learning.

Permission from the HM of the schools concerned was obtained to among the High and Higher secondary schools. The questionnaire booklets were distributed to the secondary students, which had been selected for this study. Questionnaires were collected and scored individually.

### **Administration:-**

To start with the following instruction was given while administering the test. The aim of the questionnaire that has been given is to know the level of b-learning perception among the secondary students. There are totally 50 statements, each statement has been given a four point rating scale strongly agree, agree, disagree and strongly disagree. There is no time limit.

### **3.9 PILOT STUDY**

Pilot study was effective in facilitating the final study. It helped the investigator in understanding the problem faced, while doing the research work. The pilot study was conducted on 30 secondary students to establish reliability and validity of research tools used in this used in this study and to streamline the instruction to be given for each test.

### **3.10 VALIDITY OF THE TOOL**

Validity is the most critical criterion, and it indicated the degree to which an instrument measures what it is supposed to be measure. In this investigation the tool was submitted to the panel of experts. They scrutinized the developed tools, and their suggestions were incorporated. Thus, the validity of the tools is established by ensuring that the questions possess content validity.

### **3.11 RELIABILITY OF THE TOOL**

Reliability is an important test of sound measurement. Two aspects of reliability viz., stability and equivalence deserve special mention. The stability aspects are concerned with securing consistent results with repeated measurements of the same person and with the same instrument. The equivalence aspects consider how much error different investigators of

different samples of items being studied may introduce. To find out the reliability of the tool, split half method was used. The reliability of the test has been calculated by using person's product-moment correlation coefficient formula. The value obtained was 0.83

### **3.12 COLLECTION OF DATA**

Data collection is used to describe. The purpose of data collection is to obtain information to keep on record, to make decisions about important issues to pass information on to others, primarily, data collected to provide information regarding the specific topic.

### **3.13 STATISTICAL TECHNIQUES USED**

Statistical techniques serve the fundamental purpose of the description and inferential analysis. The data was collected from various colleges. Investigator developed the Master table and the data has been analyzed by using appropriate statistical techniques, such as Mean, SD, t test, f test with the help of SPSS package

- Mean
- Standard deviation
- 't' test

In this chapter the investigator explained the research design, the tool, instrumentation, administration and statistical techniques followed in this study. The detailed statistical analysis is presented in the next chapter.

The following statistical techniques were used in the study:

#### **1. Arithmetic Mean**

Arithmetic Mean is the average of difference of the values of the series. Such a difference is technically described as deviation. In

calculating mean deviation, we ignore the minus sign of deviations while taking their total for obtaining the mean deviation.

The investigator has used the following formula for calculating arithmetic mean.

$$M = \frac{\sum x}{N}$$

Where, M = Arithmetic mean,  $\Sigma$  = Sum of scores  
 x = Individual score, N = Number of items

## 2. Standard Deviation

Standard deviation is most widely used measure of dispersion of a series and is commonly denoted by the symbol 's' (pronounced as sigma). Standard deviation is defined as the square root of the average of squares of deviations when such deviations for the values of individual items in a series are obtained from the arithmetic average.

The investigator has used the following formula for calculating standard deviation.

$$\text{Standard deviation } \sigma = \sqrt{\frac{\sum fd^2}{N} - \left(\frac{\sum fd}{N}\right)^2} \times c.i$$

Where,

$\Sigma$  = Sum of score, f = frequency  
 N = Number of items d = deviation from the  
 c.i = Class Interval arithmetic mean

### 't' test

't'- test is based on 't' distribution and is considered an appropriate test for judging the significance of a sample mean for judging the

significance of difference between the means of two samples in case of small sample as an estimate of the population variance.

't' test is used to find out the significance of the difference between the means of two variables.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

Where,

$M_1$  &  $M_2$  = Mean of the first and second groups

$\sigma_1$  = Standard deviation of the first group

$\sigma_2$  = Standard deviation of the second group

$N_1$  = Number of cases in first group

$N_2$  = Number of cases in second group

The next chapter deals with the Analysis and Interpretation of data.

## CHAPTER IV

### ANALYSIS AND INTERPRETATION OF THE DATA

#### 4.1 INTRODUCTION

The present chapter deals with the data analysis of the present study. The collected data as discussed under Chapter III were classified to different types of analysis. Different Statistical Techniques were applied, and the results are presented in this chapter along with the interpretation.

The results are presented in two major classifications such as Descriptive Analysis and Inferential Analysis. In the Descriptive Analysis and Inferential Analysis **“Opinion towards Blended Learning among Secondary Students at Perambalur District”** were discussed along with the further subdivisions such as Gender, Locality of the school and Parent’s Income were also considered.

#### 4.1.1 ANALYSIS ON THE MEAN SCORE OF THE LEVEL OF OPINION TOWARDS BLENDED LEARNING AMONG SECONDARY STUDENTS AT PERAMBALUR DISTRICT

**4.1.2 Analysis of the Mean Scores and the Standard Deviation on the level of Opinion towards Blended Learning among Secondary Students at Perambalur District in Total**

**Hypothesis – 1**

The level of Opinion towards Blended Learning among Secondary Students at Perambalur District

**Table – 4.1**  
**MEAN AND STANDARD DEVIATION SCORES ON THE LEVEL OF OPINION TOWARDS BLENDED LEARNING AMONG SECONDARY STUDENTS AT PERAMBALUR DISTRICT IN TOTAL**

| <b>S. No</b> | <b>Variables</b>        |                   | <b>N</b> | <b>Mean</b> | <b>SD</b> |
|--------------|-------------------------|-------------------|----------|-------------|-----------|
| 01           | Total                   |                   | 100      | 82.96       | 8.14      |
| 02           | Gender                  | Female            | 50       | 82.05       | 8.43      |
|              |                         | Male              | 50       | 83.87       | 7.80      |
| 03           | Locality of the College | Rural             | 44       | 85.32       | 6.98      |
|              |                         | Urban             | 56       | 81.17       | 8.54      |
| 04           | Parent's Income         | Below R.s. 10,000 | 38       | 82.22       | 8.61      |
|              |                         | Above R.s. 10,000 | 62       | 83.40       | 7.88      |

It is clearly seen from the Table 4.1 the obtained Maximum and Minimum Mean and SD values of the Opinion towards Blended Learning Scores are 85.32 and 81.17 and 8.61 and 6.98. It is also reveal that Mean and SD of the Opinion towards Blended Learning Score of the total sample were 82.96 and 8.14(Maximum value is 200 and the minimum value is 50). It shows that the level of Opinion towards Blended Learning among Secondary Students is high.

### 4.1.3 Analysis of the Mean Scores and the Standard Deviation on the level of Opinion towards Blended Learning among Secondary Students with respect to their Gender

#### Hypothesis – 2

There is no significant difference in Mean scores on the level of Opinion towards Blended Learning among Secondary Students with respect to their Gender.

**Table – 4.2**

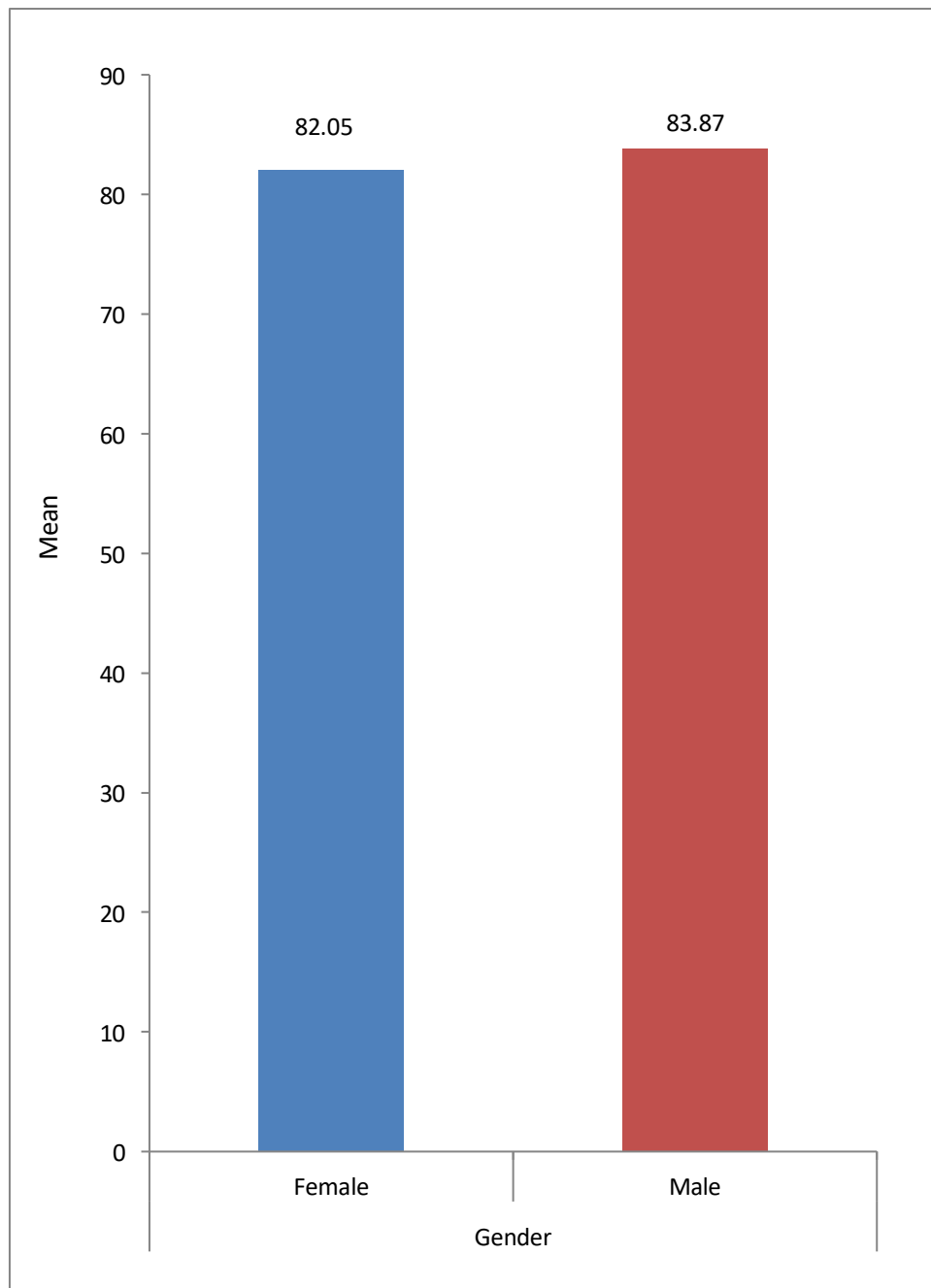
**‘t’ VALUE BETWEEN THE MEAN SCORES ON THE LEVEL  
OF OPINION TOWARDS BLENDED LEARNING AMONG  
SECONDARY STUDENTS WITH RESPECT TO THEIR GENDER**

| S. No | Gender | N  | Mean  | SD   | ‘t’ value |
|-------|--------|----|-------|------|-----------|
| 01.   | Female | 50 | 82.05 | 8.43 | 1.13**    |
| 02.   | Male   | 50 | 83.87 | 7.80 |           |

\*\* - Not Significant at 0.05 level

From the above Table 4.2 it is seen that the ‘t’ value, 1.13 is not significant at 0.05 level. It is understood from the result that there is no significant difference in the level of Opinion towards Blended Learning among Secondary Students with respect to their Gender. Male and Female Secondary Students are having similar level of Opinion towards Blended Learning. Hence the framed null hypothesis is found to be accepted.

**Graph – 4.1**  
**‘t’ VALUE BETWEEN THE MEAN SCORES ON THE LEVEL OF**  
**OPINION TOWARDS BLENDED LEARNING AMONG**  
**SECONDARY STUDENTS WITH RESPECT TO THEIR GENDER**



#### **4.1.4 Analysis of the Mean Scores and the Standard Deviation on the level of Opinion towards Blended Learning among Secondary Students with respect to their Locality of the School**

##### **Hypothesis – 3**

There is no significant difference in Mean scores on the level of Opinion towards Blended Learning among Secondary Students with respect to their Locality of the School

**Table – 4.3**

##### **‘t’ VALUE BETWEEN THE MEAN SCORES ON THE LEVEL OF OPINION TOWARDS BLENDED LEARNING AMONG SECONDARY STUDENTS WITH RESPECT TO THEIR LOCALITY OF THE SCHOOL**

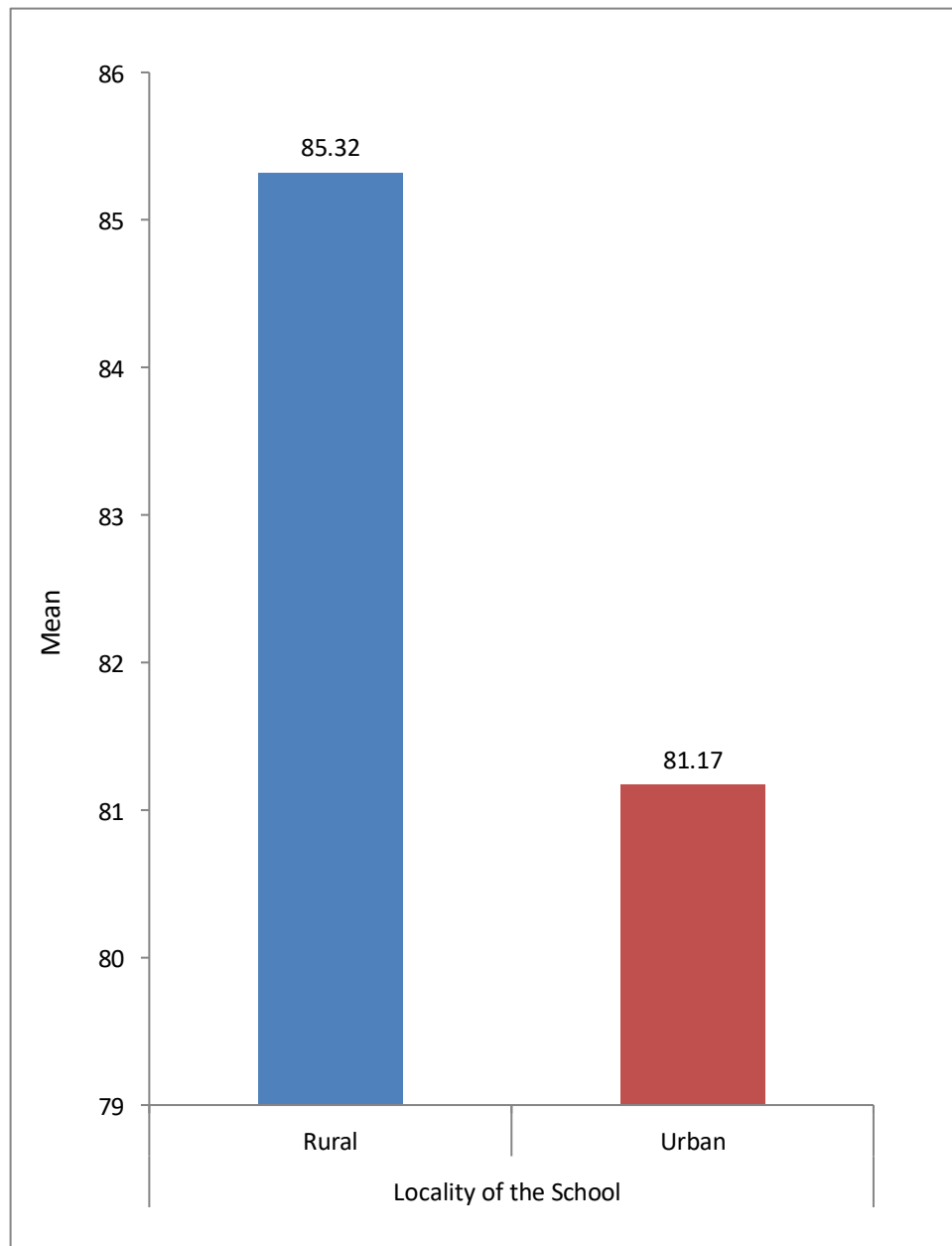
| <b>S. No</b> | <b>Locality of the School</b> | <b>N</b> | <b>Mean</b> | <b>SD</b> | <b>‘t’ value</b> |
|--------------|-------------------------------|----------|-------------|-----------|------------------|
| 01.          | Rural                         | 44       | 85.32       | 6.98      | 2.69*            |
| 02.          | Urban                         | 56       | 81.17       | 8.54      |                  |

\* - Significant at 0.05 level

It is understood from the above Table 4.3 it is seen that the ‘t’ value, 2.69 is significant at 0.05 level. It is understood from the result that there is a significant difference in the level of Opinion towards Blended Learning among Secondary students with respect to their Locality of the School. Students studying in Rural school are having significantly higher level of Opinion towards Blended Learning than the students studying in Urban Schools. Hence the framed null hypothesis is found to be rejected.

**Graph – 4.2**

**‘t’ VALUE BETWEEN THE MEAN SCORES ON THE LEVEL OF  
OPINION TOWARDS BLENDED LEARNING AMONG  
SECONDARY STUDENTS WITH RESPECT TO THEIR  
LOCALITY OF THE SCHOOL**





#### **4.1.5 Analysis of the Mean Scores and the Standard Deviation on the level of Opinion towards Blended Learning among Secondary Students with respect to their Parent's Income**

##### **Hypothesis –4**

There is no significant difference in Mean scores on the level of Opinion towards Blended Learning among Secondary Students with respect to their Parent's Income

**Table – 4.4**

**'t' VALUE BETWEEN THE MEAN SCORES ON THE LEVEL OF OPINION TOWARDS BLENDED LEARNING AMONG TEACHER EDUCATORS WITH RESPECT TO THEIR PARENT'S INCOME**

| <b>S. No</b> | <b>Income</b>     | <b>N</b> | <b>Mean</b> | <b>SD</b> | <b>'t' value</b> |
|--------------|-------------------|----------|-------------|-----------|------------------|
| 01.          | Below R.s. 10,000 | 38       | 82.22       | 8.61      | 0.68**           |
| 02.          | Above R.s. 10,000 | 62       | 83.40       | 7.88      |                  |

\*\* - Not Significant at 0.05 level

Table 4.8 reveals that the 't' value, 0.68 is not significant at 0.05 level. It is understood from the result that there is no significant difference in the level of Opinion towards Blended Learning among Secondary Students with respect to their Parent's Income. Below R.s.10, 000 and above R.s.10, 000 parent's income of secondary students are having similar level of Opinion towards Blended Learning. Hence the framed null hypothesis is found to be accepted.

The following chapter discusses the major findings and suggestions of the present study.



## **CHAPTER-V**

## **CHAPTER V**

### **SUMMARY OF FINDINGS AND CONCLUSION**

#### **5.1 INTRODUCTION**

Blended learning is a term increasingly used to describe the way e-learning which is being combined with traditional classroom methods and independent study to create a new hybrid teaching methodology. It represents a much greater change in basic techniques than simply adding computers to classrooms; it represents in many cases, a fundamental change in the way teachers and students approach the learning experience. It has already produced an offshoot- the flipped classroom that has quickly become a distinct approach of its own. Teaching being a demanding profession requires multi-dimensional skills, Patience, commitment and continuous growth to face the challenges of the present era. Therefore, preparation of highly competent teachers became the priority and concern of all the level of schools.

#### **5.2 NEED OF THE STUDY**

Most of the traditional classroom teaching-learning process fails to engage the young learners actively to construct the knowledge. The knowledge is transferred monotonously, and their needs, interests and attitude have never considered. Hence a face- to- face combination of classroom element with the online instruction, popularly referred Blended learning has become the alternative that gains.

With the advancement of technology, it is possible to revolutionize the way people learn and to present the information to

them. Most of the traditional instruction, students learn from the instructor-led approach. Usually in a traditional classroom setting, students have access to the experts, involved in questions and discussion, exposed to social interaction and can learn from others. Some students prefer an individualized or less structured environment. In other words, they need self-paced learning material. At the same time, educators are now facing with the challenges of integrating traditional and emerging technology as to balance various students learning styles.

Teachers experience difficulties in teaching their students since they must understand the interest and mood of the students. In certain cases, they need to visualize the picture when applying some hard subject matters. Studies have shown that attitude to be one of other reasons why teaching in traditional method is so difficult. Most of these experimental methods of teaching have not shown that traditional methods can affect students' attitude towards learning various subjects. It also mentioned that technological aids such as computers have improvement effects on students' attitudes towards education. With the help of the technology, blended learning (BL) makes it easy for students to study and be able to change their attitude towards education.

### **5.3 SCOPE OF THE STUDY**

The main scope is to find out the level of opinion of secondary students towards blended learning. The investigator hopes that the findings of the study will provide information about the opinion towards blended learning in each subject among secondary students.

#### **5.4 STATEMENT OF THE PROBLEM**

The present study is investigated by the investigator under the topic **“Opinion towards Blended Learning among Secondary Students at Perambalur District.”**

#### **5.5 OBJECTIVES OF THE STUDY**

The present study is framed with selected objectives and they are presented below:

- To measure the level opinion towards blended learning among secondary students at perambalur district.
- To find out the significant difference between the mean values of opinion towards blended learning among secondary students based on their gender.
- To find out the significant difference between the mean values of opinion towards blended learning among secondary students based on their locality of the school.
- To find out the significant difference between the mean values of opinion towards blended learning among secondary students based on their Parent’s income.

#### **5.6 HYPOTHESES OF THE STUDY**

Keeping in view the objectivities of the study the following hypotheses have framed as follows:

- The level of opinion towards blended learning among the secondary students at Perambalur district.
- There is no significant difference between the opinion towards blended

learning among the secondary students based on their gender.

- There is no significant difference between the opinion towards blended learning among the secondary students based on their locality of the school.
- There is no significant difference between the opinion towards blended learning among the secondary students based on their parent's income.

### **5.7 LIMITATION OF THE STUDY**

Even though every attempt has been made to make the study more precise & objective as possible, the investigator in the present study noted a few limitations. The following are the important limitation.

1. The present study was restricted to High and Higher Secondary schools of Perambalur District
2. The study was conducted among the secondary students and not extended to all the level of students, because of various constraints.
3. Even though, teaching being a complex phenomenon, involving a variety of variables, the study had been limited to a few selected variables such as Gender, Locality of the School and Parent's Income.

### **5.8 FINDINGS OF THE STUDY**

The following are the findings of the study.

- The level of opinion towards blended learning among secondary students is high.
- There is no significant difference in the level of opinion towards blended learning among secondary students with respect to their Gender. Male and Female teacher educators are having similar level of opinion towards blended learning.
- There is a significant difference in the level of opinion towards blended learning among secondary students with respect to their Locality of the

school. Secondary students studying in Rural Schools are having significantly higher than the Secondary students studying in Urban schools.

- There is no significant difference in the level of opinion towards blended learning among secondary students with respect to their Parent's Income. Below Rs.10,000 and Above Rs.10,000 parent incomes of secondary students are having similar level of opinion towards blended learning.

### **5.9 EDUCATIONAL IMPLICATIONS**

- Enhance the Blended Learning classes in teaching and learning and make it compulsory for irrespective of the levels.
- The usage of Internet facilities should be increased for the secondary students, to improve the level of blended learning.
- Innovations in Blended Learning should be encouraged by the Government sector at different level of education.
- State level study can be taken for further research.

### **5.10 SUGGESTIONS FOR THE FURTHER STUDY**

- Separate studies can be made to assess the attitude towards Blended Learning among the secondary students studying in various levels /types of schools.
- Blended Learning in education among the rural students of government schools can be taken up
- Similar study can be made at National and State level.
- Experimental studies may be undertaken to evolve a special instructional strategy to teach higher secondary school students with technological devices.

### **5.11 CONCLUSION**

The present study has investigated about the opinion towards

Blended Learning among Secondary Students at Perambalur district. The results provide evidence that the opinion towards Blended Learning among secondary students is high. It should implement in all type and levels of schools. So that the students and teachers would get more knowledge through internet, multimedia and other teaching aids in order to get clarity about the conceptual learning.

# **ANNEXURE I**

**OPINION TOWARDS BLENDED LEARNING AMONG SECONDARY STUDENTS AT PERAMBALUR DISTRICT**

| S.NO | QUESTIONS  | STRONGLY AGREE | AGREE | DISAGREE | STRONGLY DISAGREE |
|------|--|----------------|-------|----------|-------------------|
| 01   | Blended learning method is very much satisfied by comparing with other methods.  |                |       |          |                   |
| 02   | There are adequate rights for the utilization in active teaching.  |                |       |          |                   |
| 03   | The blended learning did not satisfy the Secondary Students with the ways of allotting scores to the different activities (assignments, quizzes, exams..etc) |                |       |          |                   |
| 04   | Blended learning increases achievement in all subjects.  |                |       |          |                   |
| 05   | Blended learning reduces complexity in learning for the Secondary Students.  |                |       |          |                   |
| 06   | The amount of interaction in blended learning is not effective.  |                |       |          |                   |
| 07   | Blended learning method offers sufficient identification and expectations of the students.   |                |       |          |                   |
| 08   | The learning activities are happening in healthy environment.  |                |       |          |                   |
| 09   | There could have a good communication and co-operative learning environment with their peer.   |                |       |          |                   |
| 10   | The level of anxiety of the students will be reduced while asking questions and communications with the instructor   |                |       |          |                   |
| 11   | Blended learning should not prevail for a long run   |                |       |          |                   |
| 12   | Blended learning method giving more chances for developing group as well as individualized works for Secondary Students.                                     |                |       |          |                   |

|    |   |  |  |  |  |
|----|---|--|--|--|--|
| 13 | There was a good balance between online and classroom activities in learning.                                       |  |  |  |  |
| 14 | The online and classroom activities are integrated in BL method.  |  |  |  |  |
| 15 | The Secondary Students have the opportunity to integrate classroom and lab activities with each other in BL Method. |  |  |  |  |
| 16 | The Secondary Students received the technical support when they needed during the course by Blended Learning.       |  |  |  |  |
| 17 | Through blended learning presence of the teacher is only within a period of time.                                   |  |  |  |  |
| 18 | The Secondary Students felt technically prepared to learn the content by Blended Learning                           |  |  |  |  |
| 19 | Using blended learning did not make the content more demanding to learn.  |  |  |  |  |
| 20 | Carrying out the required electronic activities are boring the Secondary Students too much                          |  |  |  |  |
| 21 | My learning style matches well with blended learning  |  |  |  |  |
| 22 | The online activities are worked well   |  |  |  |  |
| 23 | The classroom activities worked well  |  |  |  |  |
| 24 | Getting technical support was very easy   |  |  |  |  |
| 25 | The online activities was very difficult  |  |  |  |  |
| 26 | Handling the classroom activities were not easy   |  |  |  |  |
| 27 | Technical skills development and teaching activities cannot be improved through blended learning                    |  |  |  |  |
| 28 | Integrating the online and classroom activities was not easier one  |  |  |  |  |
| 29 | Blended learning course has many advantages for the students  |  |  |  |  |
| 30 | Blended learning course has disadvantages for the students  |  |  |  |  |
| 31 | The experience created by the blended learning course is very effective   |  |  |  |  |
| 32 | Blended learning course has many advantages for the Secondary students.   |  |  |  |  |
| 33 | Blended learning course has disadvantages for the Secondary students.   |  |  |  |  |
| 34 | Blended learning is a shift to an online environment to improve the learning condition of the Secondary students.   |  |  |  |  |

|    |  |  |  |  |  |
|----|--|--|--|--|--|
| 35 | Blended learning is the best online and onsite learning which will work better for the students development. |  |  |  |  |
| 36 | Secondary students are not allowed to involve in designing and learning using blended learning               |  |  |  |  |
| 37 | Blended Learning will enhance the Time Management  |  |  |  |  |
| 38 | Blended Learning helps for the critical thinking   |  |  |  |  |
| 39 | Blended Learning does not support the problem-solving skill  |  |  |  |  |
| 40 | Blended Learning offers a great flexibility by working more time in online                                   |  |  |  |  |
| 41 | Blended Learning did not offer freedom for the Secondary students by working more time in online             |  |  |  |  |
| 42 | Blended Learning did not render convenience by working in online   |  |  |  |  |
| 43 | Blended learning supports a better interaction between instructor and the student                            |  |  |  |  |
| 44 | Prompting feedback will frequently happens between the student and the teacher.                              |  |  |  |  |
| 45 | Blended learning activities cause the students to fail or do poorly  |  |  |  |  |
| 46 | Blended learning has positive effects in raising attendance and improving examination marks                  |  |  |  |  |
| 47 | Through blended learning the evaluation of the students works will be regularly checked                      |  |  |  |  |
| 48 | Through blended learning, it is easy to organize a group for a Project                                       |  |  |  |  |
| 49 | In blended learning the Secondary students respects each and every individual's way of learning.             |  |  |  |  |
| 50 | Secondary students cannot fulfill the satisfaction of the teachers with blended learning.                    |  |  |  |  |

**பெரம்பலூர் மாவட்டத்தில் உள்ள இடைநிலை மாணவர்களிடையே  
கலப்பு கற்றலை நோக்கிய கருத்து**

| வ. எண் | கேள்விகள்   | முழுவதும்<br>உடன்படுகின்றேன் | உடன்படுகின்றேன் | உடன்படவில்லை | முழுவதும்<br>உடன்படவில்லை |
|--------|---|------------------------------|-----------------|--------------|---------------------------|
| 01     | மற்ற முறைகளுடன் ஒப்பிடுவதன் மூலம் கலப்பு கற்றல் முறை மிகவும் திருப்திகரமாக உள்ளது.  |                              |                 |              |                           |
| 02     | கற்பித்தல் செயலில் பயன்படுத்த போதுமான உரிமைகள் உள்ளன.   |                              |                 |              |                           |
| 03     | பல்வேறு செயல்பாடுகளுக்கு மதிப்பெண்களை ஒதுக்கும் வழிகளில் (பணிகள், வினாடி வினாக்கள், தேர்வுகள்.. போன்றவை) கலந்த கற்றல் இடைநிலை மாணவர்களை திருப்திப்படுத்தவில்லை. |                              |                 |              |                           |
| 04     | கலப்பு கற்றல் அனைத்து பாடங்களிலும் சாதனையை அதிகரிக்கிறது.   |                              |                 |              |                           |
| 05     | கலப்பு கற்றல் இரண்டாம் நிலை மாணவர்களுக்கான கற்றலில் சிக்கலைக் குறைக்கிறது.  |                              |                 |              |                           |
| 06     | கலப்பு கற்றலில் உள்ள தொடர்புகளின் அளவு பயனுள்ளதாக இல்லை.  |                              |                 |              |                           |
| 07     | கலப்பு கற்றல் முறையானது மாணவர்களின் போதுமான அடையாளம் மற்றும் எதிர்பார்ப்புகளை வழங்குகிறது.  |                              |                 |              |                           |
| 08     | கற்றல் நடவடிக்கைகள் ஆரோக்கியமான சூழலில் நடைபெறுகின்றன.  |                              |                 |              |                           |
| 09     | சகாக்களுடன் நல்ல தொடர்பு மற்றும் கூட்டுறவு கற்றல் சூழல் இருக்க முடியும்.  |                              |                 |              |                           |
| 10     | பயிற்றுவிப்பாளருடன் கேள்விகள் மற்றும் தொடர்புகளைக் கேட்கும்போது மாணவர்களின் கவலையின் அளவு குறைக்கப்படும்  |                              |                 |              |                           |
| 11     | கலப்பு கற்றல் நீண்ட காலத்திற்கு மேலோங்கக்கூடாது   |                              |                 |              |                           |
| 12     | கலப்பு கற்றல் கற்றல் முறை, குழுவை வளர்ப்பதற்கும், இரண்டாம் நிலை மாணவர்களுக்கு தனிப்பட்ட படைப்புகளுக்கும் அதிக வாய்ப்புகளை அளிக்கிறது.                           |                              |                 |              |                           |

|    |  |  |  |  |  |
|----|--|--|--|--|--|
| 13 | கற்றலில் ஆன்லைன் மற்றும் வகுப்பறை செயல்பாடுகளுக்கு இடையே நல்ல சமநிலை இருந்தது.                                 |  |  |  |  |
| 14 | ஆன்லைன் மற்றும் வகுப்பறை நடவடிக்கைகள் கலப்பு கற்றல் முறையில் ஒருங்கிணைக்கப்பட்டுள்ளன.                          |  |  |  |  |
| 15 | இடைநிலை மாணவர்களுக்கு கலப்பு கற்றல் முறையில் வகுப்பறை மற்றும் ஆய்வக செயல்பாடுகளை ஒருங்கிணைக்க வாய்ப்பு உள்ளது. |  |  |  |  |
| 16 | இரண்டாம் நிலை மாணவர்கள், கலப்பு கற்றல் மூலம் பாடத்தின் போது தொழில்நுட்ப ஆதரவைப் பெற்றனர்.                      |  |  |  |  |
| 17 | கலந்த கற்றல் மூலம் ஆசிரியரின் இருப்பு ஒரு குறிப்பிட்ட காலத்திற்குள் மட்டுமே இருக்கும்.                         |  |  |  |  |
| 18 | இடைநிலை மாணவர்கள் தொழில்நுட்ப ரீதியாக கலப்பு கற்றல் மூலம் உள்ளடக்கத்தைக் கற்க தயாராக இருப்பதாக உணர்ந்தனர்      |  |  |  |  |
| 19 | கலப்புக் கற்றலைப் பயன்படுத்துவதால், உள்ளடக்கம் கற்க வேண்டிய தேவையை ஏற்படுத்தவில்லை.                            |  |  |  |  |
| 20 | தேவையான மின்னணு செயல்பாடுகளை மேற்கொள்வது இடைநிலை மாணவர்களுக்கு மிகவும் சலிப்பை ஏற்படுத்துகிறது                 |  |  |  |  |
| 21 | கலப்பு கற்றலுடன் எனது கற்றல் பாணி நன்றாகப் பொருந்துகிறது   |  |  |  |  |
| 22 | ஆன்லைன் செயல்பாடுகள் சிறப்பாகச் செயல்படுகின்றன   |  |  |  |  |
| 23 | வகுப்பறை நடவடிக்கைகள் நன்றாக வேலை செய்தன   |  |  |  |  |
| 24 | தொழில்நுட்ப ஆதரவைப் பெறுவது மிகவும் எளிதாக இருந்தது  |  |  |  |  |
| 25 | ஆன்லைன் செயல்பாடுகள் மிகவும் கடினமாக இருந்தது  |  |  |  |  |
| 26 | வகுப்பறைச் செயல்பாடுகளைக் கையாள்வது எளிதாக இல்லை   |  |  |  |  |
| 27 | தொழில்நுட்ப திறன் மேம்பாடு மற்றும் கற்பித்தல் செயல்பாடுகளை கலப்பு கற்றல் மூலம் மேம்படுத்த முடியாது             |  |  |  |  |
| 28 | ஆன்லைன் மற்றும் வகுப்பறை செயல்பாடுகளை ஒருங்கிணைப்பது எளிதான ஒன்றாக இருக்கவில்லை                                |  |  |  |  |
| 29 | கலப்பு கற்றல் படிப்பு மாணவர்களுக்கு பல நன்மைகளைக் கொண்டுள்ளது  |  |  |  |  |
| 30 | கலப்பு கற்றல் பாடநெறி மாணவர்களுக்கு தீமைகளைக் கொண்டுள்ளது  |  |  |  |  |
| 31 | கலப்பு கற்றல் பாடத்தின் மூலம் உருவாக்கப்பட்ட அனுபவம் மிகவும் பயனுள்ளதாக இருக்கிறது                             |  |  |  |  |
| 32 | கலப்பு கற்றல் படிப்பு இரண்டாம் நிலை மாணவர்களுக்கு பல நன்மைகளைக் கொண்டுள்ளது.                                   |  |  |  |  |
| 33 | கலப்பு கற்றல் பாடமானது இடைநிலை மாணவர்களுக்கு தீமைகளைக் கொண்டுள்ளது.  |  |  |  |  |
| 34 | கலப்பு கற்றல் என்பது இரண்டாம் நிலை மாணவர்களின் கற்றல் நிலையை மேம்படுத்த ஆன்லைன் சூழலுக்கு மாறுதல் ஆகும்.       |  |  |  |  |

|    |  |  |  |  |  |
|----|--|--|--|--|--|
| 35 | கலப்பு கற்றல் சிறந்த ஆன்லைன் மற்றும் ஆன்சைட் கற்றல் ஆகும், இது மாணவர்களின் மேம்பாட்டிற்கு சிறப்பாக செயல்படும். |  |  |  |  |
| 36 | இடைநிலை மாணவர்கள் கலப்பு கற்றலைப் பயன்படுத்தி வடிவமைத்தல் மற்றும் கற்றலில் ஈடுபட அனுமதிக்கப்படுவதில்லை         |  |  |  |  |
| 37 | கலப்பு கற்றல் நேர நிர்வாகத்தை மேம்படுத்தும்  |  |  |  |  |
| 38 | கலப்பு கற்றல் விமர்சன சிந்தனைக்கு உதவுகிறது  |  |  |  |  |
| 39 | கலப்பு கற்றல் சிக்கலைத் தீர்க்கும் திறனை ஆதரிக்காது  |  |  |  |  |
| 40 | கலப்பு கற்றல் ஆன்லைனில் அதிக நேரம் வேலை செய்வதன் மூலம் சிறந்த நெகிழ்வுத்தன்மையை வழங்குகிறது                    |  |  |  |  |
| 41 | இணையத்தில் அதிக நேரம் வேலை செய்வதன் மூலம் கலப்பு கற்றல் இரண்டாம்நிலை மாணவர்களுக்கு சுதந்திரத்தை வழங்கவில்லை    |  |  |  |  |
| 42 | கலப்பு கற்றல் ஆன்லைனில் வேலை செய்வதன் மூலம் வசதியை அளிக்கவில்லை  |  |  |  |  |
| 43 | பயிற்றுவிப்பாளர் மற்றும் மாணவர் இடையே ஒரு சிறந்த தொடர்புக்கு கலப்பு கற்றல் துணைபுரிகிறது                       |  |  |  |  |
| 44 | மாணவர் மற்றும் ஆசிரியருக்கு இடையே கருத்துத் தூண்டுதல் அடிக்கடி நிகழும்.  |  |  |  |  |
| 45 | கலப்பு கற்றல் நடவடிக்கைகள் மாணவர்களை தோல்வியடையச் செய்கின்றன அல்லது மோசமாகச் செய்கின்றன                        |  |  |  |  |
| 46 | கலப்பு கற்றல் வருகையை அதிகரிப்பதிலும் தேர்வு மதிப்பெண்களை மேம்படுத்துவதிலும் சாதகமான விளைவுகளை ஏற்படுத்துகிறது |  |  |  |  |
| 47 | கலப்பு கற்றல் மூலம் மாணவர்களின் படைப்புகளின் மதிப்பீடு தொடர்ந்து சரிபார்க்கப்படும்                             |  |  |  |  |
| 48 | கலப்பு கற்றல் மூலம், ஒரு திட்ட குழுவை ஒழுங்கமைப்பது எளிது  |  |  |  |  |
| 49 | கலப்புக் கற்றலில் இடைநிலை மாணவர்கள் ஒவ்வொருவரின் கற்றல் முறையை மதிக்கிறார்கள்.                                 |  |  |  |  |
| 50 | இடைநிலை மாணவர்கள் கலந்த கற்றல் மூலம் ஆசிரியர்களின் திருப்தியை பூர்த்தி செய்ய முடியாது.                         |  |  |  |  |

# **ANNEXURE II**







2024.03.12 11:51

**DEVELOPMENT AND VALIDATION OF FLIPPED  
LEARNING ON ACHIEVEMENT IN MATHEMATICS  
AMONG UPPER PRIMARY SCHOOL STUDENTS**

**RESEARCH PROJECT REPORT**

Submitted by

**K . REVATHI**

Lecturer

DIET



Submitted to

**STATE COUNCIL OF EDUCATIONAL RESEARCH AND  
TRAINING CHENNAI - 600 006**

**2023 - 2024**

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I am also extending my gratitude to the Headmaster, the teacher and students of GHSS Kilumathur District who have given me the support to conduct the research .

**K.REVATHI,**  
Lecturer,  
DIET, Perambalur.

## **DECLARATION**

I hereby declare that the Research project report entitled **“DEVELOPMENT AND VALIDATION OF FLIPPED LEARNING ON ACHIEVEMENT IN MATHEMATICS AMONG UPPER PRIMARY SCHOOL STUDENTS”** is an original and independent work done by me and it has not formed the basis for any other programme, research project work (or) any award.

Signature of the Researcher

( K.REVATHI ),

Lecturer,

DIET, Perambalur.

## **CERTIFICATE**

It is Certified that the Research project report entitled "**DEVELOPMENT AND VALIDATION OF FLIPPED LEARNING ON ACHIEVEMENT IN MATHEMATICS AMONG UPPER PRIMARY SCHOOL STUDENTS.**" is an original and independent research project work done by **K.REVATHI**, Lecturer District Institute of Education and Training, Perambalur District. It has not previously formed the basis for any other Research project work or for the award.

Station: Perambalur

**Principal**

Date:

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## **CHAPTER-I**

### **INTRODUCTION**

#### **1.1 INTRODUCTION**

Education encompasses the process of acquiring knowledge, skills, values, beliefs, and habits. It occurs through formal instruction in schools, colleges, and universities, as well as through informal learning experiences in everyday life. Education is not limited to academic subjects but also includes social, emotional, and practical aspects essential for personal and societal development. Its primary goal is to empower individuals to think critically, solve problems, communicate effectively, and adapt to a rapidly changing world. Education plays a crucial role in shaping individuals' identities, fostering cultural understanding, promoting social cohesion, and driving economic prosperity. Ultimately, education is a lifelong journey that empowers individuals to reach their full potential and contribute positively to society.

Mathematics is one of the fundamental subjects that must be taken by all students up through the tertiary levels of education, according to the National Policy on Education (Federal Republic of Nigeria, 2013). Mathematics is given a lot of weight in the school curriculum from primary to secondary levels, reflecting the importance of the subject to modern society. The fact that students continually perform poorly in mathematics in internal and external exams, despite the subject's relative importance, is particularly disheartening (Maruta et al., 2022).

The current age has seen rapid changes in communication and technology around the world, with information increasing exponentially, new technologies being produced daily, and a multidimensional competitive environment being present between countries (Hanna, 1998). This competitiveness has made developing new technological opportunities a necessity rather than a privilege, and to keep up with the requirements of the age regarding educational activities, technology needs to be used efficiently.

Flipped learning, an innovative pedagogical approach, has gained significant attention in recent years due to its potential to enhance student engagement and learning outcomes. This research focuses on the development and validation of flipped learning methodologies specifically tailored for upper primary school mathematics education. By shifting the traditional classroom model, where instruction is delivered in class and homework is assigned for practice at home, flipped learning reverses this dynamic. In this model, students engage with instructional materials independently outside of class, typically through videos or online resources, and then use class time for active learning activities, such as problem-solving and collaborative discussions. This study aims to investigate the impact of flipped learning on students' achievement in mathematics at the upper primary level, exploring its effectiveness in fostering deeper understanding, critical thinking skills, and overall academic success.

The rationale behind exploring flipped learning in the context of upper primary mathematics lies in its potential to address the diverse learning needs of students while promoting a more student-centered learning environment. By providing access to instructional content outside of the classroom, flipped learning allows students to progress through material at their own pace, catering to individual learning styles and abilities. Moreover, by utilizing valuable class time for interactive activities and guided practice, teachers can provide personalized support and feedback, facilitating deeper conceptual understanding and application of mathematical concepts. This research seeks to contribute to the existing literature by examining the effectiveness of flipped learning in the upper primary mathematics classroom, shedding light on its implications for instructional practice and student achievement in this critical academic domain.

## **1.2 MATHEMATICS EDUCATION**

Mathematics education is crucial for several reasons, playing a fundamental role in shaping individuals' cognitive development, problem-solving abilities, and overall academic and professional success. At its core, mathematics provides a framework for understanding and interpreting the world around us, from the patterns in nature to the principles governing technological advancements. Moreover, proficiency in mathematics is essential for various academic disciplines, ranging from the physical sciences to economics and engineering. In today's increasingly data-driven society, mathematical literacy is more important than ever, empowering individuals to analyze complex

information, make informed decisions, and participate meaningfully in civic and economic life. Furthermore, mathematics fosters critical thinking skills, creativity, and resilience in the face of challenges, preparing learners to tackle real-world problems with confidence and ingenuity. Ultimately, a strong foundation in mathematics education is not only essential for individual success but also contributes to the advancement of society as a whole, driving innovation, economic growth, and societal progress.

### **1.3 FLIPPED LEARNING**

Flipped learning is an instructional approach that reverses the traditional classroom model by delivering instructional content outside of class time and using in-class time for active learning activities. In a flipped classroom, students typically engage with pre-recorded lectures, videos, or other instructional materials independently at home or outside of class. This allows them to pace their learning according to their own needs and preferences. During class time, teachers then facilitate interactive activities such as problem-solving, discussions, group projects, or hands-on experiments to reinforce learning, promote deeper understanding, and address individual learning needs. Flipped learning aims to personalize instruction, foster student engagement, and enhance learning outcomes by maximizing the use of valuable class time for active, collaborative, and inquiry-based learning experiences.

Flipped learning is a teaching method where students learn new concepts outside of class time through pre-recorded lectures, readings, or other materials,

freeing up class time for interactive activities like discussions and problem-solving. This approach allows students to learn at their own pace, promotes active engagement, and provides flexibility in learning. However, challenges such as technology access and increased workload for teachers may arise. Overall, flipped learning offers personalized learning opportunities and enhances student participation, but requires careful planning and support for effective implementation.

### **1.3.1 Importance of Flipped Learning**

Flipped learning places students as active participants in their own learning and provides many benefits. First, when students access live instruction at home, via video or text, they can review the concept multiple times at their own pace. Second, while students spend class time applying, analyzing, evaluating, and creating, the instructor can observe, informally evaluate, and scaffold as needed. Finally, one of the biggest benefits of flipped learning is increased student engagement. Flipped learning has been shown to increase student engagement and increase motivation, which may be a key component in the language acquisition process.

The four pillars of the flipped classroom method include:

- ❖ **Flexible Learning Environment:** One of the hallmarks of a flipped learning classroom is that it provides a fluid time frame for student work and understanding. Teachers must adjust to the pace of students in class.

- ❖ **Learning Culture:** Teachers foster a rich environment that allows students to explore further topics and provides them with opportunities for self-reflection and action.
- ❖ **Intentional Content:** Teachers decide in advance which direct instruction to link to in-class activities. Students need to feel challenged but able to understand things on their own, which takes time for the teacher to master.
- ❖ **Professional Educator:** Monitoring and providing feedback to students during lessons ensures that the flipped classroom model is developed without any gaps in student knowledge.

### **1.3.2 The Advantages of Flipped Classroom Learning:**

1. **Personalized Learning:** The flipped classroom model allows students to learn at their own pace and revisit concepts as needed. Each student can tailor their learning journey to their individual needs and preferences, ensuring a more personalized and effective learning experience.
2. **Active Engagement:** By moving traditional lectures outside of class, students come to class prepared and ready to actively participate in collaborative activities, discussions, and problem-solving exercises. This active engagement fosters deeper understanding, critical thinking, and the development of essential skills.
3. **Individualized Support:** With more class time available for interaction, teachers have the opportunity to provide individualized support, guidance, and feedback to students. They can address specific areas of difficulty,

nurture strengths, and create a supportive and enriching learning environment.

4. **Enhanced Collaboration:** The flipped classroom nurtures a collaborative spirit among students. Through group projects, peer-to-peer learning, and interactive activities, students develop teamwork skills, learn from each other's perspectives, and strengthen their communication abilities.

### **1.3.3 Benefits of Flipped Learning**

Flipped classrooms offer significant advantages for both teachers and students, enhancing the learning experience and promoting deeper engagement. Here, we outline eight key benefits associated with this innovative teaching model, divided into four advantages for teachers and four for students.

#### **Benefits for Teachers:**

- ❖ By leveraging pre-class resources for initial learning, teachers can devote less time to introducing new topics during class, enabling them to delve deeper into subject matter during interactive sessions.
- ❖ Flipped classrooms empower students to take charge of their learning, fostering independence as they navigate through instructional materials at their own pace, albeit with necessary support provided by teachers.
- ❖ With foundational knowledge already acquired outside of class, teachers have more time to craft engaging, interactive lessons that promote critical thinking, experimentation, and practical application.

- ❖ In a flipped classroom environment, students who miss class can access pre-recorded materials online, minimizing learning gaps and ensuring continuity in their education despite absences.

**Benefits for Students:**

- ❖ Teachers have the flexibility to create tailored instructional materials, allowing for personalized learning experiences that cater to diverse student needs and learning styles.
- ❖ Active participation in flipped classrooms facilitates deeper comprehension as students engage with content through discussions, problem-solving, and hands-on activities, guided by teachers who provide support and encouragement.
- ❖ The flipped classroom model enables teachers to allocate more time and attention to students based on their individual learning needs, facilitating targeted support and differentiated instruction.
- ❖ By shifting focus from passive information delivery to active participation and discussion, students find classroom time more stimulating and relevant, leading to heightened engagement and overall enthusiasm for learning.

In essence, the flipped classroom approach not only optimizes teaching efficiency for educators but also cultivates a more dynamic and enriching learning environment for students, ultimately fostering deeper understanding, engagement, and academic success.

### 1.3.4 Types of Flipped Learning

Flipped learning, a dynamic educational approach, encompasses various types tailored to meet diverse learning needs and preferences. Here's a brief overview:

**1. Video-Based Flipped Learning:** In this approach, students engage with pre-recorded videos or lectures outside of class, accessing foundational content at their own pace. Class time is then utilized for interactive discussions, problem-solving, and application of concepts, facilitated by the teacher.

**2. Reading-Based Flipped Learning:** Instead of videos, students are assigned readings or texts to review before class. This allows them to gain initial exposure to the material independently, preparing them for deeper exploration and engagement during in-person sessions.

**3. Hybrid Flipped Learning:** Combining elements of both video-based and reading-based approaches, hybrid flipped learning offers flexibility and variety in instructional delivery. Teachers may incorporate a mix of pre-recorded videos, readings, and other resources to accommodate different learning preferences and needs.

**4. Project-Based Flipped Learning:** In this model, students are tasked with project-based assignments or inquiries outside of class, requiring them to apply and extend their learning beyond traditional classroom boundaries. Class time is dedicated to project discussions, collaboration, and feedback sessions, fostering creativity and critical thinking skills.

Each type of flipped learning offers unique benefits and challenges, providing educators with versatile options to optimize instruction and enhance student engagement and achievement.

### **1.3.5 Disadvantages of flipped learning**

- ❖ Access to technology: Flipped learning heavily relies on access to technology and the internet, which may pose challenges for students with limited resources.
- ❖ Student accountability: Without direct supervision during pre-class activities, some students may not engage with the materials effectively.
- ❖ Time-intensive for teachers: Creating quality instructional materials and designing engaging in-class activities can require significant time and effort from teachers.
- ❖ Potential for increased workload: Both students and teachers may experience an increased workload due to the additional preparation and responsibilities associated with flipped learning.

### **1.3.6 Flipped learning in Mathematics**

Flipped learning in mathematics transforms the traditional classroom model by leveraging technology to deliver instructional content outside of class time, allowing students to learn at their own pace and freeing up valuable class time for interactive, problem-solving activities. In this approach, students typically engage with pre-recorded lectures, online tutorials, or interactive exercises to acquire foundational mathematical concepts independently. During

class, teachers facilitate collaborative discussions, group work, and hands-on activities that reinforce understanding, promote critical thinking, and address individual learning needs. Flipped learning in mathematics empowers students to take ownership of their learning, fosters deeper conceptual understanding, and provides opportunities for personalized instruction and support. By optimizing class time for active learning experiences, this approach enhances student engagement, promotes higher-order thinking skills, and ultimately leads to improved academic performance in mathematics.

### **1.3.7 Flipped learning in classroom**

Flipped learning transforms the traditional classroom dynamic by flipping the sequence of instruction. Instead of students passively receiving lectures during class time and then practicing independently at home, the instructional content is delivered outside of class, often through pre-recorded videos, readings, or online resources. This allows students to engage with the material at their own pace, review concepts as needed, and come prepared with questions for class discussions. During class, teachers facilitate interactive activities such as problem-solving sessions, group discussions, collaborative projects, or hands-on experiments. Class time becomes more dynamic and focused on applying, analyzing, and synthesizing knowledge rather than simply delivering information. This active learning approach promotes deeper understanding, critical thinking, and student engagement.

Flipped learning offers several benefits in the classroom, including personalized learning experiences, increased student engagement, and more opportunities for individualized support and feedback from teachers. It also encourages students to take responsibility for their learning and fosters a collaborative learning environment where peers can learn from each other. Overall, flipped learning in the classroom enhances the learning experience by optimizing class time for meaningful interactions and activities that promote deeper learning and academic success.

### **1.3.8 Flipped learning model**

Flipped learning encompasses various models that educators can adapt to suit their teaching style, content, and students' needs. Here are some common models:

**1. Traditional Flipped Classroom Model:** In this model, students access pre-recorded lectures or instructional materials at home before class. Class time is then dedicated to discussions, problem-solving activities, and hands-on exercises facilitated by the teacher.

**2. Station Rotation Model:** Students rotate through different learning stations during class time, which may include a station for direct instruction (where pre-recorded materials are reviewed), a station for collaborative activities, a station for independent practice, and a station for teacher-led instruction or support.

**3. Online Driver Model:** In this model, the majority of instruction occurs online, with students accessing instructional materials, completing assignments,

and engaging in discussions through online platforms outside of class. Class time is reserved for activities that require face-to-face interaction, such as group discussions, projects, or assessments.

**4. Flipped Mastery Model:** In this mastery-based approach, students progress through the material at their own pace, mastering one concept before moving on to the next. Pre-recorded materials provide initial instruction, and class time is used for individualized support, practice, and assessment.

**5. Peer Instruction Model:** Students engage in peer teaching and learning activities during class time, guided by pre-class materials. This model encourages collaborative learning and peer-to-peer support, with the teacher serving as a facilitator and resource.

**6. Just-in-Time Teaching Model:** Teachers collect feedback from pre-class assignments or assessments to inform their instruction for the upcoming class session. This allows teachers to tailor class activities and discussions to address students' specific needs and misconceptions.

**7. Flipped Mastery with Intentional Content (FMIC) Model:** This model combines elements of flipped mastery and differentiated instruction. Teachers provide targeted instructional content to address specific learning goals or challenges, allowing students to engage with materials that are most relevant to their individual needs.

These models offer flexibility and versatility, allowing educators to customize their flipped learning approach based on their teaching goals, students' learning preferences, and available resources.

### **1.3.9 Methods of flipped Learning**

Flipped learning methods involve a pedagogical approach where traditional teaching methods are inverted or "flipped." In this model, instructional content that is typically delivered in the classroom, such as lectures, readings, or demonstrations, is moved online and accessed by students outside of class, often through pre-recorded videos, interactive modules, or online resources. This allows students to engage with the material at their own pace, review concepts as needed, and come to class prepared to participate in active learning activities, discussions, and problem-solving exercises.

#### **The key components of flipped learning methods include:**

- 1. Pre-Class Preparation:** Students are provided with learning materials, such as videos, readings, or quizzes, to review before attending class. This pre-class preparation aims to introduce students to new concepts and provide foundational knowledge, allowing class time to be used more effectively for application, analysis, and discussion.
- 2. In-Class Engagement:** Classroom time is utilized for interactive and collaborative activities that promote deeper understanding, critical thinking, and knowledge application. Teachers facilitate discussions, group work, hands-on experiments, and problem-solving tasks to reinforce learning objectives and address students' questions and misconceptions in real-time.
- 3. Technology Integration:** Flipped learning methods often leverage technology tools and platforms, such as learning management systems (LMS), video hosting services, online quizzes, and interactive simulations, to deliver

and assess instructional content. These technological resources enhance accessibility, flexibility, and interactivity in the learning process.

**4. Student-Centered Approach:** Flipped learning emphasizes a student-centered approach, where learners take on a more active role in their education. Students are encouraged to self-regulate their learning, engage in independent exploration, collaborate with peers, and reflect on their learning experiences, fostering autonomy, responsibility, and metacognitive skills development.

Overall, flipped learning methods aim to optimize instructional time, promote deeper understanding and application of concepts, foster active learning and engagement, and support personalized and differentiated learning experiences for students.

#### **1.4 THE DEVELOPMENT AND VALIDATION OF FLIPPED LEARNING IN MATHEMATICS**

The development and validation of flipped learning in mathematics for upper primary school students is a critical endeavor aimed at enhancing academic achievement and promoting deeper understanding of mathematical concepts. This research initiative involves creating instructional materials and activities tailored to the flipped learning model, where students engage with foundational mathematical content outside of the traditional classroom setting. By utilizing pre-recorded lectures, interactive tutorials, or online resources, students can access instructional content at their own pace, allowing for personalized learning experiences.

The validation process involves assessing the effectiveness of flipped learning in improving students' mathematical achievement compared to traditional instructional methods. This assessment may include measuring students' comprehension of mathematical concepts, problem-solving abilities, and overall academic performance. Additionally, the research may explore students' attitudes towards flipped learning, their level of engagement, and their perception of its impact on their learning experiences.

Through rigorous development and validation processes, this research aims to provide empirical evidence supporting the efficacy of flipped learning in mathematics education for upper primary school students. By demonstrating its effectiveness in fostering deeper understanding, critical thinking skills, and academic success, this research has the potential to inform educational practices and curriculum development, ultimately benefiting students, teachers, and educational institutions alike.

## **1.5 ALGEBRA**

Algebra is a foundational and fundamental branch of mathematics that deals with symbols, variables, and mathematical operations to study and solve equations, inequalities, and relationships between quantities. It plays a crucial role in various aspects of mathematics and real-world applications:

**1. Equations and Inequalities:** Algebra is central to solving equations and inequalities. Equations are mathematical statements that express the equality of two quantities, while inequalities compare the relative sizes of two quantities.

Solving equations and inequalities involves manipulating algebraic expressions and applying algebraic rules to find the values of variables that satisfy the given conditions.

**2. Functions and Graphs:** Algebraic functions, such as linear functions, quadratic functions, exponential functions, and logarithmic functions, are essential tools for representing and analyzing relationships between variables. Graphing these functions helps visualize their behavior, identify key features such as intercepts and slopes, and make predictions based on mathematical models.

**3. Systems of Equations:** Algebra is used to solve systems of equations, which are sets of multiple equations with multiple variables. Solving systems of equations involves finding the values of variables that simultaneously satisfy all equations in the system. This concept is widely used in solving optimization problems, balancing chemical reactions, and solving problems involving multiple unknowns.

**4. Polynomials and Factoring:** Algebraic expressions involving polynomials are extensively studied in algebra. Polynomials represent mathematical expressions with multiple terms, and factoring involves breaking down polynomials into simpler components. Factoring is used in simplifying expressions, solving equations, and finding roots of polynomial functions.

**5. Matrices and Linear Algebra:** Algebraic concepts extend to matrices and linear algebra, which are used in solving systems of linear equations, representing transformations in geometry, and analyzing data in statistics and

computer science. Matrices provide a powerful framework for mathematical operations such as addition, multiplication, inversion, and determinant calculation.

**6. Real-World Applications:** Algebra has numerous applications in real-world scenarios, including finance, engineering, physics, computer science, and economics. It is used in calculating interest rates, analyzing data trends, designing algorithms, modeling physical phenomena, and solving optimization problems.

Algebra is a fundamental part of mathematics that provides tools for problem-solving, mathematical modeling, data analysis, and understanding mathematical relationships across various disciplines and applications.

### **1.5.1 Importance**

Algebra holds immense importance in mathematics for several reasons:

**1. Foundation of Advanced Concepts:** Algebra forms the foundation for more advanced mathematical concepts and branches, such as calculus, trigonometry, and linear algebra. It provides the fundamental tools and techniques for solving equations, manipulating variables, and analyzing relationships between quantities, which are essential in higher-level mathematical reasoning and problem-solving.

**2. Problem-Solving Skills:** Studying algebra helps develop critical thinking and problem-solving skills. By learning to solve equations, inequalities, and systems of equations, students develop logical reasoning, analytical skills, and the ability to break down complex problems into manageable steps. These

problem-solving skills are not only valuable in mathematics but also in various real-world applications, including science, engineering, economics, and computer programming.

**3. Modeling Real-World Situations:** Algebraic concepts are widely used in modeling and analyzing real-world situations. From calculating interest rates and financial investments to predicting population growth and analyzing data trends, algebraic equations and functions provide powerful tools for representing and understanding quantitative relationships in diverse fields.

**4. Scientific and Engineering Applications:** Algebra is essential in scientific and engineering disciplines for formulating and solving mathematical models. It is used in physics to describe motion, in chemistry to balance chemical equations, in electrical engineering for circuit analysis, and in computer science for algorithm design and optimization, among other applications.

**5. Career Opportunities:** Proficiency in algebra opens doors to various career opportunities. Many STEM (science, technology, engineering, and mathematics) fields require a strong foundation in algebraic concepts and problem-solving skills. Careers in fields such as finance, data analysis, software development, research, and academia often rely heavily on algebraic reasoning and mathematical modeling.

In essence, algebra plays a pivotal role in mathematics education and beyond, providing the tools, skills, and concepts necessary for understanding complex relationships, solving problems, and making informed decisions in diverse academic and professional contexts.

## **1.6 NEED AND IMPORTANCE OF THE STUDY**

In recent years, educators have used the technological developments in education to create a more effective learning environment in which learning does not seem to be limited to the classroom environment and teachers may not be obliged to spend most of the class time delivering lectures; instead, they can have tutorial roles while students can also take different roles and be more actively involved in the learning process (Tan et al., 2017) Flipped learning presents a promising approach to cater to the diverse learning styles and requirements of students in this critical developmental stage. By investigating the development and validation of flipped learning specifically tailored for mathematics instruction, this study responds to the growing demand for innovative teaching methodologies that enhance student engagement, comprehension, and achievement in mathematics.

The importance of this study is underscored by the potential of flipped learning to transform traditional instructional practices and improve learning outcomes. With educational technology becoming increasingly accessible, there is a growing recognition of the benefits of leveraging digital resources to personalize learning experiences and optimize classroom time for active, collaborative learning. This study seeks to contribute to the body of research on flipped learning by examining its effectiveness in the context of mathematics education for upper primary school students. Furthermore, by validating the impact of flipped learning on students' mathematical achievement, this study

provides valuable insights for educators, policymakers, and curriculum developers seeking evidence-based strategies to enhance mathematics instruction. Understanding the benefits and challenges of implementing flipped learning in the classroom can inform pedagogical practices, resource allocation, and professional development initiatives aimed at improving mathematics education outcomes at the primary school level.

This study addresses a pressing need for innovative approaches to mathematics instruction and underscores the importance of exploring the potential of flipped learning to meet the educational needs of upper primary school students. By investigating its development and validation, this research aims to contribute to the advancement of effective teaching practices and the promotion of academic success in mathematics education.

## **1.7 SCOPE OF THE STUDY**

The scope of this study encompasses several key aspects related to the development and validation of flipped learning in mathematics for upper primary school students. Specifically, the study focuses on: This includes the creation of instructional materials such as pre-recorded lectures, interactive tutorials, and online resources tailored to the flipped learning model. The scope involves selecting appropriate content, designing engaging learning activities, and ensuring accessibility and usability for students.

The study examines the integration of flipped learning into the existing mathematics curriculum for upper primary school students. This involves planning and delivering flipped lessons, providing guidance and support to students, and facilitating interactive activities during class time. The study evaluates the impact of flipped learning on students' mathematical achievement, comprehension, and problem-solving skills. This includes measuring students' performance on assessments, analyzing their engagement and participation, and gathering feedback on their learning experiences.

The scope involves comparing the effectiveness of flipped learning with traditional instructional methods in mathematics education. This includes assessing differences in student performance, attitudes, and learning outcomes between flipped and non-flipped classrooms. The study identifies challenges and obstacles encountered during the implementation of flipped learning in mathematics instruction. It also explores best practices, strategies, and recommendations for overcoming barriers and maximizing the effectiveness of flipped learning in the classroom.

While the study focuses on upper primary school students, findings and insights may have broader implications for mathematics education across different grade levels and contexts. The scope includes considering the generalization and applicability of flipped learning principles and practices beyond the specific study population.

## **1.7 CONTRIBUTION OF THE STUDY**

This study on the development and validation of flipped learning in mathematics for upper primary school students contributes significantly to both educational research and practice. By rigorously evaluating the effectiveness of flipped learning compared to traditional instruction, this research provides empirical evidence of the potential benefits of incorporating innovative pedagogical approaches in primary education. The findings not only shed light on the impact of flipped learning on students' mathematical achievement but also offer insights into enhancing student engagement, motivation, and attitudes towards learning. Additionally, this study informs educational practitioners and policymakers about the feasibility and effectiveness of implementing flipped learning in upper primary school settings, thus offering a pathway for improving teaching practices and curriculum design to better meet the diverse learning needs of students in mathematics education.

## **1.8 OPERATIONAL DEFINITIONS OF KEY TERMS**

**Development:** In this study, development refers to the process of creating and designing instructional materials and activities tailored to the flipped learning model for mathematics education. This includes selecting appropriate content, designing engaging learning experiences, and ensuring accessibility and usability for upper primary school students.

**Validation:** Validation involves assessing the effectiveness and impact of flipped learning on students' mathematical achievement, comprehension, and problem-solving skills. This includes measuring student performance on assessments, analyzing engagement and participation, and gathering feedback on their learning experiences to validate the efficacy of flipped learning in mathematics education.

**Flipped Learning:** For the purposes of this study, flipped learning refers to an instructional approach where students engage with instructional materials, such as pre-recorded lectures, readings, or online resources, independently outside of class time. Class time is then utilized for interactive activities, discussions, and problem-solving facilitated by the teacher.

**Achievement in Mathematics:** Achievement in mathematics refers to students' mastery of mathematical concepts, skills, and problem-solving abilities as outlined in the curriculum standards for upper primary school education. This encompasses students' performance on assessments, their ability to apply mathematical principles in real-world contexts, and their overall proficiency in mathematical reasoning and computation.

**Upper Primary School Students:** For the purposes of this study, upper primary school students are defined as students typically ranging from grades four to six, approximately ages nine to twelve, in the educational system. These students are at a critical stage of mathematical development, building upon foundational skills and preparing for more advanced mathematical concepts in later grades.

## **1.9 OBJECTIVES OF THE STUDY**

1. To find out the significant difference between the pre- and post-tests of the control group among upper primary students.
2. To find out the significant difference between the pre- and post-tests of the experimental group among upper primary students.
3. To find out the significant difference between the pre- tests of the control group and the experimental group among upper primary students.
4. To find out the significant difference between the post-tests of the control group and the experimental group among upper primary students.
5. To find out the significant relationship between the pre- and post-tests of the control group among upper primary students.
6. To find out the significant relationship between the pre- and post-tests of the experimental group among upper primary students.
7. To find out the significant difference between the pre- and post-tests of the control group among upper primary students with respect to demographic variables
8. To find out the significant difference between the pre- and post-tests of the experimental group among upper primary students with respect to demographic variables

## **1.10 CHAPTERISATION**

The present thesis is organised into five chapters, as follows: The first chapter deals with the following, introduction, mathematics education, a brief explanation of flipped learning, the need and significance of the study, and the objectives of the study. The second chapter gives an account of research studies conducted in India and abroad, that are related to the present investigation. The third chapter describes the research methodology adopted for the study, such as the construction of tools, the sample, and the administration of statistical techniques. The fourth chapter deals with the analysis of data, results, and their interpretations. The fifth chapter presents the summary of the findings, discussion, and recommendations for further research. The next chapter deals about the review of related literature.

## **1.11 CONCLUSION**

In this introductory chapter, the rationale and objectives of the study focused on the development and validation of flipped learning as a pedagogical approach to enhance mathematics achievement among upper primary school students. The discussion began by addressing the importance of tackling challenges in mathematics education, particularly in the context of upper primary schooling, where foundational concepts were established. The next chapter deals with review of literature

## **CHAPTER-II**

### **REVIEW OF RELATED LITERATURE**

#### **2.1 INTRODUCTION**

A literature review helps the researcher in learning new ideas, sharing the latest findings with others, or identifying practices that might improve learning in the classroom. Reading the literature also helps to learn how other educators compose their research studies provides useful examples and models in the literature for the research (Creswell, 2012). Review of related literature allows the researcher to acquaint with current knowledge in the field or area to conduct the research. It also enables the researcher to define the limits in the field. Through the review of related literature, the researcher can avoid unintentional duplication of well-established findings. It gives the researcher an understanding of the research methodology which refers to the way the study is to be conducted. It also helps to know about the recommendations of previous researchers listed in their studies for further research (Koul, 2012).

#### **2.2 RELATED STUDEIS**

**Felix Oromena Egara (2023)** investigated the impact of the flipped classroom learning approach on mathematics achievement and interest among secondary school students. Using a quasi-experimental design with a non-equivalent pretest-posttest control group, the study involved 673 seniors in class one (SS 1) from Igbo-Etiti Local Government Area in Enugu State. Eighty-six

learners were purposively sampled from two schools, each with two SS 1 classes divided into experimental and control groups through balloting. Data were collected using the Mathematics Achievement Test (MAT) and Mathematics Interest Inventory (MII). Results from SPSS analysis revealed that students taught mathematics using the flipped classroom approach exhibited higher mathematics achievement and interest scores compared to those taught conventionally. Additionally, gender did not influence achievement and interest scores among students using the flipped classroom approach. Recommendations included the adoption of the flipped classroom approach by mathematics teachers to enhance students' achievement and interest, particularly in geometry.

**Josephine (2023)** explored the effectiveness of the flipped classroom approach on students' academic achievement in Mathematics in the Modern World. Employing an experimental research design with a true control group pretest-posttest, the study involved BSIT students from Quezon City University, divided into control and experimental groups. Faculty members assessed the effectiveness of the flipped classroom approach using a survey questionnaire. Results indicated that the flipped classroom approach significantly improved academic performance compared to traditional methods. The study suggests adopting the flipped classroom approach as an alternative modality for teaching and learning.

**Sharma and Chowdhry (2021)** conducted a research study titled, "Employing flipped classroom approach as a means to improve students' overall positivity and achieve a greater level of self-confidence. Traditional lecture

methods were compared to the flipped classroom technique in a quasi-experimental research study. T Self-efficacy was shown to have increased across the board in the study, as well as a promising increase in students' Self-Confidence and Positive Attitudes. The study also revealed that if we want students to learn more effectively, we'll need to offer blended flipped techniques that appear to integrate both face-to-face and online instruction.

**Hermilo A. Arbuyes (2021)** investigated the effectiveness of the flipped learning approach in teaching mathematics and its impact on students' achievement, attitudes, and self-regulation. Employing a pre-test-post-test quasi-experimental design, the study involved grade-12 high school students as experimental and control groups. Findings indicated that flipped learning positively influenced mathematics achievement, attitudes towards mathematics, and self-regulation levels. T-test results showed a significant increase in post-test scores for the experimental group, suggesting superior performance compared to the control group.

**S.Sandhu et. al. (2019)** conducted a study "Developing a FC framework to improve tertiary education students' learning engagements in India". An exploratory study was conducted in North India to assess public awareness of FC and interest in their implementation in HE classes. A qualitative study was conducted with 26 lecturers from Punjab, New Delhi, and Maharashtra institutions. Although participants did not fully get the concept of FC, the findings revealed that they were generally positive about them. The study

suggested that the teachers should be given proper training to teach the students using FC.

**Dr. Tarik TALAN (2019)** compared the effects of a flipped classroom, blended learning, and face-to-face learning on students' achievements, academic engagement, and satisfaction levels. The study formed one control group and two experimental groups. Experiment-I students engaged with online materials before class (flipped classroom), Experiment-II students utilized blended learning, and the control group followed traditional instruction. Analysis revealed significantly higher achievement and engagement scores among experimental group students compared to the control group. Additionally, students expressed satisfaction with the flipped classroom model.

**Erin Stratton (2019)** attempted that Evaluating Flipped Versus Face-to-face Classrooms in Middle School on Science Achievement and Student Perceptions. The objectives of this study was to compare how face-to-face instruction and flipped learning differed in terms of student achievement in seventh grade science classes, as well as to assess how students who were in the flipped classroom felt about their experiences. The study design was a matching only pre-test and post-test control group design. The major findings of this study reveals that the student survey data were largely positive, with the majority of students indicating that they enjoyed the flipped model. Large percentages felt that they learned more and were more motivated to learn. Large percentages of students reported increased engagement and motivation under the flipped model and flipped instruction was as effective as face-toface instruction.

**N. S. Goedhart et.al., (2019)** investigated that the flipped classroom: supporting a diverse group of students in their learning. The objectives of this study examined the effects of a flipped classroom trial conducted during a Master's course at the Vrije University it Amsterdam in the Netherlands. In this exploratory study, the researchers evaluated five flipped classroom sessions by using a mixed methods quantitative and qualitative approach with data triangulation. The major findings of this study revealed that More students in the flipped classroom prepared beforehand compared with the traditional lecture, which helped the students to spread the workload and study throughout the course. Some students might already study in this way, but for those with different learning styles who struggle to plan and equally spread the workload over the semester, such an approach could help them to achieve better results.

**Talan and Gulsecen (2019)** compared a flipped classroom with blended learning and face-to-face learning environments and the aim was to identify the effect of these learning environments on students' achievements, academic engagement and satisfaction levels. Based on this aim, one control and two experimental groups were formed. The students in Experiment-I learned the theoretical aspect of the course through the materials in the online learning environment which were prepared prior to the class study time in context with the —flipped classroom|. The students in Experiment-II learned the theoretical aspect of the course in the classroom in accordance with the blended learning model and fulfilled active learning activities out of class study time. The students in the control group learned the theoretical aspect of the course in the classroom

according to the current curriculum and conducted active learning activities at their homes. It was found that the scores for the students in the experimental groups with regard to academic achievement and engagement were 38 higher than the scores for those in the control group and the differences between the groups were statistically significant. It was revealed that the students were also generally satisfied with the flipped classroom.

**Sandeep Sandhu (2019)** conducted a study on Developing a Flipped Classroom Framework to Enhance Learning Engagements of Tertiary Education Students in India India has a large segment of the population with very limited access to higher education (HE). In this, northern states are worse than southern states. Access to HE is further complicated by lack of access to personal computers; however, there is a large portion of the population that has access to mobile phone technology. Coupled with this is the potential that the flipped classroom system can offer HE in North India; improving the costs of mobile technologies. This paper reports on an initial, scoping study to understand the level of awareness of the flipped classroom system in North India and if there is any appetite for it in HE classrooms. A qualitative research study was conducted using a sample of 26 lecturers from various universities in Punjab, New Delhi and Mahale. The results showed that participants generally had a positive view of flipped classrooms, even if they did not fully understand it. This suggests that it would be helpful to make teachers more aware of using the flipped classroom method and provide them with adequate training to adopt this method. It also

suggests that the use of a social networking platform (for example, WhatsApp) may be considered to help facilitate flipped classrooms.

**Kehoe et.al., (2018)** investigated *The Double Flip: Applying a Flipped Learning Approach to Teach the Teacher and Improve Student Satisfaction*. This study describes a professional development (PD) program for academics at an Australian university designed to model good blended curriculum design and effective use of contemporary learning technologies. The case study method was used in this study. This paper has demonstrated the efficacy of a professional-development program for academic teachers that models best practice in curriculum and learning design by using a flipped approach.

**Didem Alsancak Sirakaya (2018)** examined the effect of a flipped classroom model on academic achievement, self-directed learning readiness, motivation, and retention among students taking the "Scientific Research Methods" course at Ahi Evran University. Utilizing a quasi-experimental design with an experimental and control group, the study involved 66 students in the Faculty of Education. The experimental group received the flipped classroom model, while the control group received classical blended learning. Findings revealed significant differences between groups in academic achievement, motivation, and retention, with no significant difference in self-directed learning readiness. The study recommends the implementation of the flipped classroom model as an effective teaching and learning approach.

**Shyr and Chen (2018)** researched on , “A technology enhanced flipped learning system to improve student self-regulation and performance”. The purpose of the study was to determine the efficiency of flipped language learning that was aided by technology. The study's findings will help improve learning and self-regulation. The results demonstrated that compared to regular classrooms, FC Strategies improved both student attitudes and learning performance. This study's findings improved our understanding of FC dynamics.

**Zhu and Xie (2018)** compared the outcomes of mixed and traditional learning. The study's goal was to compare blended learning to traditional learning. The study looked at students' learning results in two ESL courses at a comprehensive university in Beijing, China. In this study, student characteristics such as gender, grade, knowledge domain, learning styles, and performance were investigated. Gender, grade, knowledge domain, and pre-test were used as covariates to compare student performance in blended and traditional learning. The findings revealed that students who used blended learning had higher academic accomplishment in their ESL courses when compared to students who used the traditional face-to-face learning mode.

**Emine Cab (2018)** conducted a study with a dual objective: to assess the impact of the Flipped Classroom (FC) Model on students' academic achievement and to gauge students' perceptions of the model. The experimental group experienced four weeks of instruction in a blended learning format with the FC Model, while the control group received traditional blended learning. Both groups underwent pre-test and post-test assessments. Data analysis via a two-way

ANOVA for Mixed Measures found no statistically significant differences in test scores between the groups. Positive aspects of the FC Model included students' preparedness for class and completing assignments during class time, alleviating the need for homework. However, challenges related to motivation, content, and learning were identified. The study concludes by offering insights into the advantages and disadvantages of the FC Model based on participant feedback, along with recommendations.

**Hamaidi (2018)** investigated the effect of flipped classroom strategy on the academic achievement in science among fourth grade students in Jordan. The sample consisted of 44 male and female students who were chosen purposely from the study population. The sample was distributed into two groups: the experimental group that consisted of 22 students, who has studied according to flipped classroom strategy, and the control group that consisted of 22 students, who has studied in the ordinary method. An achievement test was prepared, and its validity and reliability were checked. ANCOVA, Mean and Standard Deviation were used to analyse the collected research data. The findings revealed that the educational achievement test attributed to the teaching strategy is higher, in favour of the members of the experimental group

**Dipti Parita (2018)** investigated Impact of Flipped Teaching The aim of this research is to examine the impact of flipped teaching on student performance at school level in India in comparison to two different traditional/conventional teaching methods in different media/educational contexts. Media (English and Odia/Vernacular) in Secondary Schools. The study included science-teaching

classes to determine the effect of teaching methods. A total of 180 students from Odia secondary schools and English secondary schools were interviewed; 90 participants were from English or Odia secondary schools. It was found that flipped teaching significantly improved learners' performance after the instructional intervention. However, English medium students performed significantly better than Odia/vernacular medium students.

**Fisher, Ross, LaFerriere, and Martiz (2017)** evaluated flipped learning, flipped satisfaction, and striking the proper balance in students enrolled in higher education. The study aimed at analysing the students perception of engagement, satisfaction and achievement in relation to new FC learning Strategy. A case study interview and student survey were used to analyse the data for the study. The results revealed the preference of students to the FC learning over the traditional learning and the usage of digital technology improved engagement, satisfaction, and learning outcomes.

**Mukherjee and Pillai (2017)** explored the relationship between learners' attributes and flipped classroom success in the Malaysian context. This paper is set out to primarily explore four learners' attributes, namely cultural orientation, language competency, personality types and learning styles as antecedents to flipped classroom success during the initial phase. The learning is drawn from a case study experience of an international Australia university in Malaysia. The findings revealed that the students in introductory phase of the flipped classroom model reported being less than satisfied with the way they were prepared for the task they were given. This inextricably affected the learning outcome.

**Yilmaz (2017)** investigated higher education classroom in environmental education course in primary education. The study participants are undergraduate students who are enrolled department of primary education in faculty of education. This study used a mixed-method to answer research questions. Students were post-tested on usage of flipped classroom model in the frame of instructional materials attitude. And, focus group interview used to get students' perceptions. It was found that the students' attitude towards the flipped classroom were positive and the flipped classroom model is effective on instruction and learning environment and individual changes

**Andersen, Foss and Jespersen (2017)** analyzed the didactic model of flipped physics classroom in primary school. Four teachers in three classes observed student activity in the classroom. The preliminary ideas used in the classroom were: i) the student's use of terms and vocabulary in relation to assignments and subject content, ii) the student's use of tools during experiments, iii) the student's initiative and ability to take responsibility and iv) the student's collaboration. It was found that the flipped classroom method promotes the amount of time used on student-centered activities during lessons. Students and teachers are positive towards the method. The data showed a change from teacher-centered lessons to student-centered lessons which represents a possibility to strengthen the students learning.

**Camiling (2017)** analyzed the teaching of the basic science process skills to high- performing 2nd grade students using flipped classroom. The purpose of the study was to examine the effectiveness of flipped learning method in teaching

basic science process skills to high performing 2nd grade students. The objective of the study was to evaluate if there is a difference between the mean scores of two sets of samples on a test of basic science process skills. An experimental design was used as the participants were divided into two groups: experimental and control. The experimental group was asked to watch at home researcher-made videos that teach the basic science process skills. In class, the participants deepened their understanding of the skills through varied activities. Pre-test and post-test were administered to check the relative test scores. It was found that there is a statistically significant difference with a large effect size between the two variables. From the result it was concluded that the emerging instructional approach is deemed effective.

**Cheng and Weng (2017)** studied the factors that influence the digital media teaching of primary school teachers in a flipped class. This study focused on the key roles that affect the success of a flipped classroom. The research was conducted with a questionnaire survey created from a study of literature review. From a total of 441 teachers, 424 valid response sheets (96.14%) were received. The findings revealed that a teacher's attitude of using digital media had positive effect on student's learning achievement and parental involvement had a positive effect on student's learning achievement.

**Mohanty and Parita (2016)** investigated the effectiveness and relevance of flipped classroom instruction using a pilot study at the school level in India. The purpose of the study was to compare the effects of flipped and traditional instruction on learning outcomes of elementary school children in history and

science. 90 primary school children were randomly assigned to control or experimental group. This study used a pre-test and post-test quasi-experimental design to examine the effectiveness of flipped classroom instruction in improving elementary school students' performance in history and science subjects. Findings revealed no difference between the two groups at baseline, (before intervention) in performance. But comparing the post-test scores, the test/flipped group performed better in history and science subjects. The results showed that the flipped instruction method significantly affected and improved the performance of school students at the primary level.

**Kriewaldt (2016)** analyzed the primary flipped classroom which differs greatly from the traditional high school flip in four ways. The objective was to create four types of video content based on curriculum, basics, hooks and parents. The content was based on curriculum focused and was scaffolded to front load students and designed to support and engage parents. Parent content was shared via school social media, the newsletter or homework grid. In the Primary School parents were interested in the daily events within their child's class and were eager to support their children in their learning, even happy to help with homework. It was found that creating videos with both parents and students in mind, content they can watch together, parents feel like they have a good grasp of what their child is learning at school throughout the day. This collaborative approach to homework lays the ground work for an ongoing positive relationship with homework, for both students and parents.

**Strohmyer (2016)** conducted a study on Student perceptions of flipped learning in a high school math classroom. The purpose of this study was to explore high school math students' lived experiences of flipped learning related to content and instruction, critical thinking, and collaboration and interactions. A phenomenological design was employed using a conceptual framework combining cognitive load theory, socio-cultural learning theory, and schema theory. Key results included students' perceptions of increased engagement and interactions, as well as more in-depth learning in flipped environments. Increased critical thinking was related to both instructional strategies employed and students' ability to self-regulate learning. Concepts of peer collaboration shifted as students viewed learning environments and sources of expertise as more extensive in the flipped environment

**FezileOzdamli et.al., (2016)** investigated on Flipped classroom approach. The aim of study is to attract attention to its potential in education field and provide to make it recognize more by educators and researchers. This study can attract attention of educators about the potential of approach and can form a point of view how to use it in their courses. For expanding of flipped classroom approach in educational institutions, it is thought that the approach has to be cognitively and practically presented. Accordingly the skills of teachers in designing materials by using multiple equipments and to transform these materials with learning management systems, have to be developed. The positive development in desire, interest and motivation of educators using technological equipments will be effective in spreading of this approach. In future studies the

applications of flipped classroom approach in different education levels can be analysed.

**Amuda and Balakrishnan (2015)** analysed the experiences and challenges faced by postgraduate students in two Asian countries, India and Malaysia, in using the flipped classroom. Participants of the study were 53 postgraduate students, 30 from Tamil Nadu, India and 23 from Malaysia. Data was collected through survey. The study found high similarities with very minor differences between the two countries. Both countries seem to score higher on experiences than challenges and accept the use of flipped classrooms.

**Ramani (2015)** investigated flipped classrooms and found that flipping classes enabled students to actively engage in self-directed learning and that students took ownership of their learning. Key elements of the flipped classroom were seen as creating a learning environment for students to gain first exposure to content, encouraging class preparation through praise and grades/grades as part of continuous assessment, and providing a system for assessment. Provide in-class activities that focus on students' knowledge and higher-order thinking skills.

**Tsai, Shen and Lu (2015)** studied the effects of problem-based learning with flipped classroom on elementary students' computing skills. This study used quasi-experimental design. In this study, 144 elementary school students were selected from six grade sections taking a course titled 'Production of ebook' and were assigned into three groups: FPBL group (n = 50), PBL group (n = 48), Control group (n = 46). Both quantitative and qualitative data were collected,

including interviews with students and teacher's journal. Based on the analysis, it was found that the effect of FPBL on improving students' learning performance was significantly higher than other teaching methods.

**Ingram, Wiley, Miller and Wyberg (2014)** examined a flipped math classroom for fourth and fifth grade classrooms. The purpose of the study was to find out to what extent are there differences between flipped classrooms and comparison classrooms by providing face-to-face instruction in mathematics to students and to find out the differences in students' experiences of learning mathematics between students in flipped classrooms and students in comparison classrooms. The data was collected through observations of instruction, an online student survey, small group discussions with students, and teacher interviews. From the findings it was concluded that students in flipped classrooms have more time to work on their assigned problems, differentiated instruction occurs more often in the flipped classrooms than the comparison classrooms. The result suggested that in a flipped classroom the teacher has more opportunity to work with a small group of students because the teacher was spending less time talking to the whole class.

**Coufal (2014)** conducted a study on Flipped learning instructional model: Perceptions of video delivery to support engagement in eighth grade Math. The purpose of this case study was to explore the perceptions of eighth grade math students, their teachers, and their administrators regarding the use of video delivery to support engagement in a flipped learning instructional model. Findings from the study suggested that student engagement was significantly

higher when being taught from the flipped learning instructional model. Implications for practice would suggest educators acquire a deeper understanding and implementation of flipped learning.

**Wiginton (2013)** conducted a study to investigate the effect of learning environment on student mathematics achievement, and mathematics self-efficacy and student learning style in a ninth grade Algebra I classroom. The study also explored the lived experiences of the teachers and students in the three different learning environments and the effect students' learning style had on preference for learning environment. Key findings of the study were: 1) students in the flipped Active and flipped Mastery learning environments scored significantly higher on mathematics achievement than students in the Traditional learning environment; 2) students in the flipped Mastery learning environment scored significantly higher on mathematics self-efficacy than students in the Traditional learning environment; 3) students in both the Flipped Active and Flipped Mastery learning environments appreciated the level of control over the learning process but were dissatisfied by the inability to ask realtime questions; 4) students in the Flipped Mastery learning environment enjoyed working at an individualistic pace but struggled with falling behind; and 5) students preferring active, sensing, sequential, and verbal learning experiences expressed satisfaction with both the Flipped Active and Flipped Mastery learning environments. The study findings suggested that classroom teachers should utilize the Flipped Instructional approach to make more in-28 class time for active learning

strategies; and implement mastery learning strategies to promote student responsibility, selfregulation, and ownership of the learning process.

**Schwankl (2013)** studied the effect of Flipped classroom on achievement and student perception. This action research investigated the impact on student learning 32 and students' perceptions when instruction was delivered by the flipped classroom delivery method. One section of Integrated II Mathematics received instruction through traditional means while another section received instruction through a flipped classroom delivery method. Both sections received the same pretest, posttest, and set of six quizzes which were compared using independent-samples t tests. Additionally, the flipped classroom instruction completed a survey at the end of the unit on basic trigonometry concepts. Three of the six quizzes had significantly higher scores for the students who received instruction through the flipped classroom. Survey responses yielded no significant differences, but all scores were higher for the students who received instruction by the flipped classroom instructional method. The study suggests some material may be better delivered by the flipped classroom method of delivery and students have an overall more positive attitude toward their learning in a flipped classroom

**Roosevelt (2011)** investigated flipped classroom in a fifth-grade math class. The contents were blogged so that students watch and listen to lessons for homework, and then used the class-time for tackling difficult problems, working in groups, collaborating, and creating. The students watched a Khan Academy videos on how to multiply fractions. During class time you would do a quick

review then work on an activity where the students can collaborate with their classmates on more challenging real-world problems. It was found that all the students had mastered the concept based on my quick assessment. Many students loved that they could watch it multiple times and stop it when they needed to.

**Toto and Nguyen (2009)** explored students' perception of the flipped classroom technique using videotaped lectures as the alternate format. There were 89 students overall in both sections of the course and 74 students consented to participate in the study. Instructor is coordinating the balance between a passive teacher-centered model of instruction (e.g. traditional lecture format) and an active student-centered model (e.g. engaging students in active learning). The result of the study indicates that students' learning style in flipped classroom tended to be more active, sensing, visual and sequential learners. It was found that students need more time to be spent at the beginning of the class reviewing the video content and the students agreed that the videos were enjoyable to watch.

**Villanueva (2008)** evaluated the effect of a flipped classroom model in an elementary inclusion math class to increase student motivation for 6th grade students. It was found that flipping the classroom promoted learning in the inclusion class. It allows to work with one on one with individual students or in small groups, while other student was viewing the videos and engaging in the different tasks.

## **2.3 IDENTIFICATION OF RESEARCH GAP**

This study makes a significant contribution to understanding the effectiveness of flipped learning in mathematics education, there are several research gaps that warrant further investigation. Firstly, the study primarily focuses on upper primary school students, leaving a gap in understanding how flipped learning impacts students at different educational levels. Additionally, the study could benefit from exploring the long-term effects of flipped learning on students' mathematical achievement and retention of knowledge over time. Furthermore, while the study evaluates the impact of flipped learning on academic achievement, it could delve deeper into its effects on other important outcomes such as critical thinking skills, problem-solving abilities, and overall attitudes towards mathematics. Lastly, the study could expand its scope to investigate the potential moderating factors that may influence the effectiveness of flipped learning, such as teacher characteristics, classroom environment, and student demographics. Addressing these research gaps would provide a more comprehensive understanding of the role of flipped learning in enhancing mathematics education across different contexts.

## **2.4 CONCLUSION**

The review of related studies enhanced the investigator ability to have a clear perspective on the problem chosen for the present investigation. Based on the survey of related studies, an appropriate methodology and a well-organized approach could be adopted for the present study, which is dealt with in the subsequent chapter.

## **CHAPTER-III**

### **METHODOLOGY**

#### **3.1 INTRODUCTION**

According to **John Best (2002)** research is considered to be a more formal, systematic, and intensive, process of carrying out the scientific method of analysis. It involves a more systematic structure of investigation, usually resulting in some sort of formal record of procedures and a report of results or conclusions - Research methodology can be understood as a way to systemically solve or answer the research problem. Thus, essentially, it can be understood as the process of studying how research is done in a scientific manner. This chapter presents the methodological approach of this study. Here, the investigator explained the rationale of the study, the statement of the problem, the operational definition of key terms, the objectives of the study, the hypotheses of the study, the research method, and the research tools, a sample of the study, the development of instructional strategies, the validation of tools, and the delimitation of the study.

#### **3.2 STATEMENT OF THE PROBLEM**

The problem stated that this study focuses on the development and validation of flipped learning as a teaching approach and its impact on achievement in mathematics among upper primary school students. The problem addresses the need to investigate the effectiveness of flipped learning in

enhancing students' understanding and performance in mathematics, considering the potential benefits of this instructional method in promoting active learning, engagement, and deeper comprehension of mathematical concepts. Additionally, the study aims to validate the efficacy of flipped learning specifically tailored for upper primary school students, acknowledging the importance of adapting pedagogical strategies to meet the unique learning needs and developmental stages of this student population.

### **3.3 OBJECTIVES OF THE STUDY**

1. To find out the significant difference between the pre- and post-tests of the control group among upper primary students.
2. To find out the significant difference between the pre- and post-tests of the experimental group among upper primary students.
3. To find out the significant difference between the pre- tests of the control group and the experimental group among upper primary students.
4. To find out the significant difference between the post-tests of the control group and the experimental group among upper primary students.
5. To find out the significant relationship between the pre- and post-tests of the control group among upper primary students.
6. To find out the significant relationship between the pre- and post-tests of the experimental group among upper primary students.

7. To find out the significant difference between the pre- and post-tests of the control group among upper primary students with respect to demographic variables
8. To find out the significant difference between the pre- and post-tests of the experimental group among upper primary students with respect to demographic variables

### **3.4 HYPOTHESES OF THE STUDY**

1. There is no significant difference between the pre- and post-tests of the control group among upper primary students.
2. There is no significant difference between the pre- and post-tests of the experimental group among upper primary students.
3. There is no significant difference between the pre- tests of the control group and the experimental group among upper primary students.
4. There is no significant difference between the post-tests of the control group and the experimental group among upper primary students.
5. There is no significant relationship between the pre- and post-tests of the control group among upper primary students.
6. There is no significant relationship between the pre- and post-tests of the experimental group among upper primary students.
7. There is no significant difference between the pre- and post-tests of the control group among upper primary students with respect to demographic variables

8. There is no significant difference between the pre- and post-tests of the experimental group among upper primary students with respect to demographic variables

### **3.5 RESEARCH METHOD**

In this study, an Experimental Method with a Parallel Group design was employed to investigate the Development and Validation of Flipped Learning on Achievement in Mathematics Among Upper Primary School Students.

### **3.6 VARIABLES OF THE STUDY**

**Dependent Variable:** Learning Achievement in Maths

**Independent Variables:** Flipped Learning

### **3.7 TOOLS USED FOR THE STUDY**

The following tools are used in this study.

- Flipped Learning
- Achievement test (Pre-test and Post test)

### **3.8 CONSTRUCTION OF RESEARCH TOOLS**

#### **Flipped Learning**

These modules comprise pre-recorded video lectures, interactive activities, and supplementary materials designed to cover key mathematical concepts relevant to the upper primary school curriculum. The modules are structured to encourage self-paced learning and active engagement with the

content outside of traditional classroom settings. Develop a series of video lectures, interactive activities, and supplementary materials that align with the upper primary school mathematics curriculum. Ensure that the content is clear, engaging, and suitable for self-directed learning, with a focus on fostering conceptual understanding.

The development process of flipped learning in the study "Development and Validation of Flipped Learning on Achievement in Mathematics Among Upper Primary School Students" involved several key steps. First, a comprehensive review of existing flipped learning models and best practices in mathematics education was conducted to inform the design process. Based on this review, a curriculum framework was developed, outlining the core mathematical concepts and learning objectives to be addressed through flipped learning modules. Next, instructional designers collaborated with subject matter experts to create engaging and interactive video lectures, practice activities, and supplementary materials aligned with the curriculum framework. The content was tailored to suit the cognitive abilities and learning styles of upper primary school students, ensuring clarity, relevance, and progression of difficulty. Feedback from pilot testing and expert review sessions was incorporated to refine the flipped learning modules further, addressing any usability issues or content gaps. The finalized flipped learning resources were then validated through a series of iterative revisions and adjustments to ensure instructional effectiveness and alignment with learning outcomes.

### **Pre and Post-Tests:**

Standardized tests or assessments are administered both before and after the implementation of flipped learning. These tests evaluate students' understanding and mastery of mathematical topics, providing quantitative data to measure the effectiveness of the flipped learning approach on academic achievement. Design pre and post-tests that cover the same set of mathematical concepts to assess students' knowledge growth over time. Ensure the tests are reliable, valid, and appropriately challenging for the target student population

## **3.9 VALIDATION OF TOOLS**

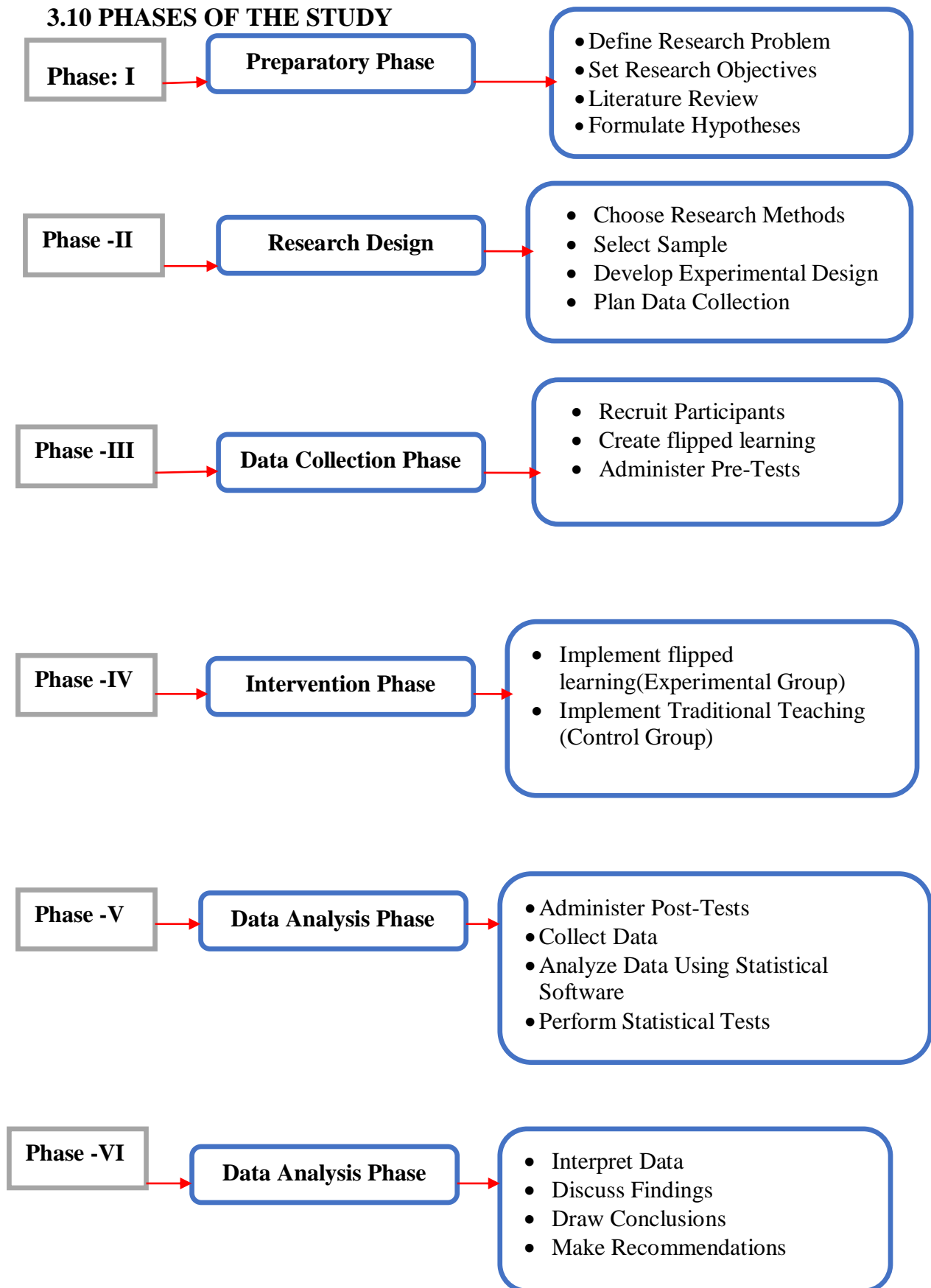
### **VALIDITY**

Validity in this context pertains to the tool's adequacy and authenticity in measuring its intended purpose. A tool is considered effective when it accurately measures what it is designed to assess. Evaluating the visual and content effectiveness of tools involves distributing them to subject experts, the research supervisor, and technical experts for assessment and feedback.

### **RELIABILITY**

To assess the reliability of the achievement test, both Cronbach's Alpha test and the retest method were employed. The obtained reliability for the mathematics achievement tests were 0.79, indicating a high level of reliability for the tools used in the study.

### 3.10 PHASES OF THE STUDY



### **3.11 SAMPLE AND SAMPLING TECHNIQUES**

For the research investigation, the researcher selected 40 students for the experimental group and another 40 students for the control group. This selection process occurred at GHSS Kilumathur School in Perambalur District, where both the experimental and control groups were established. The researcher employed purposive sampling techniques to meticulously choose the sample for this study.

### **3.12 CONDUCTING EXPERIMENTATION**

#### **Conducting Pre test**

A data-collection achievement test was administered as a pre-test to learners from both the control and experimental groups to assess their initial performance levels.

#### **Treatment**

The investigator began by creating or sourcing flipped learning specifically designed to teach mathematics. These flipped learning were carefully crafted to align with the research objectives and learning objectives. Before administering the video, the investigator ensured that all technical aspects were in order. This included confirming that the modules were easily accessible to the participants and that any necessary equipment (computers, tablets, etc.) was set up and functioning correctly. The videos were then delivered to the experimental group of students. This could involve online distribution, in-class viewing, or any other method deemed suitable for the research context.

### **Conducting Post test**

Following treatment with the experimental group, a post-test was administered to both the control and experimental groups. The aim of the post-test was to assess the final learning outcomes of the students in both groups regarding selected process skills. After the treatment period, the investigator conducted a post-test to evaluate the students' understanding of mathematics covered in the flipped learning. The post-test could have a similar format to the pre-test, enabling a direct comparison of learning outcomes.

### **3.13 DATA COLLECTION**

The investigator visited the schools located in and around Perambalur District by getting permission from the headmasters of various schools. Before administering the research tools, the investigator explained the aim and purpose of the study and then administered the research tools to secondary school students. The collected data were used for data analysis. After collecting data, the investigator gave frequencies for all question items and then entered the data in a master table.

### **3.14 DATA ANALYSIS**

The following statistical techniques are used in the present study

- Descriptive Analysis
- Differential Analysis
- Correlation Analysis
- Effect Size

### **3.15 DELIMITATION OF THE STUDY**

The following is a delimitation of the study

1. The investigator adopted a single group experimental design.
2. The present study is limited to upper primary students who were with the category of learning in mathematics.
3. The present study is limited to students who were studying at the upper primary level in and around Perambalur District

### **3.16 CONCLUSION**

The entire research plan is explained in this chapter entitled methodology. The method adopted in the study, sample selected for the study, the size of the sample, tools used in the study, reliability and validity of the tools used, design of study, collection of data, and statistical techniques used to analysis the data are explained in this chapter. The next chapter deals with Analysis and Interpretation of Data.

## CHAPTER-IV

### DATA ANALYSIS AND INTERPRETATION

#### 4.1 INTRODUCTION

According to Best and Kahn (2012) “Statistics is defined as a body of mathematical techniques or processes for gathering, organizing, analysing and interpreting numerical data”. Analysis includes the computation of certain measures along with searching for a pattern of relationship that exists among data groups. Thus, the significant task of a researcher is the analysis of collected data. The data, thus collected, are analysed statistically, and the interpretations are also given.

#### 4.2 DATA ANALYSIS

**Table 1**

**Pretest and Post test score control group**

| S.No | Pre test | Post test |
|------|----------|-----------|
| 1    | 27       | 36        |
| 2    | 24       | 41        |
| 3    | 27       | 38        |
| 4    | 23       | 41        |
| 5    | 30       | 39        |
| 6    | 23       | 40        |
| 7    | 21       | 37        |
| 8    | 20       | 36        |
| 9    | 28       | 37        |
| 10   | 31       | 39        |
| 11   | 28       | 36        |
| 12   | 24       | 48        |
| 13   | 28       | 49        |
| 14   | 25       | 48        |
| 15   | 24       | 40        |

|    |    |    |
|----|----|----|
| 16 | 25 | 44 |
| 17 | 26 | 49 |
| 18 | 25 | 41 |
| 19 | 23 | 42 |
| 20 | 26 | 42 |
| 21 | 28 | 47 |
| 22 | 26 | 42 |
| 23 | 32 | 40 |
| 24 | 34 | 41 |
| 25 | 31 | 39 |
| 26 | 26 | 44 |
| 27 | 25 | 43 |
| 28 | 20 | 54 |
| 29 | 23 | 41 |
| 30 | 26 | 49 |
| 31 | 28 | 45 |
| 32 | 25 | 43 |
| 33 | 32 | 40 |
| 34 | 34 | 41 |
| 35 | 31 | 39 |
| 36 | 26 | 44 |
| 37 | 25 | 43 |
| 38 | 21 | 37 |
| 39 | 20 | 36 |
| 40 | 28 | 37 |

**Table 2**

**Pretest and Post test score Experimental group**

| <b>S.No</b> | <b>Pre test</b> | <b>Post test</b> |
|-------------|-----------------|------------------|
| 1           | 30              | 52               |
| 2           | 36              | 54               |
| 3           | 28              | 54               |
| 4           | 37              | 58               |
| 5           | 31              | 56               |
| 6           | 27              | 52               |
| 7           | 30              | 56               |

|    |    |    |
|----|----|----|
| 8  | 29 | 62 |
| 9  | 31 | 57 |
| 10 | 31 | 56 |
| 11 | 26 | 66 |
| 12 | 30 | 50 |
| 13 | 26 | 54 |
| 14 | 34 | 62 |
| 15 | 29 | 68 |
| 16 | 30 | 52 |
| 17 | 33 | 58 |
| 18 | 31 | 66 |
| 19 | 32 | 62 |
| 20 | 29 | 56 |
| 21 | 30 | 68 |
| 22 | 31 | 58 |
| 23 | 29 | 46 |
| 24 | 28 | 56 |
| 25 | 29 | 58 |
| 26 | 36 | 50 |
| 27 | 30 | 58 |
| 28 | 36 | 56 |
| 29 | 33 | 55 |
| 30 | 30 | 52 |
| 31 | 38 | 63 |
| 32 | 30 | 48 |
| 33 | 27 | 58 |
| 34 | 30 | 64 |
| 35 | 29 | 58 |
| 36 | 31 | 61 |
| 37 | 31 | 45 |
| 38 | 26 | 56 |
| 39 | 30 | 60 |
| 40 | 26 | 48 |

### 4.3 HYPOTHESIS TESTING

*Hypothesis:1 There is no significant difference between the pre- and post-tests of the control group among upper primary students.*

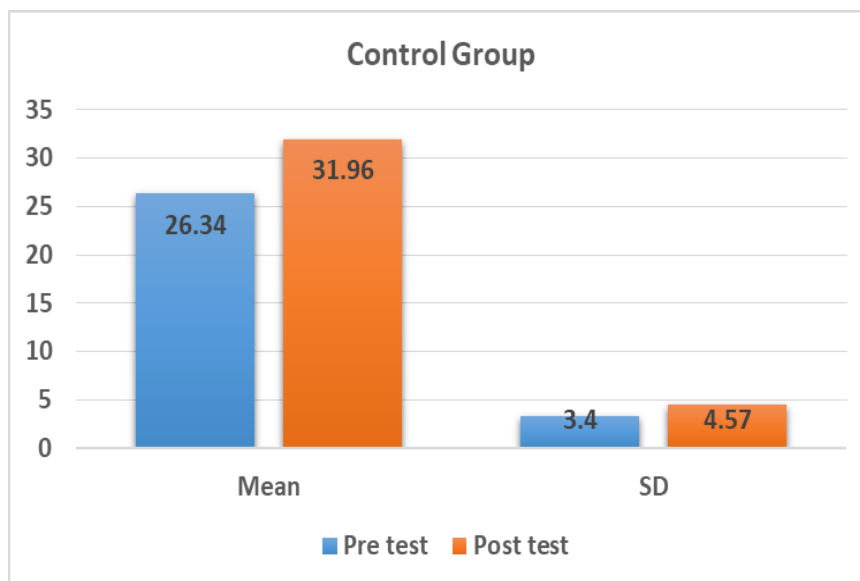
**Table 3**

**Mean SD and t test scores of pre and post test of control group**

| Control group | N  | Mean | SD   | 't' value | Level of Significance |
|---------------|----|------|------|-----------|-----------------------|
| Pre test      | 40 | 28   | 3.40 | 19.36     | S                     |
| Post test     | 40 | 41.7 | 4.57 |           |                       |

Significant at 0.05 level 1.98

The above table show that the mean scores of post-test of control group 41.7 is higher than the mean scores pre-test 28. The calculated 't' value 19.36 is greater than the table value 1.98 significant at 0.05 level. Hence the hypothesis is rejected. It is concluded that there is significant difference between the pre- and post-tests of the control group among upper primary students.



*Hypothesis:2 There is no significant difference between the pre- and post-tests of the experimental group among upper primary students.*

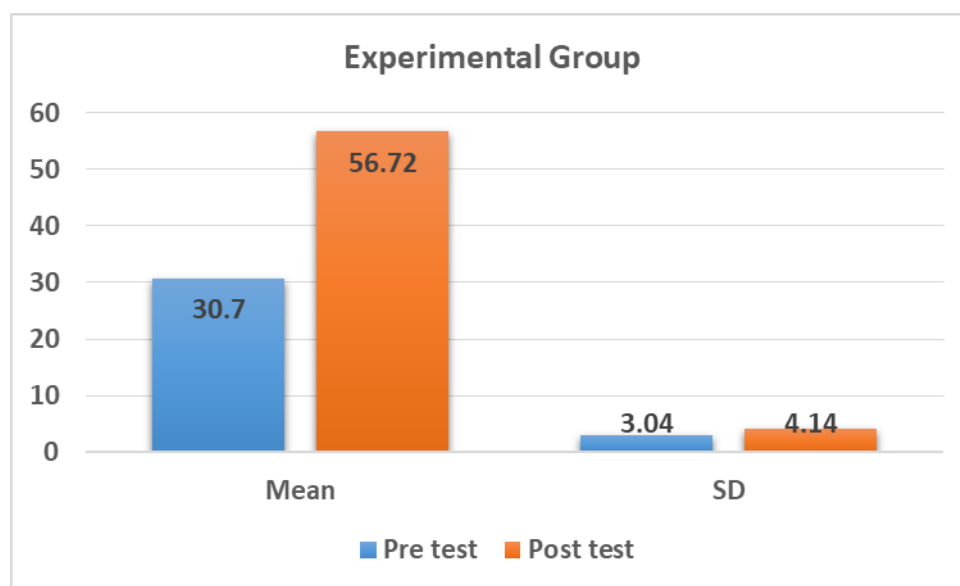
**Table 4**

**Mean SD and t test scores of pre and post test of experimental group**

| <b>Experimental Group</b> | <b>N</b> | <b>Mean</b> | <b>SD</b> | <b>'t' value</b> | <b>Level of Significance</b> |
|---------------------------|----------|-------------|-----------|------------------|------------------------------|
| Pre test                  | 40       | 30.7        | 3.04      | 22.02            | S                            |
| Post test                 | 40       | 56.72       | 4.14      |                  |                              |

Significant at 0.05 level 1.98

The above table show that the mean scores of post-test of experimental group 56.72 is higher than the mean scores pre-test 30.7. The calculated 't' value 22.02 is greater than the table value 1.98 significant at 0.05 level. Hence the hypothesis is rejected. It is concluded that there is significant difference between the pre- and post-tests of the experimental group among upper primary students.



*Hypothesis:3 There is no significant difference between the pre- tests of the control group and the experimental group among upper primary students.*

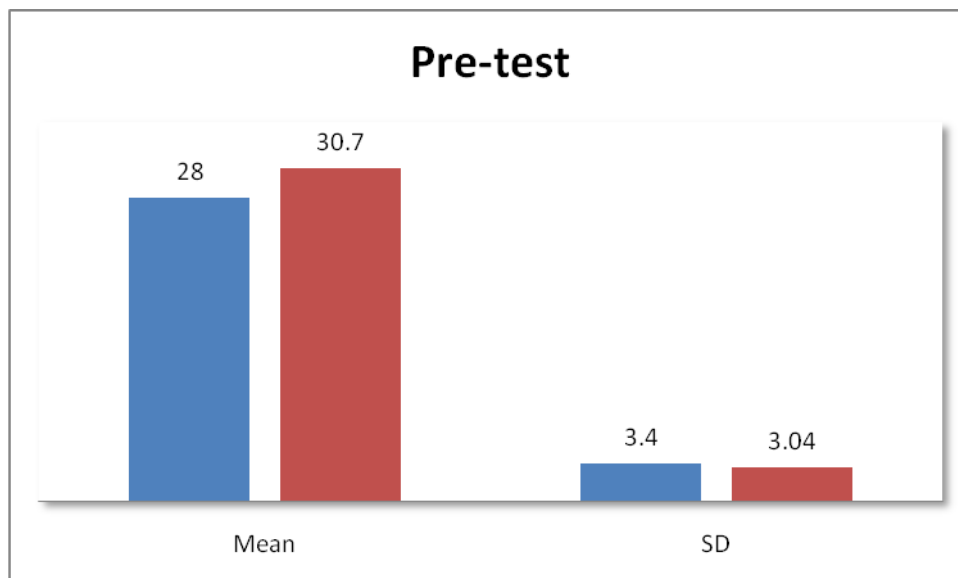
**Table 5**

**Mean SD and t test scores of pre test of control and experimental groups**

| Pre test           | N  | Mean  | SD   | 't' value | Level of Significance |
|--------------------|----|-------|------|-----------|-----------------------|
| Control group      | 40 | 28    | 3.40 | 6.74      | S                     |
| Experimental Group | 40 | 30.70 | 3.04 |           |                       |

Significant at 0.05 level 1.98

The above table show that the mean scores of pre test of experimental group 30.70 is higher than the mean scores control group 28. The calculated 't' value 6.74 is greater than the table value 1.98 significant at 0.05 level. Hence the hypothesis is rejected. It is concluded that there is significant difference between the pre-test of the control and experimental groups among upper primary students.



*Hypothesis:4 There is no significant difference between the post-tests of the control group and the experimental group among upper primary students.*

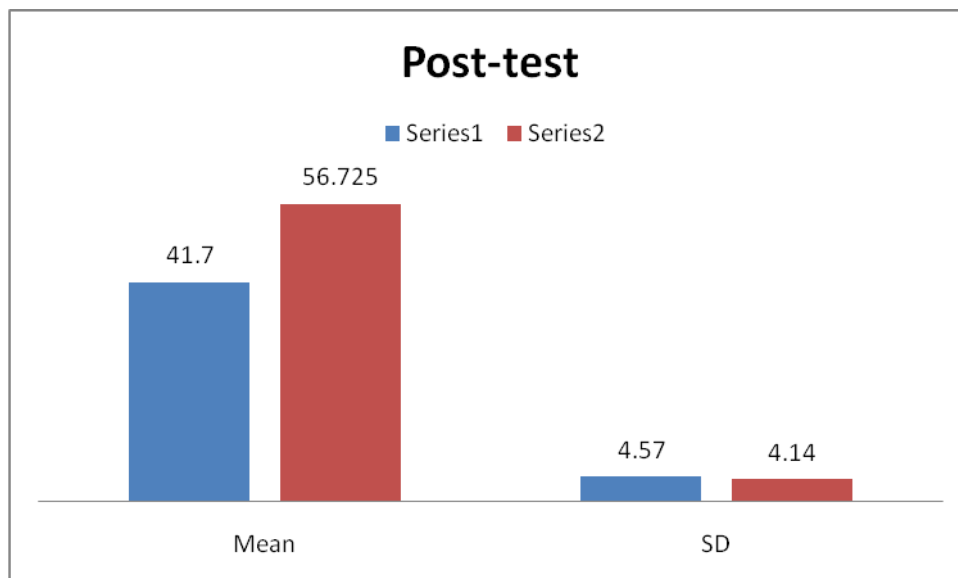
**Table 6**

**Mean SD and t test scores of post test of control and experimental groups**

| Post test          | N  | Mean  | SD   | 't' value | Level of Significance |
|--------------------|----|-------|------|-----------|-----------------------|
| Control group      | 40 | 41.7  | 4.57 | 5.45      | S                     |
| Experimental Group | 40 | 56.72 | 4.14 |           |                       |

Significant at 0.05 level 1.98

The above table show that the mean scores of post test of experimental group 56.72 is higher than the mean scores control group 41.7. The calculated 't' value 5.45 is greater than the table value 1.98 significant at 0.05 level. Hence the hypothesis is rejected. It is concluded that there is significant difference between the post test of the control and experimental groups among upper primary students.



*Hypothesis:5 There is no significant relationship between the pre- and post-tests of the control group among upper primary students.*

**Table 7**

**Significant relationship between the pre- and post-tests of the control group among upper primary students**

| <b>Control group</b> | <b>N</b> | <b>Mean</b> | <b>SD</b> | <b>'r' value</b> | <b>Level of Significance</b> |
|----------------------|----------|-------------|-----------|------------------|------------------------------|
| Pre test             | 40       | 28          | 3.40      | 0.14             | S                            |
| Post test            | 40       | 41.7        | 4.57      |                  |                              |

Significant at 0.05 level (0.19)

The above tables show that the 'r' value 0.14 is less than the table value 0.19. It is concluded that there is no significant relationship between the pre- and post-tests of the control group among upper primary students.

*Hypothesis:6 There is no significant relationship between the pre- and post-tests of the experimental group among upper primary students.*

**Table 8**

**Significant relationship between the pre- and post-tests of the experimental group among upper primary students.**

| <b>Experimental Group</b> | <b>N</b> | <b>Mean</b> | <b>SD</b> | <b>'r' value</b> | <b>Level of Significance</b> |
|---------------------------|----------|-------------|-----------|------------------|------------------------------|
| Pre test                  | 40       | 30.70       | 3.04      | 0.50             | S                            |
| Post test                 | 40       | 56.72       | 4.14      |                  |                              |

Significant at 0.05 level (0.19)

The above tables show that the 'r' value 0.50 is greater than the table value 0.19. It is concluded that there is significant relationship between the pre- and post-tests of the experimental group among upper primary students.

*Hypothesis:7 There is no significant difference between the pre- and post-tests of the control group among upper primary students with respect to gender*

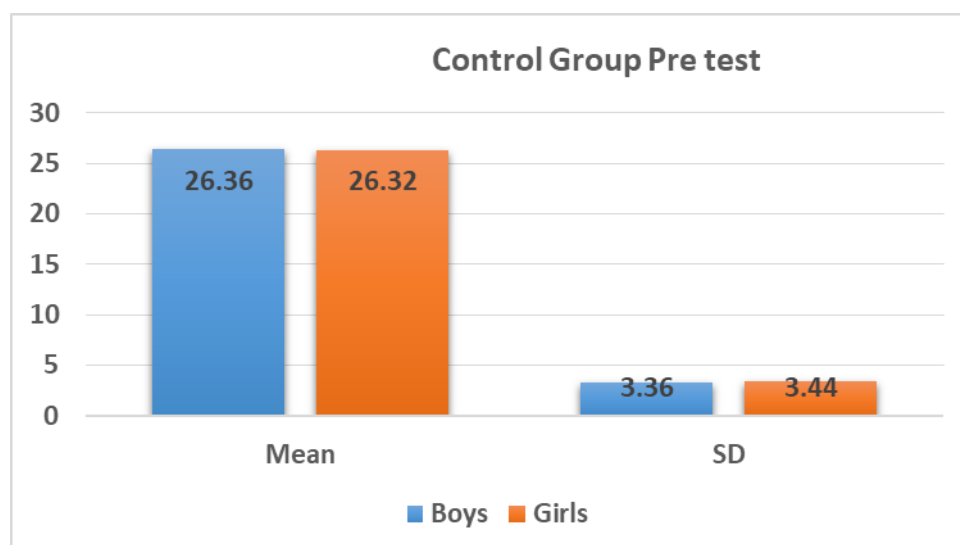
**Table 9**

**Mean SD and t test scores of pre test of control group with respect to gender**

| Pre test | N  | Mean  | SD   | 't' value | Level of Significance |
|----------|----|-------|------|-----------|-----------------------|
| Boys     | 20 | 26.36 | 3.36 | 0.04      | NS                    |
| Girls    | 20 | 26.32 | 3.44 |           |                       |

Significant at 0.05 level 2.01

The above table shows that the mean scores of pre test boys is 26.36 greater than the mean scores of girls 26.32. The calculated 't' value is 0.04 less than the table value 2.01 significant at 0.05 level. It is concluded that there is no significant difference between the pre-tests of the control group among upper primary students with respect to gender.



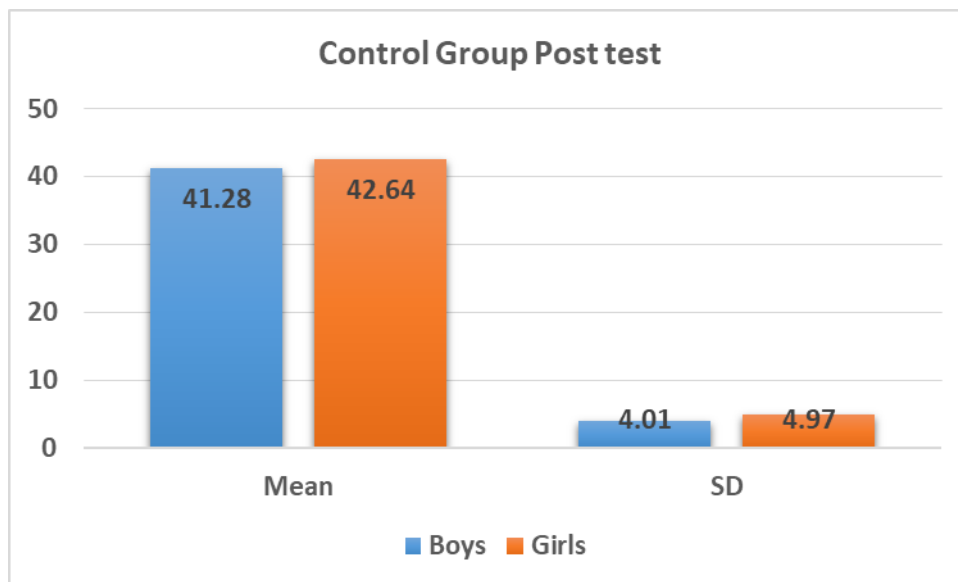
**Table 10**

**Mean SD and t test scores of post test of control group with respect to gender**

| Post test | N  | Mean  | SD   | 't' value | Level of Significance |
|-----------|----|-------|------|-----------|-----------------------|
| Boys      | 20 | 41.28 | 4.01 | 1.06      | NS                    |
| Girls     | 20 | 42.64 | 4.97 |           |                       |

Significant at 0.05 level 2.01

The above table shows that the mean scores of post test girls is 42.64 greater than the mean scores of boys 41.28. The calculated 't' value is 1.06 less than the table value 2.01 significant at 0.05 level. It is concluded that there is no significant difference between the post-tests of the control group among upper primary students with respect to gender.



*Hypothesis:8 There is no significant difference between the pre- and post-tests of the experimental group among upper primary students with respect to gender*

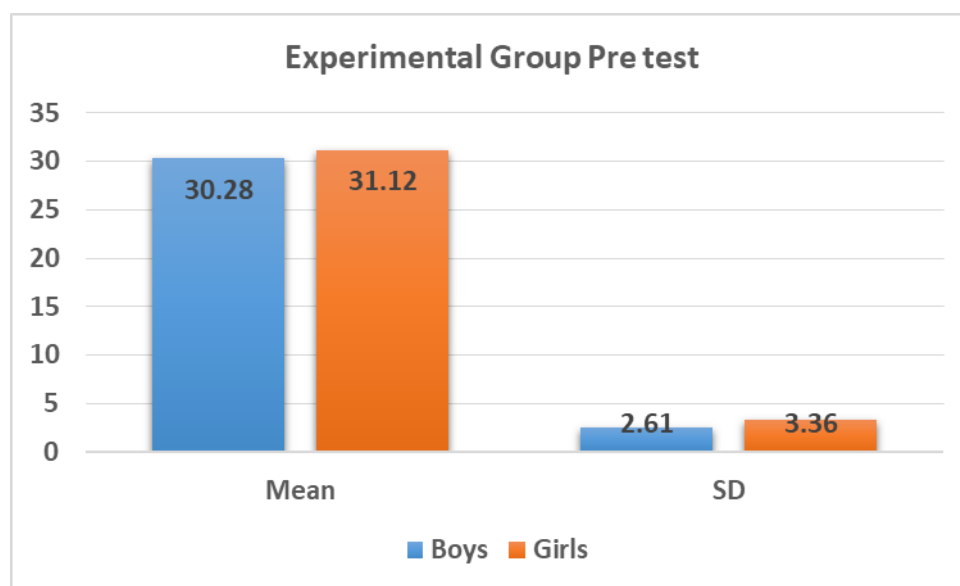
**Table 11**

**Mean SD and t test scores of pre test of experimental group with respect to gender**

| Pre test | N  | Mean  | SD   | 't' value | Level of Significance |
|----------|----|-------|------|-----------|-----------------------|
| Boys     | 20 | 30.28 | 2.61 | 0.98      | NS                    |
| Girls    | 20 | 31.12 | 3.36 |           |                       |

Significant at 0.05 level 2.01

The above table shows that the mean scores of pre test girls is 31.12 greater than the mean scores of boys 30.28. The calculated 't' value is 0.98 less than the table value 2.01 significant at 0.05 level. It is concluded that there is no significant difference between the pre-tests of the experimental group among upper primary students with respect to gender.



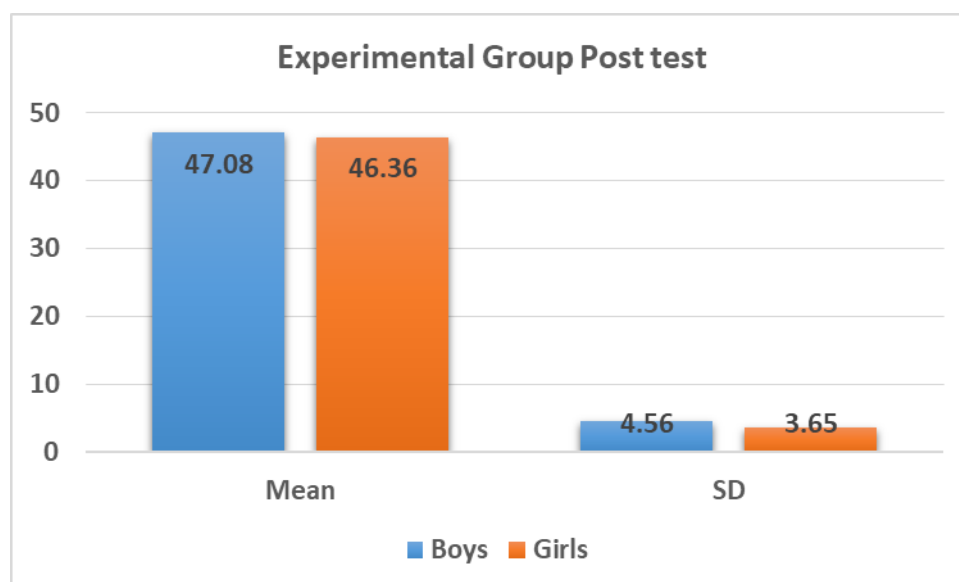
**Table 12**

**Mean SD and t test scores of post test of experimental group with respect to gender**

| Post test | N  | Mean  | SD   | 't' value | Level of Significance |
|-----------|----|-------|------|-----------|-----------------------|
| Boys      | 20 | 47.08 | 4.56 | 0.61      | NS                    |
| Girls     | 20 | 46.36 | 3.65 |           |                       |

Significant at 0.05 level 2.01

The above table shows that the mean scores of post test boys is 47.08 greater than the mean scores of girls 46.36. The calculated 't' value is 0.61 less than the table value 2.01 significant at 0.05 level. It is concluded that there is no significant difference between the post-tests of the experimental group among upper primary students with respect to gender.



## EFFECT SIZE

The effect size of the disparity in the pre-test and post-test scores of students utilizing the flipped learning approach to enhance their performance of maths.

**Table 4.13**

**The effect size of the difference between the pre - test and post- test of control group**

| <b>Test</b> | <b>Mean</b> | <b>SD</b> | $\sigma$ | <b>E.S (d)</b> |
|-------------|-------------|-----------|----------|----------------|
| Pre test    | 28          | 3.40      | 1.65     | 1.39           |
| Post- test  | 41.7        | 4.57      |          |                |

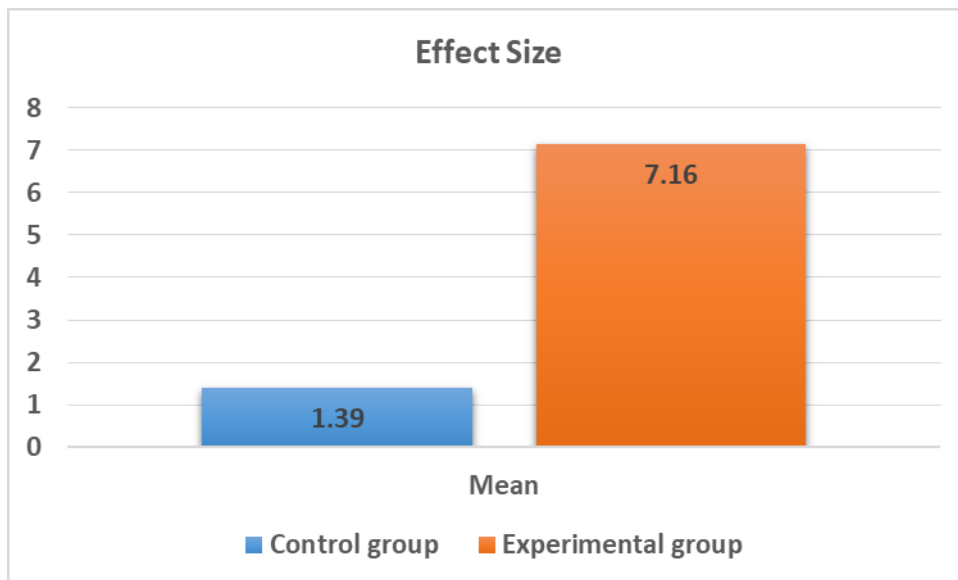
The provided table displays the Effect size (d) value when examining the scores for the Pre-and post tests related to control group. The calculated Effect size (d) of 1.39.

**Table 4.14**

**The effect size of the difference between the pre - test and post- test of experimental group**

| Test       | Mean  | SD   | $\sigma$ | E.S (d) |
|------------|-------|------|----------|---------|
| Pre test   | 30.70 | 3.04 | 8.55     | 7.16    |
| Post- test | 56.72 | 4.14 |          |         |

The provided table displays the Effect size (d) value when examining the scores for the Pre-and post tests related to experimental group. The calculated Effect size (d) of 7.16. This is large effect size. Furthermore, it is evident that there is a significant difference between the Pre and Post-test scores concerning the variable of flipped learning approach.



#### **4.4 FINDINGS OF THE STUDY**

1. The mean scores of post-test of control group 41.7 is higher than the mean scores pre-test 28. The calculated 't' value 19.36 is greater than the table value 1.98 significant at 0.05 level. It is concluded that there is significant difference between the pre- and post-tests of the control group among upper primary students.
2. The mean scores of post-test of experimental group 56.72 is higher than the mean scores pre-test 30.70. The calculated 't' value 22.02 is greater than the table value 1.98 significant at 0.05 level. It is concluded that there is significant difference between the pre- and post-tests of the experimental group among upper primary students.
3. The mean scores of pre test of experimental group 30.70 is higher than the mean scores control group 28. The calculated 't' value 6.74 is greater than the table value 1.98 significant at 0.05 level. It is concluded that there is significant difference between the pre-test of the control and experimental groups among upper primary students.
4. The mean scores of post test of experimental group 56.72 is higher than the mean scores control group 41.7. The calculated 't' value 5.45 is greater than the table value 1.98 significant at 0.05 level. It is concluded that there is significant difference between the post test of the control and experimental groups among upper primary students.

5. The 'r' value 0.14 is less than the table value 0.19. It is concluded that there is no significant relationship between the pre- and post-tests of the control group among upper primary students
6. The 'r' value 0.50 is greater than the table value 0.19. It is concluded that there is significant relationship between the pre- and post-tests of the experimental group among upper primary students.
7. The mean scores of pre test boys is 26.36 greater than the mean scores of girls 26.32. The calculated 't' value is 0.04 less than the table value 2.01 significant at 0.05 level. It is concluded that there is no significant difference between the pre-tests of the control group among upper primary students with respect to gender.
8. The mean scores of post test girls is 42.64 greater than the mean scores of boys 41.28. The calculated 't' value is 1.06 less than the table value 2.01 significant at 0.05 level. It is concluded that there is no significant difference between the post-tests of the control group among upper primary students with respect to gender.
9. The mean scores of pre test girls is 31.12 greater than the mean scores of boys 30.28. The calculated 't' value is 0.98 less than the table value 2.01 significant at 0.05 level. It is concluded that there is no significant difference between the pre-tests of the experimental group among upper primary students with respect to gender.
10. The mean scores of post test boys is 47.08 greater than the mean scores of girls 46.36. The calculated 't' value is 0.61 less than the table value 2.01

significant at 0.05 level. It is concluded that there is no significant difference between the post-tests of the experimental group among upper primary students with respect to gender.

11. The effect size (d) value when examining the scores for the pre-and post tests related to control group. The calculated effect size (d) of 1.39.
12. The effect size (d) value when examining the scores for the pre-and post tests related to experimental group. The calculated effect size (d) of 7.16. This is large effect size. Furthermore, it is evident that there is a significant difference between the pre and post-test scores concerning the variable of flipped learning approach.

#### **4.5 CONCLUSION**

In this chapter, the researcher has provided a comprehensive analysis and interpretation of the data. The chapter begins with an introduction, followed by a detailed exploration of descriptive and inferential analysis techniques, including the examination of Effect size. The study's findings, as revealed through statistical methods, are presented using tables and figures. Each table is accompanied by a brief discussion and inference. Finally, the chapter concludes with an in-depth examination and discussion of the study's results. The subsequent chapter will focus on summarizing the findings and drawing overall conclusions from the research.

## **CHAPTER-V**

### **SUMMARY OF FINDINGS AND CONCLUSION**

#### **5.1 INTRODUCTION**

This chapter is mainly focusing on a summary of findings, education implications, recommendations, suggestions for further research, and the conclusion that is also presented in the research report.

#### **5.2 FINDINGS OF THE STUDY**

- 5 The mean scores of post-test of control group 41.7 is higher than the mean scores pre-test 28. The calculated 't' value 19.36 is greater than the table value 1.98 significant at 0.05 level. It is concluded that there is significant difference between the pre- and post-tests of the control group among upper primary students.
- 6 The mean scores of post-test of experimental group 56.72 is higher than the mean scores pre-test 30.70. The calculated 't' value 22.02 is greater than the table value 1.98 significant at 0.05 level. It is concluded that there is significant difference between the pre- and post-tests of the experimental group among upper primary students.
- 7 The mean scores of pre test of experimental group 30.70 is higher than the mean scores control group 28. The calculated 't' value 6.74 is greater than the table value 1.98 significant at 0.05 level. It is concluded that there is significant difference between the pre-test of the control and experimental groups among upper primary students.

- 8 The mean scores of post test of experimental group 56.72 is higher than the mean scores control group 41.7. The calculated 't' value 5.45 is greater than the table value 1.98 significant at 0.05 level. It is concluded that there is significant difference between the post test of the control and experimental groups among upper primary students.
- 9 The 'r' value 0.14 is less than the table value 0.19. It is concluded that there is no significant relationship between the pre- and post-tests of the control group among upper primary students
- 10 The 'r' value 0.50 is greater than the table value 0.19. It is concluded that there is significant relationship between the pre- and post-tests of the experimental group among upper primary students.
- 11 The mean scores of pre test boys is 26.36 greater than the mean scores of girls 26.32. The calculated 't' value is 0.04 less than the table value 2.01 significant at 0.05 level. It is concluded that there is no significant difference between the pre-tests of the control group among upper primary students with respect to gender.
- 12 The mean scores of post test girls is 42.64 greater than the mean scores of boys 41.28. The calculated 't' value is 1.06 less than the table value 2.01 significant at 0.05 level. It is concluded that there is no significant difference between the post-tests of the control group among upper primary students with respect to gender.
- 13 The mean scores of pre test girls is 31.12 greater than the mean scores of boys 30.28. The calculated 't' value is 0.98 less than the table value 2.01

significant at 0.05 level. It is concluded that there is no significant difference between the pre-tests of the experimental group among upper primary students with respect to gender.

14 The mean scores of post test boys is 47.08 greater than the mean scores of girls 46.36. The calculated 't' value is 0.61 less than the table value 2.01 significant at 0.05 level. It is concluded that there is no significant difference between the post-tests of the experimental group among upper primary students with respect to gender.

15 The effect size (d) value when examining the scores for the pre-and post tests related to control group. The calculated effect size (d) of 1.39.

16 The effect size (d) value when examining the scores for the pre-and post tests related to experimental group. The calculated effect size (d) of 7.16. This is large effect size. Furthermore, it is evident that there is a significant difference between the pre and post-test scores concerning the variable of flipped learning approach.

### **Overall Findings**

The study on the development and validation of flipped learning in mathematics among upper primary school students revealed significant findings. Firstly, both the control and experimental groups showed a substantial improvement in post-test scores compared to pre-test scores, indicating the effectiveness of flipped learning in enhancing students' mathematics achievement. Secondly, the experimental group exhibited a notably larger effect size, highlighting the robust impact of flipped learning approaches. Additionally,

gender differences were not significant, suggesting that flipped learning is beneficial for both boys and girls. These findings collectively underscore the potential of flipped learning as an effective instructional strategy to improve academic outcomes in mathematics education for upper primary school students.

### **5.3 IMPLICATIONS OF THE STUDY**

The study on the development and validation of flipped learning in mathematics among upper primary school students yields significant implications for both educational practice and policy considerations. The findings indicate a notable improvement in students' mathematics achievement, with the experimental group showing a large effect size ( $d$ ) of 7.16, highlighting the substantial impact of flipped learning approaches. This underscores the effectiveness of integrating flipped learning strategies into teaching methodologies to enhance learning outcomes. Moreover, the study's gender-neutral results suggest that flipped learning is equally beneficial for both boys and girls, emphasizing its inclusivity in promoting academic success. These findings suggest that educators can consider adopting flipped learning strategies in mathematics education, while policymakers may explore incorporating such innovative approaches into curriculum frameworks to improve overall academic performance in primary education.

The research on flipped learning in mathematics for upper primary school students presents compelling implications for instructional design and educational policies. The significant improvement in post-test scores for both the

control and experimental groups underscores the effectiveness of flipped learning in enhancing students' understanding and application of mathematical concepts. The large effect size observed in the experimental group further supports the notion that flipped learning can lead to substantial gains in academic achievement. These findings advocate for the integration of flipped learning methodologies into mainstream educational practices, offering a promising avenue for educators to engage students more actively and effectively in their learning journey. Additionally, policymakers can use these findings to inform decisions on curriculum enhancements that leverage innovative teaching strategies like flipped learning to optimize learning outcomes across diverse student populations.

#### **5.4 RECOMMENDATIONS OF THE STUDY**

Based on the findings of the study on flipped learning in mathematics among upper primary school students, several recommendations can be made for students, teachers, and administrators:

##### **1. For Students:**

- ❖ Encourage active engagement with flipped learning materials, such as pre-recorded videos and interactive exercises, to enhance understanding and retention of mathematical concepts.
- ❖ Foster self-directed learning habits by encouraging students to review materials before class discussions and engage in follow-up activities to reinforce learning.

- ❖ Utilize collaborative learning opportunities facilitated by flipped learning approaches, encouraging peer interaction and problem-solving skills development.

## **2. For Teachers:**

- ❖ Provide comprehensive and well-structured flipped learning resources that align with curriculum objectives and cater to diverse learning styles and abilities.
- ❖ Offer guidance and support to students in navigating flipped learning materials effectively, clarifying doubts, and promoting deeper understanding through interactive discussions and activities.
- ❖ Incorporate formative assessments within flipped learning modules to monitor student progress, identify areas of improvement, and provide timely feedback for personalized learning experiences.

## **3. For Administrators:**

- ❖ Invest in professional development programs for teachers to enhance their proficiency in designing and implementing flipped learning strategies effectively.
- ❖ Evaluate the impact of flipped learning initiatives on student outcomes and consider scaling successful models across the educational institution to promote continuous improvement in teaching and learning practices.

## **5.5 SUGGESTIONS FOR FURTHER RESEARCH**

1. Conduct a longitudinal study to assess the sustained impact of flipped learning on students' mathematics achievement over an extended period.

This would provide insights into the long-term effectiveness and retention of knowledge gained through flipped learning approaches.

2. Compare the effectiveness of flipped learning with other innovative teaching methodologies, such as gamification or inquiry-based learning, to identify the most impactful approach for improving mathematics achievement among upper primary school students.
3. Conduct qualitative research, such as interviews or focus group discussions, to explore students' and teachers' perceptions, experiences, and attitudes towards flipped learning. This qualitative data can provide deeper insights into the factors influencing the success of flipped learning implementation.
4. Investigate the applicability and effectiveness of flipped learning strategies for students with special educational needs or learning in disabilities mathematics education. Understanding how flipped learning can be tailored to support diverse learners would be valuable for inclusive educational practices.
5. Examine the impact of comprehensive teacher training programs specifically focused on flipped learning methodologies. Evaluate how well-prepared teachers are in designing, delivering, and assessing flipped learning activities, and assess the correlation between teacher training and student outcomes in mathematics achievement.

## 5.6 CONCLUSION

The study on the development and validation of flipped learning in mathematics among upper primary school students culminates in a robust and encouraging conclusion. The findings demonstrate a significant improvement in students' mathematics achievement, as evidenced by the substantial increase in post-test scores compared to pre-test scores for both the control and experimental groups. The large effect size observed in the experimental group further accentuates the efficacy of flipped learning approaches in enhancing students' understanding and application of mathematical concepts. This suggests that incorporating flipped learning strategies into mathematics education for upper primary school students can yield tangible benefits in terms of academic performance and learning outcomes.

Moreover, the gender-neutral results indicate that flipped learning is equally beneficial for both boys and girls, emphasizing its inclusivity and potential to address achievement gaps in mathematics education. These findings collectively underscore the importance of adopting innovative instructional methods, such as flipped learning, to promote active engagement, critical thinking, and deeper learning experiences among students. Overall, the study's conclusion supports the integration of flipped learning methodologies as a valuable tool in enhancing mathematics education and underscores the need for continued research and implementation of evidence-based teaching practices to support student success.



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DISTRICT INSTITUTE OF EDUCATION AND TRAINING -  
PERAMBALUR ALGEBRA  
**POST TEST**

**CLASS: VIII**

**TIME: 25 MIN**

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**1. An algebraic expression that contains only one term is called:**

- A. Monomial      B. Binomial      C. Trinomial      D. None of the above

**2.  $5x+6y$  is a:**

- A. Monomial      B. Binomial      C. Trinomial      D. None of the above

**3. The algebraic expression  $3x+2y+6$  is a:**

- A. Monomial      B. Binomial      C. Trinomial      D. None of the above

**4. A polynomial contains \_\_\_\_\_ number of terms:**

- A. One      B. Two      C. Three      D. Any

**5. In which of the following, the two expressions are like terms?**

- A.  $7x$  and  $7y$       B.  $7x$  and  $9x$       C.  $7x$  and  $7x^2$       D.  $7x$  and  $7xy$

**6. If we add,  $7xy + 5yz - 3zx$ ,  $4yz + 9zx - 4y$  and  $-3xz + 5x - 2xy$ , then the answer is:**

- A.  $5xy + 9yz + 3zx + 5x - 4y + 3zx - 5x - 4y$       B.  $5xy - 9yz$   
C.  $5xy + 10yz + 3zx + 15x - 4y + 3zx + 5x - 6y$       D.  $5xy + 10yz$

**7. If we subtract  $4a - 7ab + 3b + 12$  from  $12a - 9ab + 5b - 3$ , then the answer is:**

- A.  $8a+2ab+2b+15$       B.  $8a+2ab+2b-15$   
C.  $8a-2ab+2b-15$       D.  $8a-2ab-2b-15$

**8. If we multiply  $5x$  and  $(-4xyz)$ , then we get:**

- A.  $20x^2yz$       B.  $-20x^2yz$       C.  $x^2yz$       D.  $-2xyz$

**9. The product of  $4x$  and  $0$  is:**

- A.  $4x$       B.  $4$       C.  $0$       D. None of the above

**10. The volume of a cuboid with length, breadth and height as  $5x$ ,  $3x^2$  and  $7x^4$  respectively is:**

- A.  $105x^7$       B.  $105x^2$       C.  $105x^4$       D.  $105x$

**11. The product of  $5x$  and  $3y$  is:**

- A.  $xy$       B.  $2xy$       C.  $5xy$       D.  $15xy$

**12. The product of  $6x$  and  $-11x$  is:**

- A.  $66x^2$       B.  $-66x^2$       C.  $x^2$       D.  $-x^2$

**13. The area of a rectangle whose length and breadth are  $3y$  and  $9y^2$  respectively is:**

- A.  $12y^3$       B.  $21y^3$       C.  $27y^3$       D.  $y^3$

**14. The area of a rectangle that has length =  $2a^2b$  and breadth =  $3ab^2$  is:**

- A.  $6a^3b^3$       B.  $a^3b^3$       C.  $2a^3b^3$       D.  $4a^3b^3$

**15. The side of a cube is  $2a$ . Find the volume of the cube.**

- A.  $4a^2$       B.  $2a$       C.  $8a^3$       D.  $8$

**16. Multiplication of monomials  $x^2$ ,  $(-x)^3$ ,  $(-x)^4$  is equal to:**

- A.  $x^9$       B.  $x^5$       C.  $x^7$       D.  $x^6$

**17. The value of  $(x - y)(x + y) + (y - z)(y + z) + (z - x)(z + x)$  is:**

- A.  $x + y + z$       B.  $x^2 + y^2 + z^2$       C.  $xy + yz + zx$       D.  $0$

**18.  $(a - b)^2$  is equal to:**

- A.  $a^2 + b^2 - 2ab$       B.  $a^2 + b^2 + 2ab$       C.  $a^2 + b^2$       D.  $2ab$

**19. The product of  $3xy^2z$  and  $4x$  is:**

- A.  $12xyz$                       B.  $12xy^2$                       C.  $12x^2y^2z$                       D.  $12x^2yz$

**20. Which of the following is a like term as  $8xy$ ?**

- A. 8                      B.  $8x$                       C.  $8y$                       D.  $xy$

**21. An algebraic expression that contains 4 terms is called:**

- A. Monomial                      B. Binomial                      C. Trinomial                      D. None of the above

**22. In the algebraic expression  $3x+2xy+6$  coefficient of  $y$  is:**

- A. Monomial                      B. Binomial                      C. Trinomial                      D. None of the above

**23. The area of a triangle whose height and breadth are  $5y$  and  $3y^2$  respectively is:**

- A.  $8y^3$                       B.  $15y^3$                       C.  $2y^3$                       D.  $53y^3$

**24. Which of the following is a like term as  $-5y$ ?**

- A. 5                      B.  $-5x$                       C.  $4y$                       D.  $-5$

**25.  $(a + b)^2$  is equal to:**

- A.  $a^2 + b^2 - 2ab$                       B.  $a^2 + b^2 + 2ab$                       C.  $a^2 + b^2$                       D.  $2ab$

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