EFFECTIVENESS OF COLLABORATIVE PROBLEM BASED LEARNING ON CRITICAL THINKING, ACADEMIC MOTIVATION AND EMOTION REGULATION OF SECONDARY SCHOOL STUDENTS IN KERALA

Thesis submitted for the Degree of

DOCTOR OF PHILOSOPHY IN EDUCATION

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DECLARATION

I, LINISHA C.K, do hereby declare that this thesis entitled as EFFECTIVENESS OF COLLABORATIVE PROBLEM BASED LEARNING ON CRITICAL THINKING, ACADEMIC MOTIVATION AND EMOTION REGULATION OF SECONDARY SCHOOL STUDENTS IN KERALA is a genuine record of the research work done by me under the supervision of **Dr. Fathima Jaseena** M.P.M, Assistant Professor, Farook Training College, Research Centre in Education, University of Calicut, and that no part of the thesis has been presented earlier for the award of any Degree, Diploma and Associateship in any University; and that no part of the thesis has been presented earlier for the award of any Degree, Diploma, Associateship or other similar title of recognition in any other University.

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CERTIFICATE

This is to certify that the thesis entitled **EFFECTIVENESS OF COLLABORATIVE PROBLEM BASED LEARNING ON CRITICAL THINKING, ACADEMIC MOTIVATION AND EMOTION REGULATION OF SECONDARY SCHOOL STUDENTS IN KERALA** is an authentic record of research work carried out by **Mrs. LINISHA C.K**, for the degree of Doctor of Philosophy in Education, University of Calicut, under my supervision and guidance and that no part thereof has been presented before for any other Degree, Diploma, Associateship or other similar title of recognition in any other University.

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Chapter 1

INTRODUCTION

- Need and Significance of the Study
- Statement of the Problem
- Definition of Key Terms
- Variables Selected
- Major Objectives of the Study
- Hypotheses of the Study
- Methodology
- Scope and Delimitations of the Study
- Overview of Research Report

"No problem can be solved by the same consciousness that created it;
we need to see the world a new"

- Albert Einstein.

The 21st century is a technology-driven century that enhances a knowledge-based society, knowledge-based economy, and technology-enhanced teaching-learning process. Today's educators need techno pedagogies to survive, as the main purpose of education is to prepare students for future life to meet the challenges of life's different situations. They must be equipped with many skills and capabilities, among them Critical thinking and problem solving are the core intellectual capacity by which students have to upgrade in 21st-century life goals. In addition to these skills, creativity, conflict management, disaster management, peace education, and fluency in information communication technology are also important capabilities for citizenship at the local, national and global levels. Each person needs practical skills and problem-solving skills rather than theoretical knowledge to succeed in life. In this world of competition, everyone, especially adolescents, faces more stress and strain. So, adolescent students need the ability to face the challenges of a new era and must equip with more soft skills. Inculcation of such skills in learners has become a great challenge for teachers and parents to make learners critically objective and creative thinkers, for that teachers can use a variety of methods to make innovation, solve real-world problems and motivate them to learn by using original and innovative methods. By adopting heedful learning techniques, it is possible to develop skills to live a better life in this digital world. As society changes, the skills needed to deal with the complexities of life also changes. A significant change in the teaching and learning process can be brought out by the use of several innovative instructional strategies. Collaborative Problem Based Learning is one of the important instructional strategies and it is the panacea for effective learning.

Problem Based Learning has been in the field of education for the past fifty years (Wood 2008). A new instructional approach of Problem Based Learning in collaborative learning groups (CPBL) is used for the present study. Collaborative Problem Based Learning is based on the 3C3R framework, which is the most innovative framework in Problem Based Learning. Implementation of Collaborative Problem Based Learning in educational settings will promote critical thinking skills, collaboration, and problem-solving skills among students. This framework is equally helpful for both teachers and students, which is based on constructivist theories. Constructivism states that learning takes place in collaborative contexts (Abbas et al., 2013). Collaborative Problem Based Learning is innovative because of its shift from a teaching paradigm to a learning paradigm. "It was predicted that PBL created a better learning environment, knowledge, skill and attitude" (Wood, 2008). " PBL focuses on meaningful tasks which are practical in their approach and experiential" (Hmelo-Silver, 2004) "Students should experience and interact with the curriculum and take part in their learning" (Talebi, 2015). Similarly, in PBL students solve problems that are related to the real world, construct knowledge and develop strategies for problem-solving (Hmelo-Silver, 2004).

In Collaborative Problem Based Learning (CPBL) the learning environment is connected to real-life situations and can solve real-life problems. The problems being solved this way hold a lot of merits throughout their life. Present education system gave more importance to examining the students so students were busy in preparing notes and contents for examination. Once the examination was over the content studied was forgotten. CPBL helps in improving the standard of education and meets all the aims of education recommended in the National Curriculum Framework (2005). Through CPBL, a child solves and Reflects a problem connected to their real life in a particular context by Researching and Reasoning. Here students can solve an ill-structured problems related to their life. As a result, the knowledge acquired

through solving that problem persists throughout their life and is kept in their memory. Consequently, CPBL gives real-life experiences to the student and helps them to understand the content accurately. Learning by doing, experiential learning, and learning by discovery can be explored through CPBL. The learner must be an active participant and productive learner in their learning (NCF, 2005, pp. 30).

One of the notable features of PBL approach is that students investigate and work collaboratively to find out what they need to know in order to solve the presented problem (Hmelo-Silver 2004). PBL in collaborative learning groups can be adapted to modern learning events. It is flexible and dynamic; collaboration promotes encouragement as well as the practice of mental well-being. CPBL strategy also connects the previous knowledge and encourages motivation to learners. Students can make connections between the real-life world and newly learned things. It creates a more authentic learning environment. “Repetitions have not shown to remain in long-term memory, however, when the connection is retained.” (Hmelo-Silver, 2004) This instructional strategy mainly focused on enhancing skills like Critical Thinking, Academic Motivation, and Emotion Regulation and problem solving in children.

According to Hung (2006), PBL acts as a conceptual framework that would help in guiding an effective and reliable problem design for learners of all levels by addressing the specific characteristics of PBL and its implementation. The most important skill acquired by students through Problem-Based Learning is Critical Thinking skill. It is the most necessary skill required to solve various ill-structured problems. Therefore, Critical Thinking is important for academic achievements and to solve various real-life problems as well.

Critical Thinking is a skill that is most significant in the 21st century which is mentioned in NEP 2020. Students gain knowledge through learning, but they aren’t able to use and apply those to solve real-life problems. The main reason for it is the

lack of development of Critical Thinking skills at a proper level. Thinking is the base of all intellectual activities and all cognitive processes.

One of the main aims of education is to develop Critical Thinking. Critical Thinking belongs to one of the basic intellectual needs every individual has to meet (Aizikovitsh-Udi & Cheng, 2015). It identifies the intellectual capacity and the means of judging and of being able to discern. Critical Thinking is an epistemic process which can make judgments and decisions by considering the causes, analyzing the available data, and inferring the result (Haseli & Rezaii, 2013). It is a self-regulated and purposeful process that leads to problem-solving. There were several definitions for Critical Thinking. "Critical Thinking skills are part of higher order thinking skills." (Trilling & Fdel, 2009) It requires the abilities like analyzing, evaluating, and decision-making. The development of Critical Thinking requires the learning environment to be deeply rooted in developing skills as a learning outcome (Kek & Huijser, 2011).

Problem Based Learning in a collaborative learning environment is a motivating and challenging and enjoyable instructional strategy. Therefore, Critical Thinking skills can be included when educate in an integrated manner rather than a standalone topic (Kek & Huijser, 2011). Learning through 3C3R framework, modified from teacher-centered to learner-centered that enable students to cultivate Critical Thinking, the classroom environment in which students can independently learn, solve problems, collaborate on research, and explore the real-world problem. As well, the other element is the motivational aspect of the learner.

Motivation is an important aspect of the learning process. (Pintrich & Schuk, 2002) defined motivation as the process by which goal-directed activity is investigated and sustained. According to Anderman and Dawson (2011), contextual factors and individual characteristics can shape motivation. Motivation involves the processes that energize, direct and sustain behavior. It is a multidimensional concept that comprises beliefs, goals, values, desires, needs, and emotions. Motivation is

strongly associated with academic outcomes. It is an indispensable factor for learning and it also plays a major role in education. In the classroom, the learner himself is responsible for his self-motivation. Due to the bad impact of science and technology, learner motivation has been changed and it is diverted from educational ethics. Students do not complete their tasks on time. Students utilize digital platforms for their purpose of studies and are distracted by them rather than gaining knowledge. Motivation enhances the performance and efficiency of the learner, even motivation modifies the learning goal and achievement of the student (Amarai et al., 2011). Motivation specially used for academic affairs and learners actively involved in learning is called Academic Motivation. Academic Motivation constituent, in educational environments, which refers to behaviors related to learning and improvement (Pintrich, 2004). Academic Motivation varies from learner to learner therefore, it is very important in the developmental aspects of adolescence. Academic Motivation is very much related to academic outcome (learning and achievement).

The role of a teacher is to develop positive and supportive classroom environment to energize Academic Motivation of the student. Learners who put little effort into homework and assignments and are unwilling to participate in group work were warning signs of poor motivation. However, an ill-structured problem has raised the student's curiosity to solve it (Carriger, 2015). PBL is a student-centered learning model that contains active learning strategies (Kong et al., 2014; Savery, 2006). CPBL provides a positive environment for the learner.

There are three components of Academic Motivation, Extrinsic motivation, Intrinsic motivation, and Amotivation. Extrinsic motivation involves doing something to obtain something else (a means to an end). Extrinsic motivation is often influenced by external incentives such as reward and punishment. For example, a student may study hard for a test to obtain a good grade in the course. Intrinsic motivation involves internal motivation to do something for its own sake.

Such as student may study hard for a test because he or she enjoys the contents of the course. Amotivation is defined as the state of lacking intention to act. When people are amotivated, people either do not act at all or act without intent. Amotivation behaviors are the least autonomous because there is no expectation of reward or change of events. Vallerand et al. (1992) mentioned that Amotivation is the lowest level of the autonomy continuum where amotivated individuals are neither intrinsically nor extrinsically motivated. Teachers must encourage students to become intrinsically motivated.

Collaborative Problem Based Learning creates a learning environment that promotes students' cognitive engagement and Academic Motivation for the learner. Various innovative instructional approaches which can increase Academic Motivation in the students and that must be used by teachers during class room teaching. Collaborative Problem Based Learning by the 3C3R model focuses on creating Academic Motivation among students by learning through various interdisciplinary contents. It is also connected with emotions. Emotions are closely associated with the learning outcome of students. Emotion Regulation is another important aspect of the learner.

Emotion Regulation is a concept that is imperative for leading a successful life today. A person socializes when they understand their emotions precisely and regulate them according to social values. It acts as a vital part of human life. There are three different basic elements of emotions. In the beginning, emotions occur when a person focuses on a particular situation and it perceives that situation as being concerned with his or her objectives. Secondly, emotions are versatile whole-body phenomena that involve loosely copied changes in the realm of subjective experience, behavior, and central and peripheral physiology (Mauss et al., 2006). Usually, emotions are pliable. The third aspect of Emotion Regulation is crucial for maintaining Emotion Regulation. Emotion Regulation involves the extrinsic and

intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features to accomplish one's goals (Thompson, 1994).

The social context influence Emotion Regulation of an individual. In Collaborative Problem Based Learning situations co learners regulate their emotions. Learning occurs through collaborative learning groups and effective management of emotions that takes place through learning partners. Emotional Regulation is an important factor in adolescent students. Several significant changes are occurring in children at adolescent age, when they experience emotional dysregulation (when they cannot regulate their emotions properly) results in various psychological syndromes such as depression, O.C.D (Obsessive Compulsive Disorder), overeating disorders, etc. Providing a supportive environment for them to address and tackle their problems timely will help for proper guidance and support in their life. Problem-Based Learning in collaborative learning groups helps the children to share their ideas and feelings and to accept others' knowledge in a supportive environment.

Need and Significance of the Study

In the modern technological world, there has been a remarkable change in the pedagogical process of education at all levels. The development of science and technology was the catalyst of this process. In order to compete with the changing world, learners must be able to apply their knowledge to solve real-life problems. So, more importance was given to the cognitive and affective aspects of the learner.

Many innovative instructional models have been developed for educational reform around the world. Collaborative Problem Based Learning (CPBL) is an innovative approach to traditional Problem Based Learning, which was based on the 3C3R framework. Problem Based Learning was first developed at McMaster

University of medical education. Now it has been adopted in elementary, high school, and higher secondary levels of education. Studies also evidenced that PBL is an effective method for solving ill-structured problems. “The central point of education is to teach people to think to use their rational powers to become better problem solvers” (Gagane, 1985).

A collaborative learning environment provides a positive environment for sharing ideas and emotions. Learners in this learning environment accept others' viewpoints and suggestions for learning (Bonk & Smith, 1998). The study identified a number of classroom activities that build in the potential for collaboration to enhance learning. Collaborative learning activities support the learners to expose their ideas, thus active modeling of the thinking process and motivate them to learn, thus providing a flexible learning environment for adolescent learners. It is effective in the adolescent stage. Instructional strategies will lead to knowledge acquisition and upgrading of many skills and abilities. CPBL is an instructional strategy based on a constructivist approach; students construct their knowledge by solving authentic problems and reflecting on their own experiences. So, it brings the need for knowing varied concepts like psychological, emotional, and intellectual aspects.

Adolescence is a transition period and a critical stage in life. Many problems related to cognitive and affective level causes stress on the learner in this stage. The mental state is not mature, it leads to depression, stress, anxiety, anger, and many more. As they have to live and sustain themselves in this world, they must equip with Critical Thinking, communication skill, multicultural competency, creativity, innovation, and collaborative skills, but today’s education system is highly criticized that it does not prepare people for life and future skills. Teachers gave preference to academic achievement in the classroom. They didn’t care, to what extent the learner achieved the concept and never thought about how they apply these learned things to face challenges in life through various skills. Critical Thinking is a major element,

an essential skill for solving real-life problems. It helps the learner to adapt to ever-changing life situations and problems. Critical Thinking is a higher-order thinking skill. Higher-level questioning requires students to further examine the concept under study through the use of application, analysis, evaluation, and synthesis (Nappi, 2017). According to Dewy, the ultimate intellectual goal of education is cultivating Critical Thinking. It help students for success in life and democratic citizenship. Learners with Critical Thinking skills, look at situations from multiple perspectives and dimensions, being open-minded and thinking analytically. Learners who are critical thinkers think freely, independently and didn't behave without thinking. Here Collaborative Problem Based Learning provides a positive and enjoyable learning environment for developing Critical Thinking among learners. In the words of Burris (2005), appropriate teaching methodology is the most effective way to improve the ability of students to think critically. So, it is high time to foster Critical Thinking among the future generation.

Likewise, motivation is the catalyst of human behavior (Pintrich & Schuck, 2002). It is also an essential element that contributes Academic Motivation. Student Motivation is enhanced by linking scenarios from real life. External, Internal, and Amotivation are three different types of motivation. Individuals are influenced by external motivation with an independent goal which takes a specific activity, then an internal motivation provides sufficient incentives for doing a task (Mohamadi, 2006). Motivated students express dependability, productivity, initiative and are also interested in positive reflection during learning. Research has consistently found that academically motivated students tend to perceive school and learning as valuable and they are interested in learning-related activities (Eccles & Wigfield, 2002; Zimmerman, 2000, 2008). One of the important elements of motivational belief is Academic Motivation. The positive role of Academic Motivation is inevitable for school success, school must find ways to increase Academic Motivation, (Wang & Pomerantz, 2009). Academically motivated students insist on doing difficult assignments, hard-working

or efforts in learning to reach mastery, and choosing assignments that need great effort (Abedi, 2008). So, it is helpful to know the extent of Academic Motivation among adolescents. Then priority can be given in learning situations.

As Emotion Regulation is a component in learning process. Emotion Regulation is an everyday process and it is important for the effective functioning of peaceful lives (Gross & John, 2003; Morris & Reilly, 1987). As Adolescence is a period of confusion and tension, problems such as depression, anxiety, stress, and mood fluctuation during this phase are a matter of extreme concern for those affected (Bhasin, 2010). Nowadays, the breakdown of the joint family system into nuclear families, and both parents were working, they have more expectations of the achievement of their offspring. In such a home environment, many emotions, which are not tackled and channelized properly can manifest as malpractices and hopelessness in the form of a poor emotional state. Dysregulation of emotions or problems in sudden mood changes is some of the basis of psychopathologies. Emotion Regulation is a crucial ingredient for the successful development (Eisenberg et al., 2007) of the mental and physical health of an individual (Lepore et al., 2002). In adolescence, the disclosure of emotions in social settings leads to a high risk of rejection and social exclusion. If effective Emotion Regulation is not viable there will be problems in social life. So effective management of students' emotions is very important for their growth. Here CPBL helps to manage Emotion Regulation among learners.

The growing use of social media and digital devices among school students has resulted in larger number of cases of addiction. It has affected the students by altering their learning situations, lack of interest and creativity, decreased commitment, deficiency of attention, and distraction. In addition to this, peer influence sometimes impacts students' behavior badly. The role of parents and teachers in controlling the exposure to these issues is limited since digital devices have an integral part in today's learning culture. Lack of proper guidance or mental and Physical care for children to deal with problems can lead to the development of personality disabilities, violent behaviors, mood fluctuations, and depressive

tendencies. Moreover, burnout in children needs counseling and treatment. Unhealthy use of digital media lead children to internet addiction, cybercrime, and many other life-threatening online games. Therefore, it is necessary to have advanced and creative learning techniques which will help students not only academically but also in personal development and capacity building. The 3C3R model of CPBL is a promising art in this regard.

Although normal classrooms do not provide a learning environment that emphasizes children's cognitive, affective and psychomotor aspects. Children need to acquire skills such as problem-solving skills, goal orientation, conflict management, mental hygiene, Critical Thinking, and Emotion Regulation to live healthy in society. Children can develop such skills through Collaborative Problem-based Learning environment. The variables, Critical Thinking, Academic Motivation, and Emotion Regulation can be enhanced through Collaborative Problem Based Learning. This 3C3R framework will assist in the area of curriculum developers, educational planners, and content designers to design new learner-centered approaches in education. The impact of Collaborative Problem Based Learning brings a change in the cognitive and affective aspects of adolescent students.

The Present study, therefore, is an attempt to contribute to the world of adolescent development. The study will have significant implications for changing the present classroom teaching-learning environment. The quest for educational designers to realize the unique characteristics of CPBL and its implications should be focused on how it can reshape teaching methodology and the extent to which it can change the current learning environment.

Statement of the Problem

The present study entitled as “Effectiveness of Collaborative Problem Based Learning on Critical Thinking, Academic Motivation and Emotion Regulation of Secondary School Students in Kerala”.

Definition of Key Terms

Effectiveness

Conceptual Definition

Effectiveness refers to the intervention's ability to do more good than harm for the target population in real-world settings (Schillinger, 2010).

Operational Definition

In the present study Effectiveness is defined as the extent to which Collaborative Problem Based Learning modules enhance Critical Thinking, Academic Motivation, and Emotion Regulation of adolescent students at the secondary level in terms of different dimensions of Critical Thinking, Academic Motivation, and Emotion Regulation.

Collaborative Problem Based Learning

Conceptual Definition

Collaborative learning is defined as an activity that is undertaken by equal partners who work jointly on the same problem rather than on the different components of the problem (Brandon & Hollingshead, 1999).

Problem Based Learning is a pedagogical approach that helps students to learn while they are actively solving meaningful problems (Elaine, 2016).

Operational Definition

In the present study Collaborative Problem Based Learning proposes as an instructional strategy used for instruction, here a problem is presented to the student and has to be solved by active collaboration in groups and gathering information from various resources as part of self-regulated learning. Problem Based Learning takes place in a collaborative learning group.

Collaborative Problem Based Learning (CPBL) is intended to enhance Critical Thinking, Academic Motivation, and Emotion Regulation of secondary school students in 8^{th} standard.

Critical Thinking

Conceptual Definition

Critical Thinking is the reasonable, reflective thinking that is focused on deciding what to believe or do (Ennis, 1987).

According to APA (1990), Critical Thinking is the process of purposeful, self-regulatory judgment, which drives problem-solving and decision-making.

Operational Definition

In the proposed study, Critical Thinking is the higher order thinking skill, and the scores obtained through Critical Thinking Test which includes the component of Inference, Recognition of Assumptions, Deduction, Interpretation, and Evaluation of Arguments.

Academic Motivation

Conceptual Definition

Academic Motivation is a student's desire (as reflected in approach, persistence, and level of interest) regarding academic subjects when the student's competence is judged against a standard of performance or excellence (DiPerna & Elliott, 1999).

Operational Definition

For the present study, Academic Motivation is the scores obtained through standardized scale of Academic Motivation which includes different components such as Intrinsic motivation, Extrinsic motivation, and Amotivation.

Emotion Regulation

Conceptual Definition

Emotion regulation involves ‘the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one’s goals’ (Thompson, 1994).

Operational Definition

For the present study, Emotion Regulation is the score obtained through standardized scale of Emotion Regulation which includes the component of Identifying, Processing, and Expressing**.**

Secondary School Students

Operational Definition

In the present study, the term secondary school students denotes pupils attending standard VIII in any of the recognized schools of Kerala**.**

Variables Selected

The dependent and independent variables of the study are as follows:

Independent Variable

The Independent variable used for the study is Collaborative Problem Based Learning.

Dependent Variables

The Dependent variables for the study are Critical Thinking, Academic Motivation, and Emotion Regulation.

Control Variable

Academic achievement is the control variable of the study. The first terminal examination mark of 8^{th} standard students has taken as the score of academic achievement.

Categorical Variable

The gender of the student has been taken as the categorical variable of the study. The total participants of the study were compared on gender basis.

Major Objectives of the Study

Major objectives of the study are

1. To develop Collaborative Problem Based Learning modules of 3C3R framework for Secondary School Students.
2. To determine the Effectiveness of the Collaborative Problem-based Learning modules on enhancing Critical Thinking, Academic Motivation, and Emotion Regulation of secondary school students.

Minor Objectives of the Study

1. To assess the Effectiveness of Collaborative Problem Based Learning modules of 3C3R framework on enhancing Critical Thinking and its components, viz.,
   a) Inference
   b) Recognition of Assumption
   c) Deduction
   d) Interpretation
   e) Evaluation of Arguments
2. To assess the Effectiveness of Collaborative Problem Based Learning modules of 3C3R framework on enhancing Academic Motivation and its components, viz,
   a) Intrinsic Motivation
   b) Extrinsic Motivation
   c) Amotivation
3. To assess the Effectiveness of Collaborative Problem Based Learning modules of 3C3R framework on enhancing Emotion Regulation and its components, viz.,
   a) Identifying
   b) Processing
   c) Expressing

Hypotheses of the Study

1. There is no significant difference in the pretest scores of Critical Thinking and its components between the experimental and control groups for the total sample.
2. The mean posttest scores of Critical Thinking and its components for the experimental group are significantly higher than that of the control group for the total sample.
3. There is a significant difference in the mean pretest and posttest scores of Critical Thinking and its components between the experimental and control groups for the total sample and subsample based on gender.
4. Collaborative Problem Based Learning modules of 3C3R framework have significant effect on Critical Thinking and its components for total sample and subsample based on gender.
5. There is no significant difference in the mean pretest scores of Academic Motivation and its components between experimental and control groups for the total sample.
6. The mean posttest scores of Academic Motivation and its components for the experimental group are significantly higher than that of the control group for the total sample.
7. There exist a significant difference in the mean pretest and posttest scores of Academic Motivation and its components between the experimental and control group for the total sample and subsample based on gender
8. Collaborative Problem Based Learning modules of 3C3R framework have significant effect on Academic Motivation and its components for total sample and subsample based on gender.
9. There is no significant difference in the mean pretest scores of Emotion Regulation and its components between the experimental and control groups for the total sample.

10. The mean posttest scores of Emotion Regulation and its components for the experimental group are significantly higher than that of the control group for the total sample.
11. There are significant differences in the mean pretest-posttest scores of Emotion Regulation and its components between experimental and control groups for the total sample and subsample based on gender.
12. Collaborative Problem Based Learning modules of 3C3R framework have significant and positive effect on Emotion Regulation and its components for total sample and subsample based on gender.

Methodology

The method includes the steps followed for conducting research are explained here.

Design

"Experimental design is the blueprint of the procedure that enables the researcher to test the hypothesis by researching valid conclusions about the relationship between independent and dependent variables". (Best & Khan, 2008)

Pretest- posttest nonequivalent group design from the Quasi-Experimental family was used for the study.

There are mainly three phases in the study, they are given below

1. Exploratory Phase
2. Developmental Phase
3. Experimental Phase

Exploratory Phase

The exploratory phase is the first stage of the methodology. The researcher identified and reviewed various theories related to Problem Based Learning, Critical Thinking, Academic Motivation, and Emotion Regulation. Qualitative content

analysis of 5th, 6th 7th, and 8th standard Basic science textbooks and 5th,6th and 7th standard Social Science textbooks helped to identify the interdisciplinary nature of the contents for module preparation.

Developmental Phase

The second-level experimental procedure includes tool preparation and standardization. Collaborative Problem Based Learning modules, Academic Motivation scale and Emotion Regulation Scale were prepared and standardized. A Rating Scale for 3C3R module was also prepared for the study.

Experimental Phase

This is the major phase of experimentation**.** In the experimental phase, standardized tools implemented to control and experimental group. For the present study pretest - posttest non-equivalent group design was used for VIII std students. Participants were 43 students from one school as the experimental group and 46 students from another school as the control group were taken for the study. The design is often used in classroom experiments when experimental and control groups are such naturally resembled groups as intact classes which may be similar (Best & Khan, 2008).

$$\begin{array}{c} O_1 \; X \; O_2 \\ \text{----------} \\ O_3 \; C \; O_4 \end{array}$$

O_1 and O_3 represent the Pretests

O_2 and O_4 represent the Posttests

X represents the treatment given for experimental group

C represents the treatment given for control group

Sample

Two intact class groups from two different Government schools of Calicut district. A total of 89,8th std students were the participants of the study. Total 43 students in the experimental group and 46 students in control group. Two Government schools from the Calicut district constitute the sample for the study.

Tools used for the Study

1 3C3R Model for Collaborative Problem-Based Learning modules (Linisha & Jaseena, 2019).

2 Critical Thinking Test (Francis &Mustafa, 2011).

3 Academic Motivation Scale (Linisha & Jaseena, 2019.)

4 Emotion Regulation Scale (Linisha & Jaseena, 2019

5 Rating Scale on Collaborative Problem-Based Learning (Linisha & Jaseena, 2019)

6 Lesson Transcript on the existing method of teaching (Linisha & Jaseena, 2019)

Statistical Techniques used for the Analysis of Data

1. Test of Significance of the Difference between Means.
2. Analysis of Covariance (ANOVA)
3. Hedges g for Effect Size

Scope, Limitations and Delimitations of the Study

The study revealed that 3C3R model of CPBL will be effective in enhancing Critical Thinking, Academic Motivation, and Emotion Regulation among secondary school students which are essential qualities for the personal and academic development of students and will make them better individuals. The role of Critical Thinking, Academic Motivation, and Emotion Regulation are indisputable in the personal development of a student. The level of academic aspiration help student to competent and skillful. In the events of conflict resolution and decision-making, emotional regulation can guide a person very well if they are trained in a pedagogy that gives importance to Emotion Regulation. Critical Thinking helps an individual in reaching the best solution out of all possible solutions, which is important for better character building. And the research has shown that 3C3R model of CPBL will be effective in developing all the mentioned qualities for students.

Another important contribution of CPBL, it will make learning, collaborative, interesting, satisfactory, and enjoyable. In this technological era, a large number of students are getting into screen addiction and divergence from the constructive learning process. In this context, CPBL is an efficient way to bring back students to the fun of learning through an interesting way of pedagogy. It provides a scope of group learning so students are responsible for their learning. It will create a sense of accountability in them and leads to self-motivated learning. CPBL is effective in developing intrinsic motivation, effective problem-solving, and effective collaboration skills.

For the present study, interdisciplinary contents from 8th std biology were selected. The subjects selected are not watertight compartments. As biology contents are connected with other disciplines. Thus, interdisciplinary nature of the content helps students to learn easily. It is effective and useful for real classroom learning. The teacher acts as a guiding light for CPBL learning. Students learned the Content in a particular Context and Connect the content with another discipline. The learner underwent learning processes such as Researching, Reasoning, and Reflecting. The content learned through 3C3R framework provides real knowledge. This strategy can be used by instructors to foster Critical Thinking, Academic Motivation, and Emotion Regulation among school students.

Even though CPBL modules were designed to enhance Critical Thinking, Academic Motivation, and Emotion Regulation, the study has some important limitations as well which are listed here.

1. The study did not consider more contents from 8th std biology, only interdisciplinary topics were selected for module preparation.
2. Current study follows the 3C3R framework. Other frameworks for Collaborative Problem Based Learning have not been used in this research.
3. The study was confined to an experiment with 89 adolescent students from Kozhikode district.

Some of the delimitations of the study are described here**.**

1. Sample collected from two government schools of Calicut district only.
2. 8^{th} std secondary school students were selected as the sample for the study. Other levels of education have not been considered for the study.
3. For the present study, gender of secondary school students is taken as a categorical variable; other variables like locale, Socio-Economic status, etc. are not considered for the study.
4. The study is delimited to three lessons only. Therefore, other interdisciplinary contents from the textbooks have not been considered here.

Overview of Research Report

The report of the study is presented systematically in six chapters.

Chapter 1

The first chapter is an introduction to the problem, establishing the need and significance of the problem, a Statement of the problem, Definition of key terms, Variable selected for the study, Objectives and hypotheses of the study, Methodology, Scope, and limitations of the study, and finally organization of the report.

Chapter 2

The second chapter divides into two parts. The first part is the theoretical overview of the independent variable Collaborative Problem Based Learning and the dependent variables Critical Thinking, Academic Motivation, and Emotion Regulation respectively. The second part deals with empirical studies related to selected variables and with a detailed conclusion of the empirical studies.

Chapter 3

This chapter's Methodology comprises the whole procedure for the experimentation. It deals with Research Design and consists of three phases,

Participants of the study, Preparation, validation, and standardization of the tools employed. Finally, data collection procedure and statistical technique for analyzing data.

Chapter 4

This chapter comprises a detailed analysis of the data collected and a discussion of the result.

Chapter 5

Chapter 5 deals with a Summary of the research work done. It consists of Major findings, the Tenability of hypotheses.

Chapter 6

This chapter deals with the objectives, hypotheses, the educational implication of the findings, Suggestions for Further Research and major recommendations of the study.

Chapter 2

REVIEW OF RELATED LITERATURE

- Theoretical Aspects of Problem Based Learning
- Theoretical Aspects of Critical Thinking
- Theoretical Overview of Academic Motivation
- Theoretical Overview of Emotion Regulation
- Empirical Studies
  - Empirical Studies Related to Problem Based Learning
  - Empirical Studies Related to Critical Thinking
  - Empirical Studies Related to Academic Motivation
  - Empirical Studies Related to Emotion Regulation
- Conclusion

A review of literature gives us a conceptual understanding of each variable under study. It also provides a clear idea of ongoing research and theoretical and empirical studies related to the study's main variable and different dimensions. A review of literature can be classified into two, theoretical and empirical reviews. The theoretical part deals with conceptual overview of Problem Based Learning, Critical Thinking, Academic Motivation and Emotion Regulation and empirical review parts detailed the different researches with regard to major variables.

Theoretical Aspects of Problem Based Learning

This part discovers conceptual overview of Problem Based Learning and related theories**.** Contextualized learning is one of the important underpinnings of PBL (Barron et al., 1998). This learning approach helps the learner to transfer what they have learned in the classroom to real life. The learner connected new knowledge with previous knowledge and presented the content in a particular context familiar to the student. This approach is based on the transferability of learning from one context to another. The transfer of learning has been proved to be more effective when students can understand the whole scope of knowledge, including principles, patterns, and relationships. (Bransford et al., 1999; Glaser 1992) Students who learned through traditional methods are relatively passive and students who learned through contextual learning retain meaningful information. Different theories, namely behavioural, cognitive, developmental and humanistic approaches which depicts differently about Problem Based Learning.

Problem Based Learning Related to Behavioral Theories

Behavioural theories like Watson’s Classical conditioning model, Skinners operant conditioning model describes individually about Problem Based Learning. Trial and error Theory of Thondike provides details about importance of feedback, clear goals and practices in learning. These concepts are part of Problem Based Learning. Drive Reduction Theory of Hull provides knowledge about importance of

Motivation in problem solving. Problem solving is an important aspect of Problem Based Learning.

Problem Based Learning and Cognitive Theories

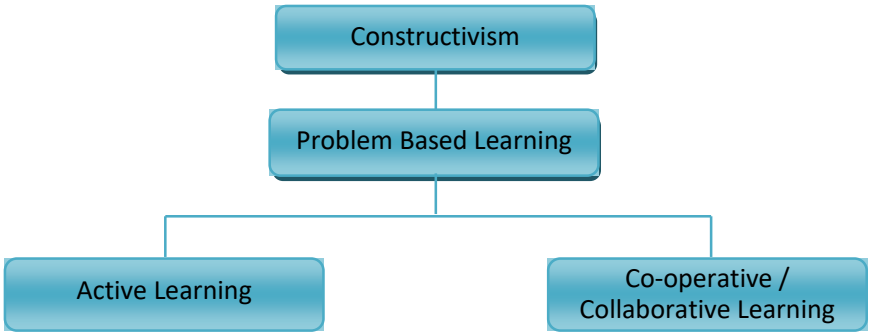
Cognitive Theories gave importance to mental processes such as information processing, insight, memory and perception of knowledge. At the same time PBL is in lined with these concepts. Cognitive theories aim to understand the individual learning and also the processes that occurring while learning.

Piaget's Theory of Cognitive Constructivism (1936, 1950)

Cognitive theories are based on mental process of learner. During learning process, students organize, store and find relationships or connect the new information with the previous knowledge Schema and Scripts. Details of cognitive constructivism with Problem Based Learning summarized in figure 1.

Figure 1

Cognitive Constructivism



(Source: https://utminers.utep.edu/mnortega/ted5314/understandingpbl.htm)

Piaget's theory was mainly based on how learning occurs rather than what factors influence learning. The teacher acts as a mentor or facilitator for learning. In Collaborative Problem Based Learning (CPBL), teachers act as co-learners and create learning experiences for the needs of students. This stage is in line with Paige's theory of constructivism. In 3C3R framework of CPBL, students were challenged and nurtured to become critical thinkers and problem solvers. Student-centered

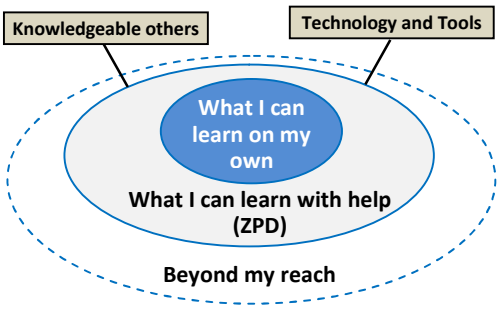
characteristics of CPBL are well aligned with theories of constructivism. "PBL did not originate from a philosophical background; student characteristics make it well-aligned with theories of constructivism (Savery, 2006). It is thus highly regarded as an effective inquiry model to bring about the integration of new knowledge. Other theory related to Problem Based Learning is the Socio-historical theory of Vygotsky.

Vygotsky's Socio Historical Theory (1978)

Vygotsky's theory stress on fundamental role of social interaction in the development of cognition. Social interaction plays a major role in the development of cognition. This theory appears to be a good fit for the application of PBL (Barrows, 1986) socio-historical theory as (Vygotsky, 1978) and PBL has some similarities. According to Vygotsky's theory, every function in the child's cultural development appears twice, social level and individual level. Details of Zone of Proximal Development and Scaffolding in Socio Historical Theory summarized in the figure 2.

Figure 2

Zone of Proximal Development and Scaffolding



(Source: https://www.simplypsychology.org/vygotsky.html)

Based on Vygotsky's (ZPD) Zone of Proximal Development, theory suggested that scaffolding instruction around small groups, more competent peers in collaborative learning groups, and authentic tasks (Tasks that would be done in a real-world context) are basic elements in ZPD. Vygotsky stated that one must understand the historical and cultural background of the student then only one can understand the student and their level of learning. Learner shape their thoughts,

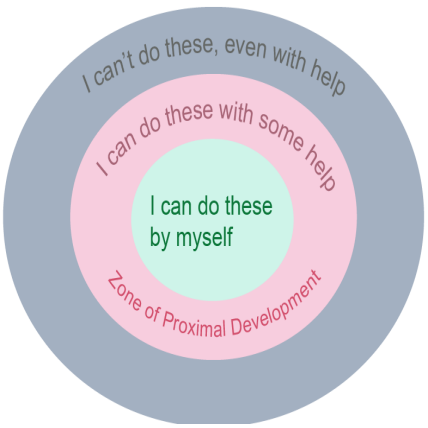
actions, and experiences through interaction and individual experiences. Knowledge would be perceived and co-constructed between at least two people (Vygotsky, 1978). These theoretical perspectives can be applied in CPBL to problem-solving and higher-order thinking skills. An individual can attain higher-order thinking, abstract thinking occurs through problem-solving. The learning and development process occurs through encountering continually novel concepts (Gredler & Shields, 2008). Learning takes place only through interactions between individuals and within a small group. Vygotsky was "concerned with how such mental functions occur on the intermental (i.e., socially distributed) as well as intra mental (i.e., individual) plan of functioning. (Wertsch, 2002)

Sociocultural Theory (Vygotsky, 1962)

According to Sociocultural Theory, individual learning occurs through interaction between individuals and within the groups. In CPBL environment, students may feel more comfortable in discussing and comparing ideas with peers than with an expert. Children were allowed to collaborate with peers, which can be very effective for learning. Peer interaction helps the learner to perceive others' ideas, problem-solving skills, and better understanding once in thinking process. Details of Sociocultural Theory summarized in Figure 3.

Figure 3

Vygotsky's Sociocultural Theory



(Source: https://www.psychologynoteshq.com/vygotsky-theory)

The major theory related to Problem Based Learning is Information Processing Theory. It deals with problem solving aspects.

Information Processing Theory of Herbert A Simon

Simon was the pioneer of artificial intelligence, information processing, decision making and organization theory. According to information theory, a human being is faced with many problems in their life. Problem-solving is associated with it. There were different types of problems such as highly structured, Puzzle like tasks, and ill-structured tasks in real life. Problem solving is a lifelong human activity. A problem itself share information for solving the problem. The theory describes behavior as an interaction between an information processing system, a problem solver, and a task environment. These three components established a framework for the problem. In this theory learner processing information to solve ill structured problem then reached a solution.

Different Perspectives of Problem Based Learning

Historical Perspective of Problem Based Learning

Epistemological origins of Problem Based Learning can be found in a number of schools of philosophical thought as described below. By understanding the nature of knowledge, people can acquire, develop and design educational approaches (Savin–Baden & Major, 2004).

Association of Problem Based Learning with Naturalism

The association of naturalism is knowledge acquired through questioning. This questioning approach helps for enhancing critical questioning skills. In the similar way Problem Based Learning also increases curiosity in children to solve problems. It is also based on investigation and nature of problem. This feature connects Problem Based Learning with naturalism.

Association of Problem Based Learning with Rationalism

Rationalism applies deductive reasoning to examine impressions. In this approach, it assumes that humans grasp only impressions and students do not know

things directly. Problem Based Learning connects with rationalism though it's emphasis on deductive reasoning. In both approach students examine and solve problem, but in Problem Based Learning students encourage in active participation with strong link between intellect and emotions.

Association of Problem Based Learning with Metaphysics

In Problem Based Learning approach, importance is given to metacognitive skill of students. Here students use reasoning and managing abilities to solve complex problems. Students gained knowledge through sensory perceptions and with the help of logical activities. This ideas connected with epistemological questions like 'What is the nature and reliability of the knowledge. This notion connects Metaphysics with PBL, like knowledge is personal.

Association of Problem Based Learning with Empiricism

Problem Based Learning requires inductive and deductive reasoning. It helps students to solve complex problems along with scientific method, empiricism is a major factor in the field of education. Empiricism based on evidences which received through experiences and observation. Thus students gain knowledge from gathering information and from testing our understanding of experiences with the external world.

Association of Problem Based Learning with Phenomenologicalism

Knowledge gained through Problem Based Learning is linked as knowledge needed for work place. It gives new space for testing new ideas in environment. Kant (1983) argued that in both empirical and rational views students have to go outside to acquire knowledge for understanding reality of world. There is no physical world; we acquire knowledge that seems real to our mind not based on reality. Acquired knowledge is a means to end. This knowledge is beneficial to society. Individual perception of knowledge is more important in Phenomenology. Problem Based Learning bridges the gap between knowledge, theory and practice.

Association of Problem Based Learning with Positivism

Positivism is based on the ideals of social justice. The principle of positivist is, matter is a unique reality. Problem Based learning provides democratic

environment for learning. Like positivism, PBL also addressing the issues of social justice.

Association of Problem Based Learning with Existentialism

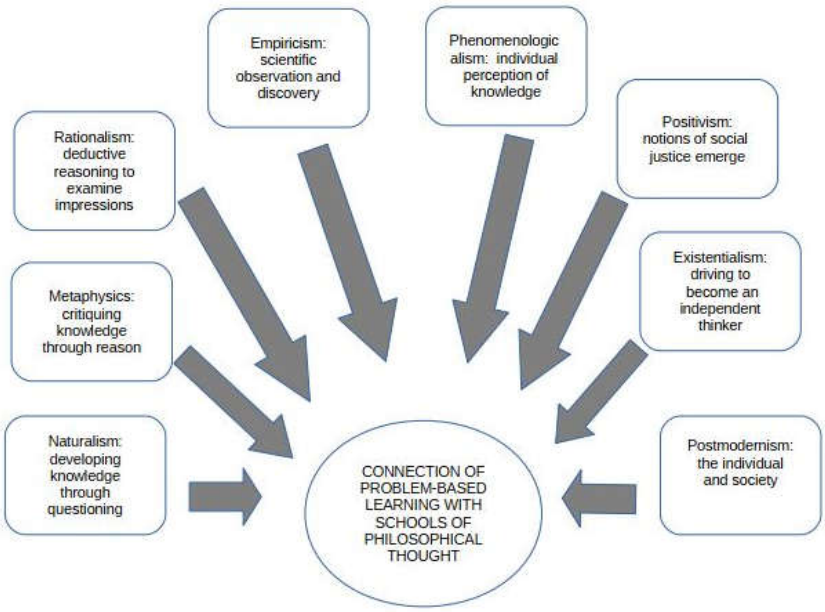
In Problem Based Environments, learning occurs through observation and experimentation. Which motivates for developing self-directed learning skills (Stendahal, 1976). In PBL student think themselves, and take responsibility for his own learning, peer learning conducts through collaboration.

Association of Problem Based Learning with Postmodernism

Problem Based Learning provides learning environment for all children without exclusion. Individual and society is the basis of post modernism, PBL paid more importance to individual through group collaboration. Students and teachers were co learners in PBL. Connection of Problem Based Learning with Schools of Philosophical Thoughts represented in Figure 4.

Figure 4

Connection of Problem Based Learning with Schools of Philosophical Thought



Duch et al., (2001) highlighted some of the important characteristics of a good PBL problem.

1) Motivate students to have a deep understanding of subject matter related to the real world by engaging the student's interests.
2) Based on the principle of learning, a student must make judgments and decisions based on the facts, logic, and rationalization of the problem.
3) To work effectively towards a solution the problem it should have enough complexity, so that cooperation can be sought from every member of the group.
4) Open-ended and controversial questions based on the previous knowledge should be administered in the initial stage to draw discussion towards the topic, that will encourage collaborative learning and remembering what is already known.
5) Content objectives that connect previous knowledge of the learners with the new concepts and knowledge with other courses/disciplines of the course should be incorporated into the problem.

According to Tan (2002) PBL approach consisted following characteristics.

- Problem is the starting point of the learning.
- Unstructured, real world problems are used in PBL
- The problem can be solved through multiple perspectives of the problem, this activity is capable of challenging current knowledge, attitude and competencies of the student.
- PBL primarily practicing self-directed learning, major responsibility in acquisition of knowledge and information lies in the learner.
- Wide variety of sources for solving the problem are used for PBL
- Cooperative, collaborative and communicative learning take place in small groups.

- Inquiry learning and problem solving skills are developed in PBL which is important as content knowledge acquisition for the solution of the problem
- PBL tutor acts as cognitive coach and facilitator through questioning and cognitive coaching.
- Integration and synthesis of the problem are included in the course for PBL process along with the review and evaluation of the learning process and the learner's experience.

Higher-order thinking skills should be developed by the problem, which will challenging students to move beyond (Bloom, 1956) knowledge and comprehension, lower cognitive levels to the higher cognitive level of analyzing, synthesizing, and evaluating. They are important criteria that need to be developed which is essential for successful in any profession.

Strategies and Techniques for Problem-Based Learning

Barrows (1986) proposed a taxonomy of problem-solving methods (all of which he identified as problem-based learning). This taxonomy has highlighted the educational objectives that it is possible to address through problem-based learning and the following varieties were included.

Lecture-based Cases. Students receive information through lectures, and the case material is used to demonstrate that information.

Case-based Lectures. Students read case histories before a lecture then covers relevant material.

Case Method. Students receive a complete case study that they must research and prepare for discussion.

Modified Case-based. Students receive information and must decide upon the action they may take. Following their conclusions, they receive more information about the case.

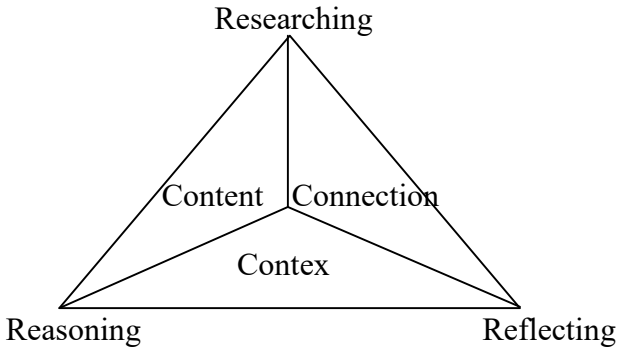
Problem-based. Students meet with a client in some form of simulated format that allows for free inquiry to take place.

Closed-loop Problem-based. This is an extension of the problem-based method, in which students consider the resources they used in the process of problem-solving to evaluate how they may have reasoned through the problem more effectively. The present study follows Hung's (2006) model of CPBL.

Hung's model (2006) for PBL acted as a conceptual framework that would help in guiding the design of effective and reliable problems for learners of all levels by addressing the specific characteristics of PBL and its implementation. Structural elements of 3C3R framework depicted in the Figure 5.

Figure 5

3C3R Framework



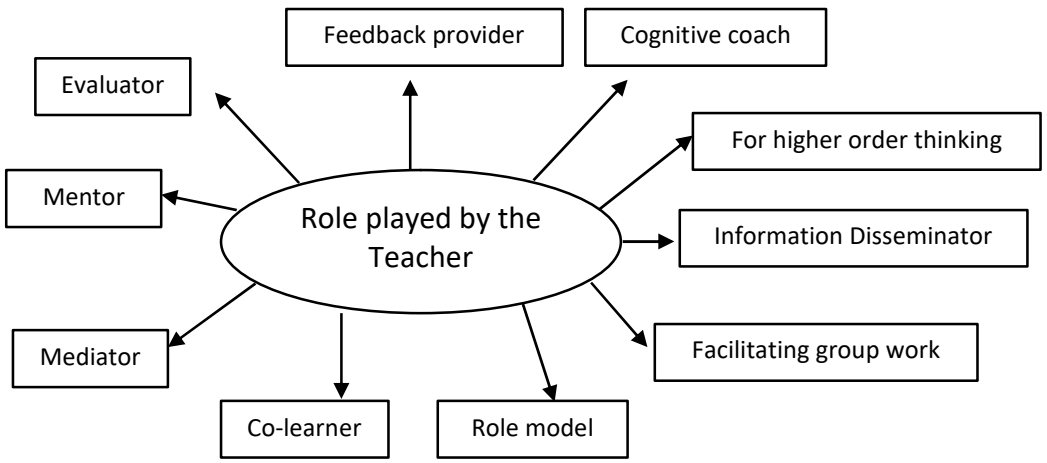
Collaborative Problem Based Learning design consisted of three parts which are given above. The PBL problem design of 3C3R model consisted of components of two classes given in the figure. There are three core components: Content, Context, and Connection, and three processing components Researching, Reasoning, and Reflecting that lead to self-regulated learning and problem-solving skills supporting

cognitive process. Collaborative Problem-Based Learning is based on the principle of collaboration, learner works in collaborative learning groups towards a common goal. The goal of PBL is to help students for developing intrinsic motivation, flexible knowledge, self-directed learning, effective problem-solving skills, and effective skills (Hmelo -Silver 2004). The role of a teacher in CPBL is explained below.

Role of Teacher in CPBL. In CPBL teacher acts as a facilitator in classroom learning. Teacher helps students to gain skills necessary for problem solving and collaboration (Hmelo-Silver, 2004). A teacher in this scientific world is one who recognizes, encourages, and facilitates the learner for learning. Teachers and students were the partners in the learning process. "Teachers should foster creativity and real-life problem solving, purpose and passion." (Fallon et al., 2013) Collaboration in learning groups promotes engagement as well as positive mental well-being. Role of the teacher in CPBL summarized in the Figure 6.

Figure 6

Role played by the Teacher in CPBL

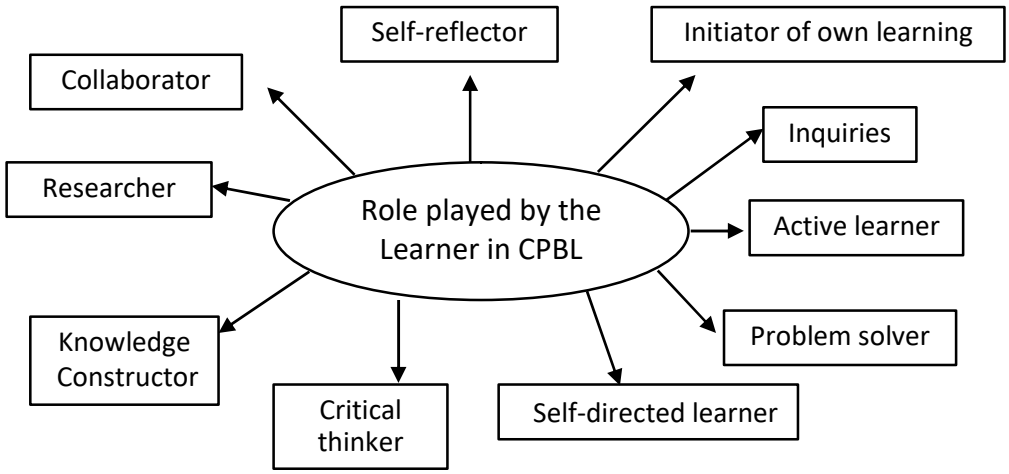


Role played by learner in CPBL. CPBL is a learner-centered instructional strategy that defines the role of the learner in different learning environment. Students work in collaborative learning groups to attain goal. The role of the learner in PBL has been recognizing that students were responsible for their learning.

Bridges and Hallinger (1999) identified that students assume greater responsibility for their learning in PBL as direct instruction is minimized. The goal of PBL is to help in developing intrinsic motivation, flexible knowledge, self-directed learning, effective problem solving, and effective collaboration skills. Role played by the learner in CPBL summarized in the Figure 7.

Figure 7

Performance of Learner



Various theories related to Problem Based Learning are discussed above. Piaget's Cognitive Constructivism discussed about how learning occurs rather than what factors influence learning. Problem Based Learning had direct connection with Vygotsky's Socio historical Theory, Socio cultural Theory etc. Both theories stressed on the importance of social interactions for developing cognition in individual. Characteristics of good PBL, Role of teacher and role of students are also detailed.

Theoretical Aspects of Critical Thinking

Critical Thinking is the ability to think rationally and decisively. Various skills are needed for Critical Thinking. One can connect the things logically and also reflect on the justifications of their own assumptions, beliefs and values.

Critical Thinking is analytic and evaluative within a given framework. Now a days the ability to develop Critical Thinking became one of the goals of education. Watson and Glaser (1941) mentioned that the relationship between rational thought and the process of education was the key factor of Critical Thinking. There were mainly three approaches to the conception of Critical Thinking.

Philosophical Tradition of Critical Thinking

The philosophical inquiry into Critical Thinking extends from Socrates, Plato, and Aristotle to the contemporary of Dewy, Ennis, and Paul. Dewy was considered the founder of the modern Critical Thinking movement. Critical Thinking is reflective thinking and defines as active, persistent, and careful consideration of a belief or supposed form of knowledge in light of the grounds that support it, and further conclusion to which it tends (Dewy, 1961). In the philosophical tradition, the concept of Critical Thinking features enumerating the characteristics of a Critical Thinker, attaching importance to the reasoning skill and processes. This implies the qualities of an ideal critical thinker under ideal circumstances in which the limitations on human thoughts are not in place (Sternberg, 1986).

Definitions of Critical Thinking emerging from the philosophical tradition.

- "The propensity and skill to engage in an activity with reflective skepticism" (McPeck, 1981, p. 8);
- "Reflective and reasonable thinking that is focused on deciding what to believe or do" (Ennis, 1985, p. 45);
- "Skillful, responsible thinking that facilitates good judgment because it 1) relies upon criteria, 2) is self-correcting, and 3) is sensitive to context" (Lipman, 1988, p. 39);
- "Purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential,

conceptual, methodological, soteriological, or conceptual considerations upon which that judgment is based" (Facione, 1990, p. 3).

Psychological Tradition of Critical Thinking

The psychological approach is mainly concerned with the processes and skills of Critical Thinking in a practical context (Moon 2008). The processes of Critical Thinking aim to develop an idea that is more comprehensive, more usable, and more relevant to practice. Robert Sternberg (1986) described that Critical Thinking consists of "mental processes and strategies". These are utilized to solve problems, make decisions and learn new concepts. Psychological researchers highlight the importance of context that it can impose on the performance of processes and skills. The practical discipline or professional contexts determine the appropriate application of particular skills of Critical Thinking.

Definitions of Critical Thinking that have emerged from cognitive psychological approach include "The mental processes, strategies, and representations people use to solve problems, make decisions, and learn new concepts" (Sternberg, 1986, p. 3);

"The use of those cognitive skills or strategies that increase the probability of a desirable outcome" (Halpern, 1998, p. 450);

"Seeing both sides of an issue, being open to new evidence that disconfirms your ideas, reasoning dispassionately, demanding that claims be backed by evidence, deducing and inferring conclusions from available facts, solving problems, and so forth" (Willingham, 2007, p. 8).

Educational Tradition of Critical Thinking

The educational tradition of Critical Thinking is a combination of philosophical and psychological approaches (Sternberg 1986). Educators are

primarily concerned with how to develop students into critical thinkers rather than the process or skill itself (Moon, 2008). In the classroom, process and skills, which are necessary for problem-solving, decision making, and concept learning can be taken as guidance in nurturing critical thinkers.

Different Approaches of Critical Thinking

Holistic Approach

The holistic approach normally lasts for at least one year and even more than two or three years. Here no direct instruction for Critical thinking.

Alternative Instructional Approach

In this approach, Critical Thinking can be defined as a set of skills and these skills are specific and teachable through description, practice and once learned, can be used for a variety of issues (Davis, 2006, 2011; Ennis, 1991).

According to Moore (2006), Critical Thinking can be enhanced only through prolonged immersion in the content of the discipline, and exposure to and participation in a variety of subject matter instructions can create an automatic Critical Thinker.

Diane Halpern's Four-part Model of Critical Thinking

According to Halpern, Critical Thinking is "the use of those cognitive skills or strategies that increase the probability of a desirable outcome. Halpern proposed a four-part model of Critical Thinking, they are Instructions in the skill, Disposition for Critical Thinking, and Structure training as a means of improving the probability which will recognize a particular thinking skill needed in a particular context. The fourth component of Critical Thinking instruction is monitoring based on metacognition. Metacognition means "what we know about what we know. Metacognitive monitoring is the executive function of directing the thinking process.

Brookfield (1987) explained the main characteristic features of Critical Thinking.

Critical Thinking as a Productive and Positive Activity

Persons with Critical Thinking ability are actively engaged in life. They create and recreate different aspects of their personal work and practical lives. Critical Thinkers sense that life is full of possibilities and appreciate creativity and engage in innovations. The persons with Critical Thinking gave importance to the diversity of values, behavior, social structure, and artistic forms in the world.

Critical Thinking is a Process, Not an Outcome

Critical thinkers question the assumptions. A person does not achieve fully developed or realized critical awareness, by its nature, Critical Thinking is a process.

Manifestations of Critical Thinking Vary According to the Context in Which they Occur. The presence of indicators causes, Critical Thinking variation enormously. Critical Thinking processes appear almost internally and very few external features are changed. “People who renegotiate aspects of their intimate relationships, managers who deliberately depart from their habitual ways of coming to decisions or solving problems, workers who reshape their workplace according to nonhierarchical organizational norms after establishing a worker cooperative, or citizens campaigning for a nuclear freeze after observing the effects of a radiation leak in their community are all examples of how Critical Thinking can prompt dramatic action” (Brookfield, 1987).

Critical Thinking is Triggered by Positive as Well as Negative Events. According to Brookfield (1987) “A common theme of Critical Thinking is that an activity that usually results from people having experienced traumas or tragedies in their lives. These events, when the argument goes, it cause people to question their previously trusted assumptions about how the world works; and this questioning

prompts scrutiny of what were previously unquestioned ways of thinking and living. Critical Thinking is triggered by a joyful, pleasing, or fulfilling event-a "peak" experience such as falling in love, being unexpectedly successful in some new workplace role or finding that others place great store by abilities or accomplishments that exhibit almost without being aware of them".

Critical Thinking is Emotive as Well as Rational. Sometimes people regard Critical Thinking as a pure ascetic cognitive activity that is above and beyond the realm of feeling and emotions. Emotions are central part of Critical Thinking process. When we ask Critical Thinking questions about our previously accepted values, ideas and behavior that produce anxiety. But students feel a happy release and relief when they work on new ways of thinking. When students realize that they have aspects of change with positive and excitement this will create a sense of self-confidence.

The Watson-Glaser Critical Thinking Skill(1941). Edward-Glaser developed Critical Thinking pattern in 1941. According to Glaser, Critical Thinking involves:

- A wise attitude is required while considering the problem.
- Idea about logical investigation of the problem.
- Skills that are involved in the method of Critical Thinking

Critical Thinking is a set of skills that are strongly involved in students' success in learning. Students encourage for combining the attitudes, knowledge, and skills formed from Critical Thinking skills.

The major steps put forward by Watson-Glaser are as follows.

Inference making. The ability to distinguish between true or false conclusions from the given data.

Recognition of Assumption. The skill of recognize an assumption of written or oral statements.

Deduction. It is the ability to determine a discussion based on the conclusion that must be followed from the given information.

Interpretation (Induction). The art of consider and decide whether the obtained evidence and conclusions can be generalized.

Evaluation of Arguments. These are options of more appropriate and relevant arguments through specified questions about the problem provided.

Every person thinks consciously based on its nature. It is the process to solve any kind of problems. Result of the thinking is based on how the thinking process is done. It can be explained in terms of a process or on a skill. The process aspects of Critical Thinking involves some specific processes such as analyzing a problem, Collecting the data, Evaluating the data and synthesizing in deciding a conclusion. This facts realize that Critical Thinking is an ability beyond thinking process and the processes that has role in higher order cognitive aspects.

This area discussed theories underlying Critical Thinking. These theories and concepts related to Critical Thinking helped investigator to acquaint about the importance of Critical Thinking and it's role in development of learner.

Theoretical Overview of Academic Motivation

Motivation is not only one of the central concerns of education but also for individual's growth and development. Motivation is important in learning and learning depends on motivation. Students will work hard if they are properly motivated. A highly motivated student directs his attention and desires toward a goal with such force that he is interested in preserving the pursuit of these goals. "Motivation is an indispensable factor for learning," says S.G Callahan. How strongly a student is motivated will determine his persistence and effort in reaching an objective. This requires intrinsic motivation. A teacher who imposes goals often fails to provide pupils with intrinsic motivation. Students will accept the teacher-imposed or parent-imposed goals once they see goal achievement about its effect on themselves. In other words, motivation is closely related to the experiences, abilities,

and needs of the individual. They will respond to a given learning situation to the extent that it is compatible with their subjective interests. Motivation is enhanced when students can relate to immediate goals that are often viewed as easily attainable.

The power of motivation is well described by Maitra (2012) when students are highly motivated to learn when they want to learn and are willing to try to learn, they almost surely will learn even if the instructional materials and methods that are employed by their teachers have something to be desired more. Motivation is a personal, internal process, a state of arousal, a striving that determines the strength and direction of a person's behavior. It is something within the individual that not only arouses but also directs and sustains a line of action. It enables a person to wish to achieve a specific goal and to make an effort to do so. A motivated person strives to accomplish something to do his best to excel others in performance. Academic Motivation is a learned motive to compete and strive for success in academic areas. Besides that, it is more likely to be learned by social customs and education rather than by being born. Motivation plays a crucial role in student learning and achievement.

Role of motivation in education has several possessions on how students learn and how they behave towards the subject matter. It can complement as follows

- Direct behavior toward particular goals
- Lead to increased effort and energy
- Increase initiation and persistence in, activities
- Enhance cognitive processing
- Determine what consequences are reinforcing
- Lead to improved performance

Intrinsic motivation, Extrinsic motivation and Amotivation are the main theoretical dimensions of Academic Motivation.

Intrinsic Motivation

Intrinsic motivation refers to motivation that is driven by an interest or enjoyment in the task itself, and exists within the individual rather than relying on any external pressure. Intrinsic Motivation is based on taking pleasure in an activity rather than working towards an external reward.

Intrinsic motivation has been studied by social and educational psychologists since in early 1970s. Students who are intrinsically motivated are more likely to engage in the task willingly as well as work to improve their skills, which will increase their capabilities. Students are likely to be intrinsically motivated when they will…

- Attribute their educational results to factors under their control, also known as autonomy.
- Believe they have skill that will allow them to be effective agents in reaching desired goals (i.e., the results are not determined by luck).
- Interested in mastering a topic, rather than just rote-learning to achieve good grades.

Intrinsic motivation exists within individuals and exists in the relation between individuals and activity. Mainly there are three types of intrinsic motivation. According to Deci and Ryan (2000),Intrinsic Motivation to know, Intrinsic Motivation to accomplishment and Intrinsic Motivation to experience stimulation.

Intrinsic Motivation to Know

Intrinsic motivation to know is observed if an activity is performed for the pleasure or satisfaction of learning or understanding something**.** Sub component of

intrinsic motivation are, exploration, curiosity, learning goals, intrinsic intellectuality and intrinsic motivation to learn.

Intrinsic Motivation towards Accomplishment

Intrinsic motivation to accomplishment is defined as engaging in an activity for the pleasure of accomplishing or crating something**.** Individuals interact with the environment in order to feel competent and to create unique accomplishments. Academic achievement in any subject is the example for Intrinsic motivation to accomplishment.

Intrinsic Motivation to Experience Stimulation

Intrinsic motivation to experience stimulation occurs when an activity is performed to obtain stimulating experiences.

Extrinsic Motivation

Extrinsic motivation refers to the performance of an activity in order to attain an outcome, which is then contradicts intrinsic motivation. Extrinsic motivation comes from external factors of the individual. Common extrinsic motivations are rewards like money and grades, coercion, and the threat of punishment. Competition is in general extrinsic because it encourages the performer to win and beat others, not to enjoy the intrinsic rewards of the activity. Social psychological research has indicated that extrinsic rewards can lead to over-justification and a subsequent reduction in intrinsic motivation. A study demonstrating the effect that children who expected to be (and were) rewarded with a ribbon and go for drawing pictures spent less time playing with the drawing materials in subsequent observations than children who were assigned an unexpected reward condition, for those children who received no extrinsic reward. Self-determination theory proposes that extrinsic motivation can be internalized by the individual if the task fits with their values and beliefs and therefore helps to fulfill their basic psychological needs. Within extrinsic

motivation there is a continuum of behavior regulations reflecting the degree to which the behavior has been integrated into the individual's sense of self.

Sub components of Extrinsic motivation are External regulation, Introjected regulation, identification and integration. According to Deci and Ryan (2000) various dimensions and it's examples of Extrinsic Motivation are given below.

External Regulation

Behaviour is regulated through external means such as reward and constraints. Here the behavior is controlled by external incentives such as praise, rewards and punishment avoidance.

Eg. I study at night before exam because my parents force me to.

Introjected Regulation

It indicates when, individuals begins to internalize reason for his or her action. Here external contingencies have been internalized and the individual acts to facilitate self-esteem or lessen guilt and avoid demonstration of failure.

Eg. I study at night before exams because that's what good students are supposed to do.

Identification or Identified Regulation. Here behaviour becomes valued and judged important for individual. That is behavior is explicitly recognized and valued by the individual.

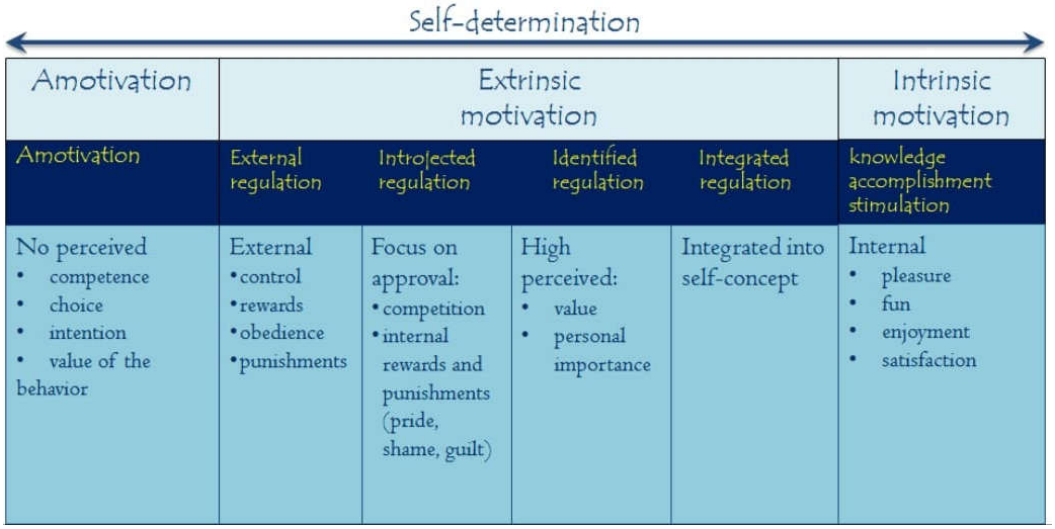
Integrated Regulation. Integrated regulation, which is the most autonomous kind of extrinsic motivation and appears when the behavior is fully integrated into personal values and beliefs. Internalization of extrinsic motives becomes regulated through identification.

Eg. I have chosen to study during night because it is something important for me.

Amotivation. Amotivation is defined as the state of lacking intention to act. When people are amotivated, people either do not act at all or act without intent. Amotivation behaviors are the least autonomous because there is no expectation of reward or change of events. Vallerand et al. (1992) mentioned that Amotivation is the lowest level of autonomy continuum where amotivated individuals are neither intrinsically nor extrinsically motivated. In this category, individual believes that actions are result of something that is not under their control. Component wise details of Self-determination theory represented in Figure 8.

Figure 8

Graphical Representation of Self-determination Theory



(Source: https://images.app.goo.gl/DbYNsiMoLEKEtXaX7)

During late 1980s, theories related to Academic Motivation reported that the plethora of research from the previous 10 years in motivation started with same conclusion. Success in learning was no longer attributed to the natural intellect alone, but to a set of psychological forces that drove an individual to achieve success. At the same time, there was recognition that some intelligent students were not reaching attainable levels of performance. This shortcoming is illustrated by researchers both in the classroom and laboratories (Ames, 1978), who showed that, although children may have the same intellectual capabilities, they choose either adaptive or maladaptive patterns which has deep effects on cognitive performance. Research studies on motivational variables have

received increased attention within the fields of psychology and education over the past decade (Murphy & Alexander, 2000; Pintrich, 2000). Theoretical approaches in Motivation have been used to define, why individuals behave in a given manner in a specific situation. Learners are believed to exist as part of one's goal structures, and they direct whether or not one would engage in a given pursuit (Ames, 1992). As motivation is one of the major factor in Academic Motivation.

Academic Self-Concept

Academic self-concept is another important part of Academic Motivation. One of the essential aims of education is enhancement of positive self-concept which is a mediating variable of desired outcomes. Academic self-concept refers to attitudes and feelings that students have about their intellectual or academic skills, especially when comparing them with other students. It consists of a mixture of cognitive judgments or self-beliefs in addition to effective judgments or self-feelings about one's academic skills. Marsh (1989) stated that there was a consistent pattern of self-concept declining from a young age through at least adolescence, leveling out, and then increasing at least through early adulthood. Craven (1997) mentioned that although young children have a higher self-concept, they develop more realistic judgments of their relative weaknesses and strengths as they grow up and those experiences fit into their self-concept. Similarly, Marsh et.al (2003) contend that as children became older, measurement of academic self-concept became more reliable and stable since children's awareness of the wrong increases as they become older. In addition, with the increase of age, self-concepts of young children become more predictable and are more closely aligned with external indicators. For instance, the school environment is one of the factors that stress importance of evaluation and competition as students grow older (Wigfield & Eccles, 2002). Furthermore, academic self-concept was found to be positively associated with global self-esteem and the individuals who decided to participate in higher education for cognitive interest were regarded as having the most positive academic self-concept (Michie et al., 2001). Several theories detailed Academic Motivation. Some of the main theories are explained here under.

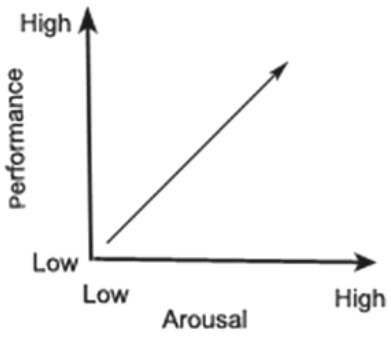
Theories Related to Academic Motivation

Drive Theory (Hull, 1943)

As Hull describes that all individuals have needs that lead to internal stimuli prodding us into action, driving us to reduce those stimuli by satisfying the relevant needs. Drive theory is consequently also known as Drive Reduction Theory. These drives are necessary; otherwise, needs would not be satisfied. It is also important for the person to perceive the stimulus and response in order to learn. Primary drives are those related to basic survival and procreation. Secondary drives are related to social and identity factors which are less important for survival. As we act to satisfy needs, we become conditioned and acquire habits and other unconscious forms of response or reaction. Behavior is changed only if habits no longer satisfy needs; in such a situation, the drives remain. If enacting of drives is frustrated or the driven action does not satisfy needs, this can lead to anxiety and other negative emotions. For example, a person in a strange house is hungry and looks for food. He found some under the staircase. When he is in another house and hungry the first search is under the stairs. It is understood, that what drives people and stimulate these to get a person into action. Ensure that motivate the drive such that the person acts in a way that want them to. Relationship of Arousal and Performance in Drive Theory depicted in Figure 9.

Figure 9

Drive Theory (Hull, 1943)



(Source: https://en.wikiversity.org/wiki/Motivation_and_emotion/Book/2017/Drive_reduction_theory_of_motivation)

Activation Theory (Scott, 1966)

In accordance with Activation theory **(**Scott, 1966), it describes how mental arousal is necessary for effective functioning so that we need a certain level of activation to be sufficiently motivated to achieve goals, do good work, and so on. The Yerkes-Dodson Law points out that how people need a certain amount of activation to be motivated but not to have too much stimulation. We have an upper limit to activation, beyond which we become overly stressed and fall into satisfaction. People will seek activation through different types of stimulation, including novelty, complexity, variation, and uncertainty. At low level of activation, performance is decreased due to three factors:

- Lack of alertness
- Dulling of senses
- Limited muscular coordination

These factors in turn can lead to increased error or accidents, and slower completion of tasks. Under activation, it also leads to boredom and seeking of alternative stimulation (including sabotage), unless the person has a low activation preference, where they are happy to daydream or otherwise be lazy. For example, a person designing a job considers carefully the level of activation needed and includes just enough challenges and stimulation to keep the job- interested but not so much that they get overloaded.

Intrinsic Motivation (Deci & Ryan, 1985)

Intrinsic motivation come off when anyone is motivated by internal factors, as opposed to the external drives or extrinsic motivation. Intrinsic motivation drives to do things just for the fun of it, or because of the belief as it is a good or right thing to do. There is a paradox between intrinsic and extrinsic motivation. Intrinsic motivation is far stronger motivator than extrinsic motivation, yet external

motivation can easily act to displace intrinsic motivation. Most people's hobbies are intrinsically motivated. Few people carry the amount of passion into their workplace. If someone has to believe in an idea or align their values with what you want, then you have to set very powerful motivation in place which Seek to make them feel good about what you want and also minimize extrinsic motivation. According to Goal-Setting Theory (Locke & Latham, 1990) in order to direct ourselves to achieve goals that are:

- Clear (not vague) and understandable, so we know what to do and what not to do.
- Challenging, so we will be stimulated and not be bored.
- Achievable, so we are unlikely to fail.

If other people set goals without our involvement, then we are much less likely to be motivated to work hard on them than if we feel we have set or directed goal ourselves. When we are working on a task, we need feedback so we can determine whether we are succeeding or whether we need to change direction for that find feedback (if it is sympathetically done) which is very encouraging and motivating. This need feedback from ourselves. Negative self-talk is just as demotivating as negative comments from other people. Depending on the type of goal we have, we will go about achieving it differently. A directional goal is one where we are motivated to arrive at a particular conclusion. We will thus narrow our thinking, selecting beliefs, etc. that support the conclusion. The lack of deliberation also tends to make us more optimistic about achieving the goal. An accuracy goal is one where we are motivated to arrive at the most accurate possible conclusion. It occurs when the cost of being inaccurate is high. Unsurprisingly, people invest more effort in achieving accuracy goals, as any deviation costs, and a large deviation may well more. Their deliberation also makes them realize that there is a real chance that they

will not achieve their goal. When we have an accuracy goal we do not get to a 'good enough' point and stop thinking about it-we continue to search for improvements. Both methods work by influencing our choice of beliefs and decision-making rules. If you want someone to deliberately think about what they are doing, give them an accurate goal. Choose your own goals. Notice the difference between when you are diving into action and when you are carefully thinking. The next component related to Academic Motivation is Extrinsic Motivation (Petri, 1991).

Extrinsic Motivation (Petri, 1991)

With respect to Extrinsic motivation as opposed to the internal drives of intrinsic motivation. Extrinsic motivation drives to do things for tangible rewards or pressures, rather than for the fun of it. When I do something, I have to explain why I do it. If I am being rewarded extrinsically for doing it, then I can explain to myself that I am doing it for the reward. In this way, rewards can decrease internal motivation as people work to gain the reward rather than they like doing the work or believe it is a good thing to do. As extrinsic motivations can change a pleasurable thought into work. The following are three primary types of extrinsic motivation.

Different Types of Extrinsic Motivation. Motivation is sustained by different factors such as External motivation, Environmental reward or punishment contingencies, etc. Do work because you are paid to do it. Introjected motivation is the desire to avoid internally imposed guilt and recrimination. Do work to earn money to sustain a family. Identified motivation, is desire to express important self-identifications. Do work because it is 'what I want to do'. You can offer positive motivations such as rewards and other bribery or you can use negative motivations such as threats and blackmail. Either way, extrinsic motivation is crude, easy, and often effective. However, it focuses people on the reward and not the action. Stop giving the reward and they'll stop the behavior. This can, in fact, be useful when you

want them to stop doing something: initially, give them extrinsic rewards for doing the unwanted behavior, and then remove reward.

Cognitive Evaluation Theory (Deci & Ryan, 1985)

This theory explained as, when looking at a task, we evaluate it in terms of how well it meets our needs to feel competent and in control. If we think we will be able to complete the task, we will be intrinsically motivated to complete the task, requiring no further external motivation. Where a person has a stronger internal locus of control, they will feel they are in control of how they behave. Where they have a stronger external locus of control, they will believe the environment or others have a greater influence over what they do. People may see external rewards as achieving some degree of control over them or may see the reward as informational, such as where they reinforce feelings of competence and self-determination. When people see the reward as mostly for control, they will be motivated by gaining the reward but not by enacting the requested behavior.

Attribution Theory (Weiner, 2012)

Attribution theory is probably the most influential contemporary theory with implications for Academic Motivation. It incorporates behavior modification in the sense that it emphasizes the idea that learners are strongly motivated by the pleasant outcome of being able to feel good about themselves. It incorporates cognitive theory and self-efficacy theory, but it emphasizes that learners' current self-perceptions will strongly influence how they interpret the success or failure of their current efforts and hence their future tendency to perform these same behaviors. According to Attribution theory, main postulates is that people tend to explain success or failure, can be analyzed in terms of three sets of characteristics as follows.

- First, the cause of the success or failure may be internal or external. we may succeed or fail because of factors that we believe have their origin within us or because of factors that originate in our environment.

- Second, the cause of the success or failure may be either stable or unstable. If we believe the cause is stable, then the outcome is likely to be the same if we perform the same behavior on another occasion. If it is unstable, the outcome is likely to be different on another occasion.
- Third, the cause of the success or failure may be either controllable or uncontrollable. A controllable factor is one that we believe that we can alter if we wish to do so. An uncontrollable factor is one that we do not believe we can easily alter. An important assumption of attribution theory is that people will interpret their environment in such a way as to maintain the need of positive self-image. It means, they will attribute their successes or failures to factors that will enable them to feel as good as possible about themselves. In general, it means that when learners succeed at an academic task, they are likely want to attribute this success to their efforts or abilities; but when they fail, they will post attribute for their failure to factors over which they have no control, such as bad teaching or bad luck. The basic principle of attribution theory as it applies to motivation is that a person's perceptions or attributions for success or failure determine the amount of effort the person will expect on that activity in the future. There are 4 factors related to attribution theory that influence motivation in education: Ability, Task Difficulty, Effort, Luck. In terms of the characteristics discussed previously, these four factors can be analyzed in the following way:
    - Ability is a relatively internal and stable factor over which the learner does not exercise much direct control.
    - Task difficulty is an external and stable factor that is largely beyond the learner's control.
    - Effort is an internal and unstable factor over which the learner can exercise a great deal of control.
    - Luck is an external and unstable factor over which the learner exercises very little control.

Acquired Needs Theory (McClellan, 1961)

Acquired Needs Theory is also known as the Three-Need Theory or Learned Need Theory. Needs are shaped over time by our experiences. Most of these fall into three general categories of needs:

- Achievement
- Affiliation
- Power seekers

There may be different preferences, one of these needs influence more powerfully than others and thus affects our behaviors.

- Achievers seek to excel and appreciate frequent recognition of how well they are doing. They will avoid low-risk activities that have no chance of gain. They also will avoid high risks where there is a significant chance of failure.
- Affiliation seekers look for harmonious relationships with other people. They will tend to conform and shy away from standing out. They seek approval rather than recognition.
- Power seekers want the power either to control other people (for their own goals) or to achieve higher goals (for the greater good). They seek neither recognition nor approval from others - only agreement and compliance.

Self-Determination Theory (Deci & Ryan, 2000)

Conforming to Self-Determination Theory (SDT) reported that, this idea is supporting our natural or intrinsic tendencies to behave effective and healthy ways. Self-determination theory has been researched and practiced by a network of researchers around the world. The theory was initially developed by Deci and Ryan at the University of Rochester and has been elaborated and refined by scholars from many countries. Self-determination theory is mainly based on three fundamental

psychological innate needs; Need for competence, Relatedness, and Self-determination (autonomy) where the same context allows all people in to a comparable level of satisfaction of their needs. Need for competence is related to understanding how to obtain various external and internal outcomes and being efficacious in a given action. In other words, it is related to the need for experience, satisfaction in improving one's ability. Need for Relatedness involves having safe and satisfying connections with others. Lastly, Autonomy refers to the self-regulation of one's actions. Besides, it is related to the need to engage in self-directed behavior.

Self-determination theory assumes that human beings are not only growth-oriented, proactive, and inherently desirous of autonomy, or self-determined, but they are also open to being controlled. Deci emphasized that when a behavior is self-determined, the individual recognizes that the locus of causality is internal to them self, whereas when it is controlled, the recognized locus of causality is external to the self.

Nevertheless, researchers indicated that when people are self-determined they show greater initiative and persistence, have higher satisfaction and trust, perceive themselves to be in better control of decision making, and take more responsibility for outcomes of event than when they are controlled. Self-determined motivation is related to various educational outcomes from early elementary school to college. Some researchers reported that students who had high self-determined forms of motivation for doing school-related work were more likely to stay in school, achieve, show evidence of conceptual understanding, and be well adjusted than those who had low self-determined motivation. When applying self-determination theory in academic motivation, intrinsic and extrinsic motivations are two primary types of motivated academic behavior.

Deci and Ryan distinguished intrinsic motivation (doing something for the sheer pleasure that it brings or because of interest) from extrinsic motivation (the actions or behaviors a person engages in that are coerced or seduced by external forces). Intrinsic motivation is related to the behaviors driven by the pleasure and satisfaction one receives from engaging in activities. Ryan and Deci defined intrinsic motivation as "the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn". Students' enjoyed when they learn new things is an example of intrinsic motivation. Students may do their homework because they find it interesting and satisfying to learn about certain subjects. Ryan and Deci posit that people are intrinsically motivated only by the activities that hold intrinsic interest for them and the activities that have the appeal of novelty, challenge, or aesthetic value.

On the other hand, extrinsic motivation refers to "the performance of an activity in order to attain some separable outcome". Extrinsically motivated behaviors are more controlled behaviors compared to intrinsically motivated behaviors. Unlike intrinsic motivation, extrinsic motivation is not related to an intense interest to participate in particular activities. Such as, people act in a certain way because their behaviors are valued by others to whom they are attached. In this case, behavior is prompted by external contingency such as reward, punishment, and deadlines where performed behavior is not internalized. For instance, a student who do an assignment for teacher's praise or to avoid parental confrontation is externally regulated.

Deci categorizes extrinsic motivation into four types; namely, External regulation, Introjected regulation, Identified regulation, and Integrated regulation. When these four types are placed along an autonomy continuum, external regulation is the least self-determined, and integrated regulation is the most self-determined. External regulation refers to the behaviors regulated by rewards and constraints. Students who study hard and know that their parents will reward them for doing well are examples of external regulation. On the other hand, introjection is related to

implementing a regulation, but not fully accepting it as one's own. For instance, a student who gets to class on time to avoid feeling guilty is regulated by introjects. The third type of extrinsic motivation is identified regulation. This happens when individuals value their behavior and believe that it is important. They also claim that when people perceive the personal relevance of an activity for themselves, they are likely to identify its importance and will engage in the activity voluntarily or willingly. Such as, a student who studied statistics because he accepted the importance of statistics for his self-selected goal behavior through identification. Finally, integrated regulation is the most developmentally advanced form of extrinsic motivation. It has some relation to intrinsic motivation because both are forms of autonomous self-regulation in which the person behaves willingly in a given situation. However, the learner who is only externally regulated could not be considered to be autonomous compared to intrinsic motivation.

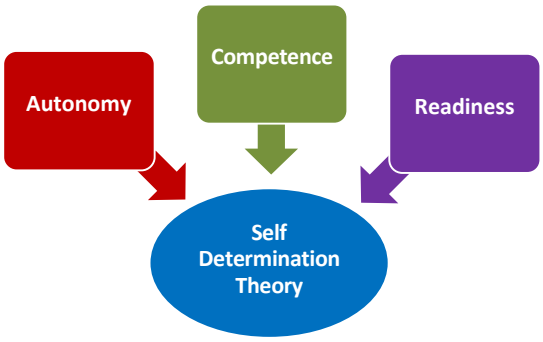
The last type of motivation is Amotivation which is defined as the state of lacking intention to act. When people are amotivated, people either do not act at all or act without intent. Amotivation behaviors are the least autonomous because there is no expectation of reward or change of events. Amotivation is the lowest level of the autonomy continuum where amotivated individuals are neither intrinsically nor extrinsically motivated. In this category, the individual believes that actions are a result of something that is not under their control.

Deci and Ryan stated that when people are intrinsically motivated, they engage in activities that interest them with a full sense of volition without the necessity of material rewards or constraints. Extrinsically motivated behaviors, on the other hand, are instrumental. They performed not out of interest, but because they believed to be instrumental to some separable consequences. Intrinsic goals such as community contribution, health, personal growth, and affiliation etc provide direct satisfaction to basic psychological needs and they are positively related to psychological wellbeing and positive adjustment. On the other hand, extrinsic goals, such as fame, financial

success, and physical appearance are concerned with external manifestations of worth rather than the basic need for satisfaction. On the contrarory autonomous people with intrinsic motivation experience choice in the initiation, maintenance, and regulation of their behaviors. On the other hand, people with extrinsic motivation perform activities with a sense of pressure or demand by external contingencies. Although extrinsically oriented people primarily focus on getting social approval and external rewards and they often neglect their personal interests. Research studies show that intrinsic motivation is linked to positive academic performance, more enjoyment of academic work, higher academic achievement, higher perceived academic competence, and higher quality of learning. Latest changes in self determination theory (Deci & Ryan 2000) represented in figure 10.

Figure 10

Self Determination



(Source: https://commons.wikimedia.org/wiki/File:SelfDeterminationTheory.png)

Affect Perseverance Theory (Sherman & Kim, 2002)

As outlined by Affect Perseverance theory, it occurs when an emotional preference continues, even after the thoughts that gave rise to the original emotion are invalidated. Feelings are often independent of facts and evidence, and once initiated tend to take on a life of their own. Almost by definition, they are not rational. Affect Perseverance is similar to Belief Perseverance. Despite this change in cognition, the affective preference persevered. To get someone emotionally

engaged with an item or topic, start with some rational purpose that makes sense to them. Then, when emotions are established, slowly ignore and remove the rationale. Then reinforce the emotion as its justification. Endowed Progress Effect (Nunes & Dreze, 2006) explains that when people feel that they have made some progress towards a goal then they will become more committed to a continued effort towards achieving the goal. Perception is critically important with this and appearance of progress can have a strong effect whilst actual progress that is not recognized can be demotivating. The corollary is that people who feel they are making little or no progress will be more likely to abandon efforts. As people get closer to the goal, their commitment is likely to deepen as they strive increasingly harder to achieve success. If you are seeking to create change or keep somebody committed to a longer-term goal, show them that they are making progress. This may be helped by making the first steps very easy for them.

The above segment discussed the theories underlying Academic Motivation. These theories and concepts related to Academic Motivation helped investigator to acquaint about the importance of Academic Motivation and it's contribution in education.

Theoretical Overview of Emotion Regulation

This fragment of review deals with the details of Emotion Regulation and it's contribution in the field of emotional control. Different theories of Emotion Regulation are explained hereunder.

Models of Emotion Regulation

Emotion Regulation has its roots in psychology. Emotion Regulation first gained currency as a distinct construct in the developmental literature, and then subsequently in adult literature (Gross, 2006).

Effective Emotion Regulation has been considered as a developmental attainment and that act as an essential requisite for other developmental tasks. Strong emotions have potential to disrupt multiple psychological processes and modulation of their experiences and expressions which has been considered essential for basic regulation of the state of behavioral exploration and social competence. Emotion is a highly functional phenomenon that has a crucial evolutionary significance and biological grounding. Emotion Regulation refers to the attempts to influence the type of emotions that people experience, when they experience these emotions and how these emotions are expressed and experienced (Gross, 1998).

The Psychoanalytic Tradition

The Psychoanalytic tradition was one of the precursors in the contemporary study of Emotion Regulation.

The Psychoanalytic tradition was one of the precursors in the contemporary study of Emotion Regulation. In this tradition two types of anxiety regulation are emphasized. First type of anxiety regulation is reality- based anxiety, which arises when situational demands overwhelms ego. In the second type of anxiety regulation it concerns id-and super ego based anxiety, which arises when strong impulses compel for expression.

> "This tradition emphasizes the conflict between biologically based impulses, internal and external restraining factors are psychoanalytic tradition. Freud used anxiety as a common term for negative emotions and a discussion of his views on anxiety regulation ideally would be couched in a general psychoanalytic theory of affect. Maladaptive defenses are thought to develop as children associate situations or impulses with high levels of anxiety and learn to regulate this anxiety through idiosyncratic and problematic forms of anxiety regulation. Treatment consists of learning new ways to regulate anxiety, in part through a `corrective emotional experience' in which dreaded consequences of impulse expression fail to materialize".

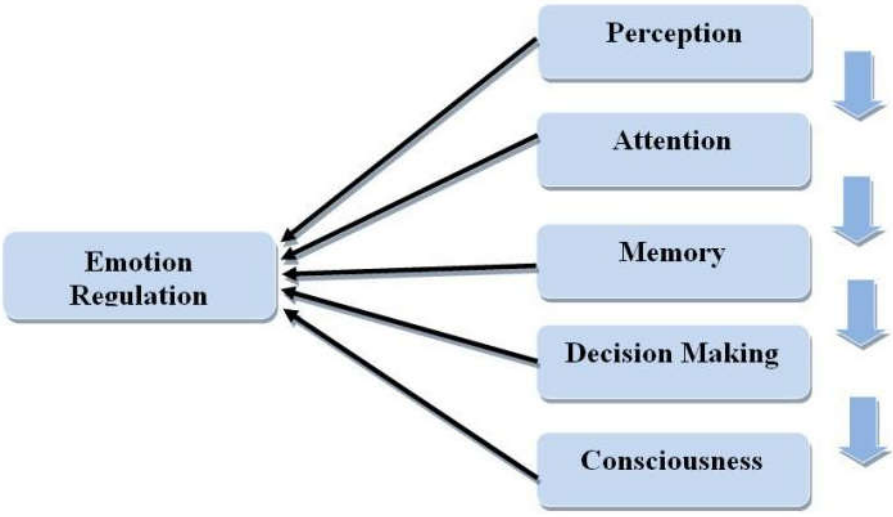
For instance,

> “one's perception of loss may trigger an emotional response. Although one can perceive a variety of information from various sources, they usually selectively pay attention to only a particular part of information. Moreover, the memory of one’s past experiences, namely cognitive schemas, also influence human affective behavior and affect decision making. Actively making decisions and taking actions could also regulate emotions and minimize the negative effects of events. In addition, Philippot and his colleagues also recognized the importance of the reflexive consciousness of emotional experience in the whole process of emotion regulation. Overall, Philippot and his colleagues’ model offer a foundation for understanding the process of emotion regulation".

Details are depicted in Figure 11.

Figure 11

The Cognitive Model of Emotion Regulation (Philippot et al., 2004)



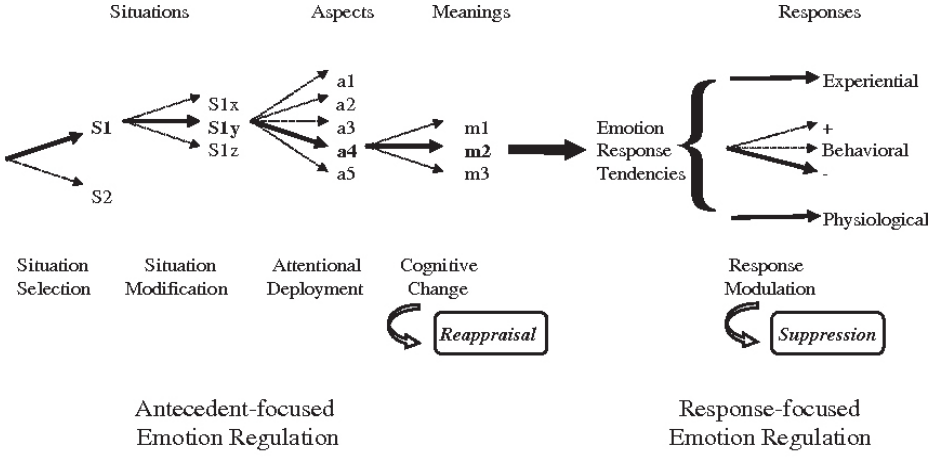
Gross (2001) examined how individuals experience, control, influence, and express their emotions and proposed the process model of Emotion Regulation. Gross suggested that emotional response tendencies involve experiential, behavioral, and physiological systems, and could be modulated in various ways.

"This model suggests that emotions may be regulated either by manipulating the input to the system (antecedent-focused emotion regulation) or by manipulating its output (response-focused emotion regulation). Antecedent-focused Emotion Regulation and Response- focused Emotion Regulation are two types of Emotion Regulation. Antecedent-focused Emotion Regulation includes situation selection, in which one approaches or avoids certain people or situations based on their likely emotional impact, and situation modification, in which one modifies an environment to alter its emotional impact. Another component of this theory is attention deployment, in which one turns attention toward or away from something to influence one's emotions; and the last one is cognitive change, in which one evaluates either the situation one is in or one's capacity to manage the situation so as to alter one's emotions. Response-focused Emotion Regulation also includes a multiplicity of types, such as strategies that intensify, diminish, prolong, or curtail ongoing emotional experience, expression, or physiological responses. The fundamental claim of this model is that Emotion Regulation strategies differ in when they have their primary impact on the emotion-generative process" (Gross 1998).

Details of Process Model of Emotion Regulation summarized in figure 12.

Figure 12

Process Model of Emotion Regulation (Gross, 1998)



(Source: https://images.app.goo.gl/cMwtSn3fHeezA8Q48)

> “According to the Process Model, emotion begins with an evaluation of external or internal emotion cues. Certain evaluations trigger a coordinated set of behavioral, experiential, and physiological emotional response tendencies that together facilitate adaptive responding to perceived challenges and opportunities. However, these response tendencies may be modulated, and it is this modulation that gives the final shape to manifest emotional responses” (Gross 1998).

Functionalist Theory of Emotion Regulation

The functionalist theory of emotion provides a foundation for understanding the importance of Emotion Regulation for adaptive psychosocial functioning. The Functionalist theory defines emotions as "bidirectional processes of establishing, maintaining, and/or disrupting significant relationships between an organism and the (external or internal) environment”. “Emotions may be experienced as subjective feeling states, physiological arousal, urges, cognitions, or behavioral expressions, and they function to alert the individual and persons in the environment for the occurrence of an important event and to organize goal-directed behavior” (Barrett & Campos, 1987). From a functionalist perspective, each emotion is associated with a unique motivational function for individual and social environment. For example, sadness functions to signal the self and others that assistance is needed; anger organizes behavior to overcome an obstacle to goal-attainment. "Functionalist theory suggests that emotional experience and expression are influenced by personal characteristics such as biological factors and learning history, the emotion-eliciting event, and the social context" (Barrett & Campos, 1987; Saarni et al., 1989). Learning to attend emotional information and modify emotional experience and expression is essential to goal attainment and adaptive functioning.

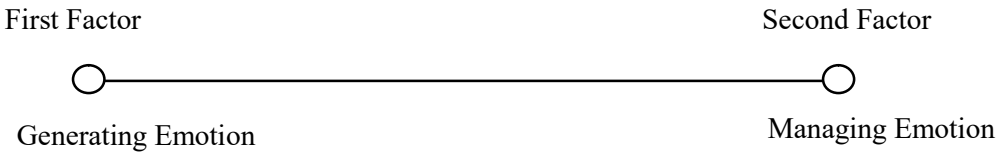
According to Thompson (1994), "Emotion regulation consists of the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions to accomplish one's goals." (Thompson, 1994) "Coping strategies for managing negative effects represent only one facet of emotion regulation, and

although emotion regulation is often associated with the diminishing of physiological arousal or the minimizing of emotional expression, effective emotion regulation depends on the context and at times may involve intensifying emotions" (Thompson, 1994). "Positive emotions should also be regulated and, healthy emotion regulation is determined by the ability to experience and maintain positive affect" (Cole, Michel, &Teti, 1994). "As implied in Thompson's (1994) definition, other aspects of Emotion Regulation include the ability to attend to and monitor emotional events, to correctly interpret internal and external emotion cues, and to implement effective regulatory strategies for the expression of positive and negative effect".

Two Factor Model of Emotion Regulation (Campos et al., 2004) represented in Figure 13.

Figure 13

Two Factor Model of Emotion Regulation (Campos et al., 2004)



There are two factors which enhances Emotion Regulation. The first factor includes a process that generates emotion. The second factor takes account of managing an emotion after it is elicited. These two factors can be used to appropriately manage or mismanage emotion. Other one was model of emotional sensitivity versus Emotion Regulation which is described below.

Model of Emotional Sensitivity versus Emotional Regulation (Kuhl, 2008 & Koole, 2009)

"Model of Emotion Sensitivity versus Emotion Regulation that connects biological factors such as temperament and individual differences in emotional sensitivities. The model consists of two reactions: (a) primary reaction, and (b) secondary reaction. The primary reaction implies that individuals' emotional

> experiences are heavily impacted by their level of emotional sensitivity. Individuals with high emotional sensitivity will quickly have a high level of emotional response. Individuals with low emotional sensitivity will take a longer time to reach high levels of emotional response. After individuals reach a high level of emotional response, they experience secondary reaction which involves emotion regulation. The secondary response consists of two types of Emotion Regulation: (a) up-regulation, and (b) down-regulation. Up-regulation increases the degree of emotional response and down-regulation decreases the magnitude of emotional response".

Koole (2009) reported that the emotion regulation strategies utilizing three emotion-generating systems which is given below.

- Attention,
- Knowledge representation,
- Body manifestations of emotion,
- Three psychological functions such as (a) Need-oriented, (b) Goal-oriented and (c) Person-oriented.

Koole (2009) identified the relevant empirical Emotion Regulation strategies regarding the systems and functions. Need-oriented Emotion Regulation refers individuals' needs that experience low levels of negative and high levels of positive emotion. Goal-oriented Emotion Regulation is driven by a single verbally describable goal, standard, or job that could be motivated by people's beliefs or emotionally charged information. Person-oriented Emotion Regulation sustains the truthfulness of individuals' personality systems, which include their desires, objectives, intention, and other personal factors. It should be noted that, unlike the afore mentioned theorists' Emotion Regulation strategies, Koole (2009) does not formally include environmental factors as a

part of the categorization of Emotion Regulation strategies, and does not include the manipulation of the environment. This is additional evidence of how different theorists view emotion regulation". Categorization of Emotion Regulation Strategies depicted in figure 14.

Figure 14

Categorization of Emotion Regulation Strategies (Koole, 2009)

	Psychological function		
Emotion-generating system	*Need-oriented*	*Goal-oriented*	*Person-oriented*
Attention	Thinking pleasurable or relaxing thoughts (Langens & Mörth, 2003); Attentional avoidance (Derakshan et al., 2007)	Effortful distraction (Van Dillen & Koole, 2007); Thought suppression (Wenzlaff & Wegner, 2000)	Attentional counter-regulation (Rothermund et al., 2008); Meditation (Cahn & Polich, 2006); Mindfulness training (Brown et al., 2007)
Knowledge	Cognitive dissonance reduction (Harmon-Jones & Mills, 1999); Motivated reasoning (Kunda, 1990); Self-defence (Tesser, 2000)	Cognitive reappraisal (Gross, 1998b; Ochsner & Gross, 2008)	Expressive writing (Pennebaker, 1997); Specification of emotional experience (Neumann & Philippot, 2007); Activating stored networks of emotion knowledge (Barrett et al., 2001)
Body	Stress-induced eating (Greeno & Wing, 1994); Stress-induced affiliation (Taylor et al., 2000)	Expressive suppression (Gross, 1998a); Response exaggeration (Schmeichel et al., 2006) Venting (Bushman et al., 2001)	Controlled breathing (Philippot et al., 2002); Progressive muscle relaxation (Esch et al., 2003)

Theories of Emotion and Emotion Regulation

Major theories related to Emotion Regulation are explained based on the idea of ability to control various emotions.

Implicit Theories of Emotion Regulation

Notion of this theory says that individuals who believe that emotions are fixed and individual can modify their own emotions. This is the first case of notion. In the second case of notion, individuals who believe that emotions are malleable should be more likely to believe that they can control their own emotions. In the first case emotions that have been fixed have little incentive to try for modify their emotions by using cognitive reappraisal. In the second case, emotions as malleable should try to actively modify emotions by changing their appraisal of events that elicited emotions.

Individuals more frequently separate emotional experience from its expression. This is because individuals can suppress or mask expression of their feelings in certain situations without modifying their emotional experience (Gross 1998). This theory mainly focused on emotional experiences and has little or no depend on emotional expression.

Mentalized Affectivity Theory of Emotion Regulation (Jurist 2005)

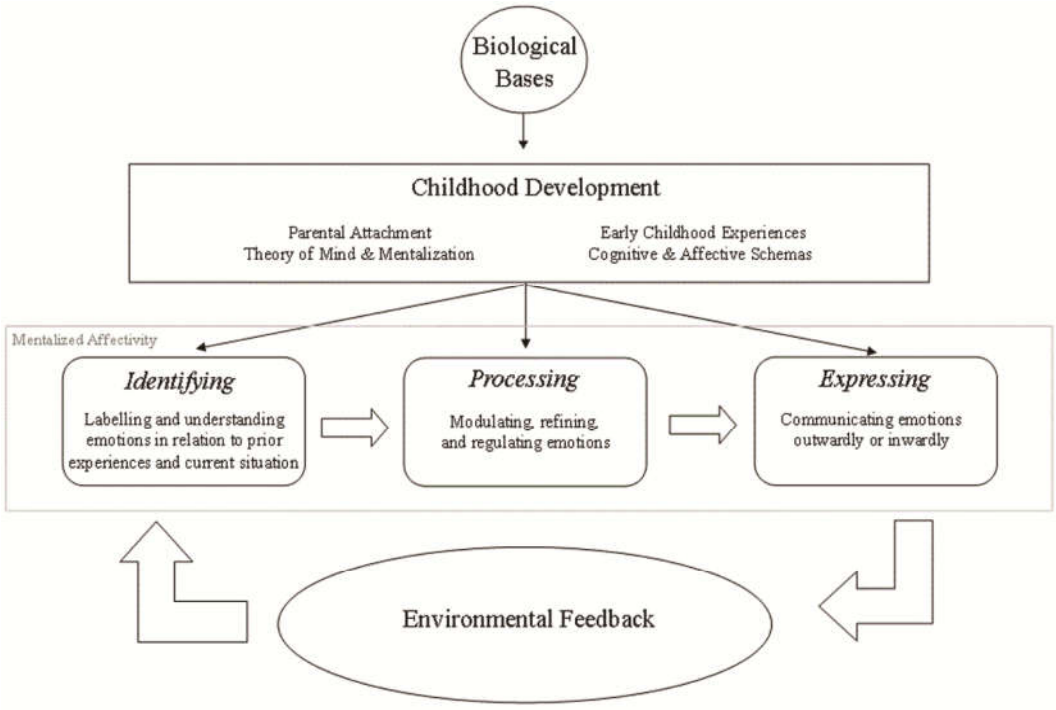
Several theories discussed above to explore regulatory process of emotion. All these theories didn't outline much about the importance of Mentalization or the Theory of Mind.Mentalized affectivity theory integrates various theories of Emotion Regulation. Emotion Regulation is the term that describes explicit and implicit processes that comprise monitoring, evaluating, altering, and modulating emotions.

Jurist (2005) proposed innovative theoretical aspects of Emotion Regulation. The central idea of above mentioned theories did not describes about Mentalization and the Theory of mind. There is no description about Mentalization. The theory of mind focused on effectively regulating or modulating an emotion. Through mentalization, individuals can manage, alter or change their emotions of their own. Mentalization is the ability to reflect on one's thoughts and feelings. All the

childhood experiences, current experiences, feelings, and thoughts were mentalized. There were three aspects of mentalized affectivity theory, Identifying, Processing, and Expressing. Identifying, Processing and Expressing were the theoretical dimensions of Emotion regulation used for this study. Identifying is the basic level of or lower level of emotion regulation. An individual identifies their own emotions based on their past experience or current experience in a particular context. Processing was the second aspect; it was the modulation or regulation of emotions. Processing is followed by expressing, which is the third aspect of Emotion Regulation. Expressing is the process of expressing one's thoughts and feelings both externally and internally. The chart which indicates the process of Emotion Regulation it begins with biological bases, genetics and dispositional traits at the top, which was followed by childhood development, then the development of cognitive and affective schemas. Component wise details of Mental Affectivity Theory of Emotion Regulation summerised in the figure 15.

Figure 15

Mentalized Affectivity Theory of Emotion Regulation (Jurist, 2005)



Most of the theories provides the details of Emotion Regulation in experiential aspects and do not share the importance of how to operate and manage emotions. Cognitive model of emotion regulation described the basic determinants such as perception, attention, memory, decision making, and consciousness. Functionalist theory extended the emotion regulation determinants to social aspects and explained the relationship between emotion regulation and motivation. Two-factor theory pointed out the two main aspects of emotion regulation and the importance of managing emotions. Implicit theory focused on emotional experience rather than its expression. The latest theory, Mentalized affectivity theory explained the actual revelation of mentalization. This theory explained three aspects of emotion regulation, Identifying, Processing, and Expressing. The process model of emotion regulation explained how an individual experiences, control and expresses emotions and how situational factors affect them.

Empirical Studies

Empirical studies related to Problem Based Learning, Critical Thinking, Academic Motivation and Emotion Regulation were explained hereunder.

Empirical Studies Related to Problem Based Learning

Fesharaki et al. (2010) reported a study on effect of two learning methods, lecture method and PBL on self-efficacy of nursing students. Total 44 nursing students were the sample for the study. Experimental groups were taught through PBL methods and control group students were taught through lecture methods. Iranian edition of the generalized self-efficacy questionnaire was the tool for data collection. Collected data were analyzed by SPSS software. The result of the study revealed that self-efficacy score increased significantly in both experimental and control groups.

Celik et al. (2011) studied the effect of PBL on student's success in physics course. 20 under graduate students of second year assigned as experimental group

and 24 students were control group. Experimental group treated with PBL. The result of the study indicated that there was significant difference between two groups in terms of total mean scores in PBL group. PBL was very effective on student's physics achievement.

Nanda and Manjunatha (2012) conducted a study on medical students and examined the effect of PBL on learning efficiency and student-teacher relationship. Conclusion derived was students taught through PBL scored significantly for learning efficiency and student-teacher relationship. Each learning strategy had its advantages, but students were willing to adapt PBLS.

A study by Lian and He (2013) showed that the effectiveness of hybrid PBL and hybrid Lecture Based Learning in second-year undergraduate students. The performance of the students was analyzed through short essay questions and multiple-choice questions in biochemistry and also used case analysis to assess the performance of the students. The result of the study revealed that hybrid PBL groups have significantly higher scores for case analysis and short essay questions. Higher-order thinking skills such as problem-solving skills and Critical Thinking skills improved through hybrid PBL.

Erdogen and Senemoglu (2014) investigated influence of PBL on student's academic achievement and their self regulation skill. This study also stress more importance to self peer assessment. The findings of the study revealed that PBL was effective on students academic achievement but no significant effect found on self regulated skills. The findings also suggested that students were consistent in self and peer assessment. Self assessments were lower than peer assessment.

Wilder (2015) published a review paper which examined the effectiveness of PBL among secondary school students. Results of the study found that PBL fosters content knowledge, and higher-order thinking skills such as problem-solving skills,

critical thinking skills, and decision making. Through PBL students collaborate and improve communication skills and self-regulated learning.

Sulaiman et al. (2016) made a study to find out the effect of PBL on achievement. An open-ended survey was used for collecting data. A genuine peer performance perception is obtained in terms of cooperation and leadership. The result of the study revealed that there was a significant and positive correlation between higher final grades of examination with good leadership. Students who performed better in their achievement did not cooperate in their teamwork. There was no significant relationship between cooperative learning and teamwork.

Horak and Gulluzo (2017) analysed the effect of PBL on students' achievement and perception of classroom quality among students. 457 students were the sample for the study. Data was collected with the help of 25 multiple choice test items. Conclusion derived was there found significant gain score for both groups. There existed a significant difference in the total score on the student perception of classroom quality that favored PBL group.

Ismail et al. (2018) conducted a study in the area of problem-based learning and mobile applications to develop Critical Thinking in children. The result of the study revealed that the mobile app is good for Critical Thinking. Seven processes were required for the development of Critical Thinking in students. This study suggested that mobile application which include problem-based critical thinking framework is better for enhancing science learning.

Dakabesi and Luoise (2019) investigated the effectiveness of Problem-Based Learning to develop Critical Thinking skills. The design of the study was a quasi-experimental post-test only design. The sample for the study was 124 students of 11-grade students of science subjects. Problem-Based Learning method was applied to the experimental group and conventional method for control group. A Critical

Thinking test and a problem-based learning plan were used for the study. The result of the study revealed that Problem-Based Learning develops more Critical Thinking in students than conventional methods.

Kardoyo et al. (2019) analysed a study in the area of Problem-Based Learning, and its impact on Critical Thinking and creative thinking among students. Problem-Based Learning was implemented in learning management information courses. The study aimed to improve the critical and creative thinking of students through Problem-Based Learning. Classroom action research was used for the design of the study. Classroom action research consisted of two cycles, observation and interview methods. Both descriptive and qualitative and quantitative research data were analyzed. The result of the study proved that Problem-Based Learning improves students' Critical thinking and creative thinking.

An effort by Darhim et al. (2020) on role of Critical Thinking in Problem-Based Learning. Quantitative pre-test –post-test was the design of the study. Critical Thinking tests, documentation, and observation were the tools used for the study. 124 undergraduate university students were the sample of the study. Analysis of data done through Mann Whitney and normalized gain scores. The result of the study found that the critical thinking skills of students improved through problem-based learning and the mathematical problem-posed methods. The result of the study also revealed that there was no significant difference between Problem Based Learning and mathematical problem-posed methods.

Noordziji and Wijnia (2020) made a study to examine the role of perceived quality of problems, its association between achievement goals of students and their motivation for problem-based learning. 226 psychology students from Dutch university were the sample of the study. The result of the study revealed that the perceived quality of the problem motivates students and it also influences their achievement and goals of students.

Musalamani et al. (2021) examined the effect of school-based cooperative problem-based learning on students' attitudes towards science. Quasi-experimental non-equivalent control group design was used for the study. 60 students from 8th grade were treated with the School-Based Cooperative Problem-based Learning module. Control group consisted of 60 students and taught conventionally. The result of the study indicated that a significant improvement in students found who taught with School Based CPBL and students' attitude toward learning science than the control group.

Dermentzi et al. (2022) investigated the use of Problem Based Learning method and Educational technologies to teach open data among university students. The study consisted of three phases. The first phase was the examination about the needs of stakeholders, second phase was the development of an open data module and at the third phase, re design of developed module based on learning outcomes and its application. Interview with practitioners, focus group interview and tutor's reflection were the instruments used for the study. The result of the study revealed that PBL method was helpful for the development of open data skills among university students.

Studies Related to Collaborative Problem Based Learning

Tarmizi and Bayat (2012) analysed a research study on Collaborative Problem-Based Learning and role of Critical Thinking in Mathematics. This study examined the effect of Problem-Based Learning on educational statistical courses. Comparing students' performance based on two tests showed that there was a significant difference between the mean performance of the PBL and that of the conventional group – indicating PBL efficacy.

Tempelaar et al. (2013) conducted an experimental study on self and social directed goals in a problem based collaborative learning context. Role of different

goal constellation, goal settings and learning performance data in a collaborative problem based learning program were used for the study. The result of the study revealed that educational context appears to have a crucial role in the relationship between students goal settings in one side and students group functioning on the other hand.

Muhlfelder and Chandrasekaran (2015) reported a study on Collaborative Problem Based learning in Distance and Mobile education. They introduced the 3C3R Model for designing Collaborative Problem-Based Learning. The findings of the study showed that, due to limited communication in a distance/mobile education program, didactic elements that require student collaboration must be carefully defined and built into the learning process. Students will need some time to get to know each other and to develop cohesion and team spirit.

Unal and Cakir (2017) conducted a study to examine student's view towards Problem Based Learning in collaborative learning environment. The sample consisted of 36 students at University level. Object oriented programming one to two course was developed with dynamic web technologies for the students. Semi structured interview and focus group interview were used for the study. The result of the study revealed that there were some positive aspects noticed while learning. Suggestions derived was Collaborative Problem Based Learning methods with dynamic web technologies can be applied in the community college learning environment.

Efendi and Yulastri (2018) conducted a classroom action research to observe the effectiveness of Collaborative Problem Based Learning model on improving learning activities in computer network course. 42 university students were the sample for the study. The study consisted of two cycles. Data collected through observation sheet, Achievement test, interviews, field notes and documentation. The findings of the study discovered that CPBL increased Academic achievement and

creativity of the students. The study also recommended that CPBL can be used as an alternative learning model in higher level of learning.

Taufiq et al. (2019) developed Collaborative Problem Based Learning model for university students. This model was applied in flipped classroom at university level. The flipped classroom was an integration of distance learning and face to face classroom learning. In this study CPBL acts as a teaching model, starting with problem and that can be solved in groups. They reported that CPBL in flipped classroom can shift the responsibility of learning from teacher to students.

Khairani et al. (2020) investigated the influence of Collaborative Problem Based Learning on student's motivation and Critical Thinking skills. Experimental group consisted of 28 elementary school students, and control group consisted of 27 students. Control group taught with direct instructional model and experimental group was taught by Collaborative Problem Based Learning model. The result of the study revealed that students who were taught with Collaborative Problem Based Learning obtained higher score in Critical Thinking. Learning model and motivation influenced each other to improve student's Critical Thinking skills.

Hendarwati et al. (2021) explored Collaborative Problem Based Learning model in teaching learning process. This model supported for enhancing 21^{th} century skills such as Critical Thinking Skills, collaboration and problem solving skills. Collaborative Problem Based Learning model consisted of five model syntaxes. Problem orientation, organizing, collaborative problem solving, presentation, discussion and Evaluation. Conclusion derived was the developed model helped students and interaction with lecture as multidimensional and constructivist manner. It also enhances inductive and deductive reasoning among students.

Chang et al. (2022) conducted a study to combine Problem Based Learning with different Collaborative Learning strategies. Which was applied to improve learning motivation and learning outcomes. 96 university students were the sample

for the study. A questionnaire was used for learning motivation through three aspects model as Flipped classroom, PBL and Collaborative learning. Statistical software, digital learning platform were used as tools for the study. The result of the study revealed that a combination of PBL and Collaborative learning strategies with flipped classroom improved learning outcomes of the learner.

Empirical Studies Related to Critical Thinking

Daniel and Gagnon (2011) reported a study to model for the development of critical thinking in children with the age group 4 to 12 years. The study was carried out in three geographical context and students belonging to 17 classrooms. Logical thinking and creative thinking were also part of this model. Analysis of 17 transcripts of exchanges formed a revised model of developmental process of critical thinking. The result of the study revealed that development of critical thinking occurred through a process of transformation. This transformation associated with scaffolding.

Hariri and Bagherinejad (2012) conducted a study which aimed to assess level of medical science student's critical thinking. Sample of the study comprised of 196 degree students and 28 post graduate students. Survey method was used for the study. The result of the study revealed that critical thinking was weak and found a relationship between critical thinking and demographic variables as degree and discipline.

Oliveral et al. (2013) investigated the use of newspaper article on developing Critical Thinking in secondary school science students. 61 secondary school students were the sample for the study. The study conducted in two schools with students of high social and economic braket and other students with medium social and economic braket. Two newspapers with critical reading activities in relation to study of scientific contents were carried out in two schools. Barz Critical

Thinking scale was used for the study. The result of the study revealed that the activities designed for developing Critical Thinking were very useful.

Kwan and Wong (2014) conducted a study on the perception of constructivist learning environments and whether their perception is related with Critical Thinking ability. 967 secondary school students were the sample for the study. Self-administered questionnaire and Cornell Critical Thinking test level 10 were the tools used for the study. Multiple regression analyses of the data revealed that three of the five scales of constructivist learning environment scale were predictors of Critical Thinking ability. Personal relevance of the student and their critical voice were positively related to Critical Thinking ability.

Chaipichit et al. (2015) explored a study in the area of Critical Thinking. The learning management model was developed for science learning, which was based on constructivist theories. Ninth-grade students were the sample for the study. 33 students in the experimental group. Control group comprised of 30 students. The newly developed model is mainly aimed at enhancing critical thinking. The result of the study showed that the experimental group obtained higher post-test scores for Critical Thinking and also a higher score for academic achievement than the control group.

Devika and Soumya (2016) conducted a study on the Critical Thinking ability of higher secondary school students. A normative survey method was used for the study. A Critical Thinking Ability test was used for the study. Collected data from 640 higher secondary school students. Effect of gender, type of management, and optional subject were the classificatory variables of the study. The result of the study reported that a significant difference exists in the mean scores of Critical Thinking ability with sub-variables like gender, type of management, and optional subjects for the students.

Fung (2017) studied the effect of different types of pedagogy for cultivating Critical Thinking disposition in children. It was a quasi experimental study. 140 secondary school students were sample for the study. Kuhn's model of Critical Thinking framework was used for the study. The result of the study showed that collaborative group work exerted a positive impact on Critical Thinking disposition of the children. Group work with guidance of teachers were the effective strategy for developing Critical Thinking.

Changwong et al. (2018) evaluated the logical and analytical skills of students in ten provinces of Thailand. Critical Thinking, a learning management model, and focus group were used as tools for data collection. An experimental setup consisted of 35 students and 34 students as a control group. The conceptual model was tested for the experimental group and the traditional model for the control group. The result of the study revealed that the experimental group showed higher Critical Thinking ability and achievement than the control group.

Ahamad and Duskri (2018) conducted a study on gender differences among secondary school students in mathematical Critical Thinking skills. The tools used for the study were a Critical Thinking test and an interview. 30 students were the sample for the study. Conclusion was that female students showed better Critical Thinking skills than male students. Female students met all the aspects of Critical Thinking but male students met only 12 aspects of Critical Thinking indicators.

Hasan et al. (2019) made a study in the area of Critical Thinking and mathematical problem-solving skills. The study aimed to describe the Critical Thinking for solving mathematical problems among high school students and identified various components of critical thinking skills. Tools used for the study were Critical Thinking tests, and interviews. The result of the study revealed that students showed low Critical Thinking skills and the lowest level of evaluation, analysis, and self-regulation sub-skills.

Jamil and Muhammad (2019) made a study in the area of secondary school student's Critical Thinking skills. The study analyzed different curriculum policy documents and policy directives of pedagogy for enhancing secondary school student's Critical Thinking skills in science education. Content analysis of document (NCF 2009 and 2017) highlighted the development of Critical Thinkers, more stress on importance to curriculum and assessment systems. Conclusion was different teaching and learning methods such as cooperative learning, questioning, and different problem solving techniques are better to enhance Critical Thinking in students.

Mahanal et al. (2019) studied the effect of the RICOSRE Learning model on the academic abilities and critical thinking skills of secondary school students. An experimental study was conducted with a sample of 134 students. The Critical Thinking test used data collection. Results of the study revealed that the RICOSRE learning model reduced the gap between law and high ability of Critical Thinking.

Saputra et al. (2019) investigated the effect of jigsaw collaboration and Problem-Based Learning to enhance Critical Thinking of students. Pre experimental one-group pretest-posttest method was used for the study. Conclusion was Jigsaw collaboration and PBL were very effective for developing Critical Thinking in students. The average pretest score was 48.44 and the average post-test score was 69.23. The average difference between these scores was 29.795.

Prayogi & Asy'ari (2020) analysed a study to find out the effect of Problem-Based Learning on naturalistic intelligence, Critical Thinking, and curiosity. Three types of treatments based on Problem-Based Learning are provided to high school students. Tools used for the study were a naturalistic intelligence test, a Critical Thinking test, and students' curiosity observed and assessed through self-assessment. The result of the study revealed that problem-based learning with

character emphasis affects Critical Thinking and curiosity of students. The study also found that naturalistic intelligence does not affect the Critical Thinking and curiosity of students. They also suggested that problems based learning on character emphasis may be applied as alternative learning to develop students' critical thinking and curiosity. The combined effect of problem-based learning with character emphasis and naturalistic intelligence did not affect students' Critical Thinking and curiosity.

Kosece et al. (2020) carried out a study on Critical Thinking and mathematical problem solving and achievement of secondary school students. Total 429 students were selected as sample of the study. A descriptive method of research was conducted. Critical Thinking scale and problem-solving success determination tests were developed for data collection. Conclusion was 6th-grade students' Critical Thinking was found to be significantly higher than the level of 5th and 7th-grade secondary education students. In terms of grade-level mathematical problem-solving achievements differ significantly. The result of the study also revealed that there existed a significant difference in the reading habits of male and female students' Critical Thinking skills and problem-solving achievement.

Zafar et al. (2021) discussed relationship between Critical Thinking and Academic Achievement among secondary school students. Participants of the study were 400 students. Annual examination score taken as Academic achievement and Critical Thinking test was applied to the sample. Correlational analysis was carried out to find the relationship between Critical Thinking and Academic achievement The findings of the study presented that a low positive relationship found between Critical Thinking and Academic achievement among secondary school students. Female students scored higher level of Critical Thinking than male students.

Romero and Delgado (2022) explored in the area of Critical Thinking and Academic development during Covid 19 times. The study was a mixed type consisted of 37 students at the age group 20 to 40. There were two stages in the research. Teachers were trained with Critical Thinking model. The study conducted through Google classroom. In the second stage of the research, a quasi experimental quantitative correlational study was conducted. Questionnaire for teachers, Disposition towards Critical Thinking was carried out. The Holistic Guide to Evaluating Critical Thinking, Critical Thinking development questionnaire were the tools used for the study. The findings of the study suggested that Critical Thinking is required for teachers before starting any educational intervention on Critical Thinking. No significant difference was found in case of Academic Performance among experimental and control group.

Selvarani and Saroja (2022) investigated Critical Thinking and Academic Achievement of secondary School students. The main objective of the research was to examine the relationship between Critical Thinking and Academic Achievement in science students. Data collected from 150 sample through random sampling technique. Data collected from half yearly science examination. The result of the study showed that Critical Thinking among male students was higher than the Critical Thinking of female students. Study also showed that a significant relationship was found between Critical Thinking and Academic Achievement.

An effort by Zhang (2022), through an experiment, it was carried out for English teaching methods, approaches and strategies in English classroom. The experimental and control group consisted of 32 students. All participants learned the same content but used different teaching method, approach or strategies were applied. Data collected through observation interview and Critical Thinking Questionnaire. The conclusion of the study showed that experimental group

excelled in Critical Thinking than the control group. The study strongly recommended that the teacher should use new methods encouraged the students to become critical thinkers.

Empirical Studies Related to Academic Motivation

Rao (2010) examined the impact of Academic Motivation and perception of classroom climate on academic achievement. The scores of Academic Motivations collected from different groups were compared. Various extraneous variables such as sex, locale, district, and type of management of schools were selected. Different types of learning such as cooperative learning, Individualistic learning, and competitive learning were selected as aspects of the classroom climate. The result revealed that there was a positive correlation among students on Academic Motivation, perception of classroom climate, and academic achievement.

Alfaro and Taylor (2010) conducted a study on the Academic Motivation of adolescents. In this study, two competing models were tested to find out how sibling relationship quality directly predicted or interacted with academic support from siblings to predict adolescents' Academic Motivation. Gender differences were analyzed. Findings revealed that siblings' academic support was an important predictor of both boys' and girls' Academic Motivation. The quality of the relationship between siblings was directly related to the motivation of girls.

Amrai et al. (2011) conducted a study on relationship between Academic Motivation and academic achievement in Tehran University students. The result revealed that there was a positive and significant relationship between Academic Motivation and academic achievement. Eight subscales of Academic Motivation had a significant relationship with academic achievements.

Domene et al. (2011) focused a study on post-secondary students' Academic Motivation. They also studied the effects of career outcomes, expectations, and

aspiration type. Tool used for the study was framework of social cognitive theory and examined students' career outcome expectations and aspirations in Science, Mathematics, and Technology. Findings of the study showed that students with high Career outcomes and expectations and aspirations of Science, Technology, and Maths directly related to their academics. Expanding students' expectations with successful career outcomes promoted interest in Science, Technology, and Maths.

Carr et al. (2012) studied motivational components that predict academic performance among underachievers. The study focused on the achievement status of students and its relationship with motivational attributes and ability. Conclusion was Positive attribution beliefs are associated with achievers' extent of knowledge and skills.

Kumari and Chamundeswari (2013) made a study on the relationship between Academic Motivation, academic self-concept, and academic achievement of secondary school students. Results revealed that highly motivated students showed high self-concepts and they performed very well in mathematics. It was also reported that Academic Motivation and academic achievement were positively correlated. The study made a clear idea of Academic Motivation, self-concept, and academic achievement.

Zadeh et al. (2014) explored the effectiveness of successful intelligence training program on female student's Academic Motivation and Academic Engagement. 30 female high school students were the sample for the study. The successful intelligent training program was the dependent variable of the study. Academic Motivation scale, Academic Engagement questionnaire were the instrument used for the study. The training consisted of 12 sessions. The findings of the study revealed that successful intelligence program was effective on enhancing Academic Motivation and Academic Engagement among female students.

Momanyi et al. (2015) studied about the role of students age on Academic Motivation and academic achievement of secondary school students. The findings of the study showed that there existed a positive relationship between academic achievement and the academic performance of the students. Age of students showed a significant effect on academic achievement and no significant effect on the Academic Motivation of students.

Bedel (2016) studied in the area of Academic Motivation and teachers' attitudes in pre-service early childhood teaching. Data was collected through a questionnaire; 251 pre-service early childhood education teachers were the sample of the study. Conclusion was Academic self-efficacy and Academic Motivation was significantly related. Teachers had a positive attitude towards teaching. The study also revealed that only meaningful predictors of Academic Motivation were academic self-efficacy.

Bugler et al. (2016) explored a study in the area of Academic Motivation of 415 girls and 440 boys were the sample of the study. The study examined the gender and age differences of Academic Motivation and classroom behavior. The Academic Motivation Scale and classroom behavior questionnaire were the tools for the study. Findings was, there is significant difference in gender and age was observed. The result of the study revealed that girls exhibited more adaptive cognition, adaptive behavior, and higher levels of maladaptive cognition.

Harde et al. (2016) conducted a study in Taiwan. The study analyzed the predictive relationship among students' characteristics that influence achievement and motivation for learning. The sample of the study was 6539 high school students from the western half of Taiwan. Students of three grade levels were taken, samples were balanced in gender, correlation, analysis of variance, and multiple regression analyses were conducted. In findings individual differences predicted classroom perceptions and perceptions predicted motivation. This study illuminated the motivational aspects of the Education system in Taiwan.

Gupta and Mili (2016) studied in the area of Academic Motivation with scholastic achievement of secondary school students. The findings of the study indicated that there existed a positive relationship between the variables. High and low achievers showed significant relationships between the variables. High and low achievers showed a significant difference in Academic Motivation among low achievers.

Gbollie and Keamu (2017) made a study in the area of motivational strategies and students' perceived factors on academic performance. Junior and senior secondary school students used learning strategies and motivational beliefs based on their academic performance. Results indicated that motivational belief and academic achievement showed a significant relationship. The result also revealed that the most preferred component of extrinsic goal orientation was motivational belief and test anxiety. By analyzing different motivational strategies, Rehearsal strategies were most frequently used and students used help-seeking strategies as the least strategy.

Arulmoly and Branavan (2017) conducted a study on Academic Motivation and its effects on achievement in mathematical learning outcomes, among secondary level students. The main objective of the study was to examine the relationship between academic achievement and learning outcomes in mathematics. The result showed that different learning outcomes of mathematical learning differ significantly in gender and compared mathematical learning outcomes. They also noted that a student's degree of motivation showed a significant difference in academic achievement in mathematics.

Wijnen et al. (2017) examined association between the student-centered PBL method and motivation. 185 law students were the sample of the study. A self-regulation questionnaire, work-related basic need satisfaction scale, and PBL program were used as tools for the study. MANOVA was conducted and the results of the study revealed that students taught through PBL experienced more relatedness and an autonomous form of motivation.

Veyis et al. (2018) investigated the role of mediators on burnout in school and Academic Motivation. 690 samples were collected from various high schools in Turkey. The result of the study found that Academic Motivation was predicted significantly by academic stress and school burnout. The role of mediators in school burnout is positively related with Academic Motivation.

Fatima et al. (2018) conducted a study on university graduates between the ages of 18 to 23 years about Academic Motivation. They examined independent and interactive role of self-efficacy to enhance Academic Motivation. The study used Intrinsic motivation, Extrinsic motivation, and Amotivation indices for Academic Motivation. After controlling demographic variables, the study revealed that self-efficacy and social support showed independent and interactive effect.

Fromuth et al. (2019) investigated in the area of Academic Motivation. 272 undergraduate students were the sample for the study. Academic Entitlement scale, Academic Locus of control scale for college students and Academic Motivation scales were the tools used for the study. In this study Academic Entitlement was correlated with more external locus of control and Academic Motivation. A significant correlation was found between Academic entitlement and Academic performance. Students with higher scores in Academic Entitlement were less accurate in reporting their grades, Academic performance and their study behavour.

Melike and AVCI (2020) explored in the area of Academic Motivation and attitude towards Social Science. A mixed method triangulation approach was used for the study. 443 secondary school students were the sample for the study. Stratified sampling technique was used. Socio economic level and student's school success was taken as other classificatory variables of the study. Academic Motivation Scale and Attitude Scale for Social Scale course were the tools used for the study. The result of the study showed that a significant difference was observed

in male students in introjected regulation. But there was no difference in the motivation scores based on socio economic level of the student. Majority of students expected a positive attitude towards Social Science.

Fong (2021) reviewed five prominent theories to know relationship between Academic motivation during Covid 19 and effect on teaching-learning process. The output was there was a shift from offline learning to an online/hybrid mode of the teaching-learning process. Students' perceptions, values, goals, and behavior were influenced by pandemic conditions. A new theory, culturalized contextual integrative model, and its implication in education also discussed.

Ozadal et al. (2022) carried out a study to compare Academic Motivation and career decidedness of college students. Gender, Year of study, Academic achievement expectation of pursuing graduate education were classificatory variables of the study. Academic Motivation Scale, Carrier decidedness Scale were used to collect data from 376 students. Correlational comparative survey design was used for the study. The result was moderate level of Academic Motivation found in the participants. The result of the study also revealed that female students have higher Academic Motivation than male students. Academic Motivation had a positive effect on their career decidedness.

Güngör and Sari (2022) investigated in the area of Academic Motivation on School burnout in College students. Data collected from a sample of 544 students. A path analysis was conducted to find out the direct and indirect effects. Academic Motivation Scale, Hope survey, the meaning in life questionnaire was tools of the study. The findings was intrinsic motivation negatively predicted all dimensions of school burn out both directly and indirectly. Extrinsic motivation showed positive relationship with dimensions exhaustion and cynicism of school burn out. Different dimensions of Academic Motivation such as Intrinsic Motivation and Extrinsic motivation showed direct effect on school burn out.

Empirical Studies Related to Emotion Regulation

Aldao et al. (2010) conducted a meta-analytic study to examine the relationship between various Emotion Regulation strategies, such as acceptance, avoidance, problem-solving, reappraisal, rumination, and suppression, and various psychopathological symptoms of anxiety, depression, eating disorders, and substance abuse. They examined diverse patterns of responsive regulation of emotion overtime in their study, which focused on dispositional emotion regulations. Conclusion derived was internalizing disorders were found to be more related to regulatory techniques than externalizing disorders.

Gotlib and Joormann (2010) investigated different cognitive processes and the relationship between depression and emotion control. The findings revealed that depressed people lacked inhibition when processing unpleasant information. The study's findings revealed that each person's emotion control mechanisms are distinct. This distinction is crucial in the development of depression.

Verstain et al. (2011) investigated the role of emotional self-regulation in children and its relationship to functional impairment in children with ADHD and children without ADHD. The findings demonstrated that children with ADHD have confirmed levels of emotional self-regulation deficits. Emotion regulation deficits are linked to functional impairment and comorbidity consequences.

Füstös et al. (2012) conducted research in the field of Emotion Regulation. The brain dynamics of reassessment of emotional responses were investigated in this work. The study sample consisted of 28 people they varied in terms of introspective consciousness. The study found that reappraisal was associated with a decrease in arousal, also discovered that late neuronal responses were significantly modulated.

Kim et al. (2013) assessed the effects of childhood poverty and chronic stress on Emotion Regulation and brain function. They explore the influence of childhood poverty at age 9 on brain circuitry activation also in adults at age 24 in this long-

term functional magnetic resonance imaging study. The study's findings demonstrated that brain outcomes during emotion control in adults were associated with childhood chronic stress.

Ali et al. (2014) researched on Emotion modulation strategies. They evaluated the most recent research on emotion management strategies and in the area of depression. They demonstrated how the Gross model of Emotion Regulation is important in cognitive and neurobiological disorders. Findings also reported about difficult emotional management strategies and its implication.

Yang et al. (2015) investigated emotion modulation and its implications in decision making. They evaluated at the impact of implicit emotion control on psychological and electrophysiological response gains and losses. The participants were given several tasks aimed at activating emotion control and reducing emotional gain and loss. Findings showed that subjective emotional experiences were found to successfully influence implicit Emotion Regulation. The study also found that emotion control played major role in decision-making.

Gross (2015) experimented current state of Emotion Regulation as well as its future prospects. The distinctions between emotion and emotion control were clearly highlighted in this study. A detailed discussion of the process model of emotion regulation as well as other emotion regulation tactics was studied and reported.

Jiang et al. (2016) conducted a study in lower secondary school students. Student’s perception of their teacher’s emotions and their Emotion Regulation while teaching. A mixed method approach was used for the study. In this study student perception towards teachers positive and negative emotions and reflection of their Emotion Regulation were assessed. The sample consisted of 53 lower secondary school students, findings of the study showed that the focused Emotion Regulation appeared more desirable than response focused. Reappraisal was more effective than suppression in increasing positive emotion of teachers.

Desatnik et al. (2017) conducted research in the domain of attachment and Emotion Regulation. They explored the association between emotion control and attachment in teenagers with and without substance abuse. The survey included 472 students aged 13 to 21 years old from high schools and vocational education institutes. Findings of the study showed that Emotion control was discovered to be a predictor of all addictive behavior. In both maternal and peer attachment, females scored much higher. Males, on the other hand, scored much higher in gambling problems and video game addiction.

Alex et al. (2017) investigated about how adolescents regulate their emotions. They examined on how different emotion management strategies which helped teenagers to cope with negative emotions. The study's sample consisted of 53 teenagers with Event-Related Potential (ERP). Each sample's expressive suppression approach was recorded. Findings of the study are expressive suppression was more effective in adolescents than other emotion regulation measures.

Research on Emotion Regulation in adolescents was conducted by Estevez et al. (2018). They discussed age differences in emotion regulation and mood-specific Emotion Regulation patterns. Evaluation in 14-year-old teenagers, emotion-specific patterns and their involvement in the effectiveness of reappraisal and distraction methods. The study found that emotional content influenced the success of reappraisal, however, distraction was not taken into account. They evaluated the efficacy of reappraisal and distraction in 12-year-old adolescents in the experimental setup 2. Conclusion was both age groups used similar emotional management techniques. Expressional repression has increased with aging.

Damaradzka and Fajkowska (2018) examined correlation between cognitive emotion management methods, anxiety and depression. The aim of the research was to uncover several Emotion Regulation strategies and their use in depression and anxiety disorders. Questionnaires on anxiety, depression, and cognitive emotion

control were used to collect data. A total 1632 people were picked, and regression analysis was performed. They also discovered that no cognitive emotion management methods were linked to reactive arousal anxiety. There was a link between depression, self-blame, and refocusing on sex-based planning.

Young et al. (2019) analysed a study on the control of positive and negative emotions. They discussed the importance of emotion regulation disruption in depression and anxiety, as well as evidence from adolescent self-reports. According to the researchers, conclusion was future research should orient into different types of training and specialized tactics for understanding Emotion Regulation in adolescents.

Sanchis et al. (2020) investigated the link between adolescent Emotion Regulation, age and gender. The study included 254 adolescents from eight different schools. A cognitive emotion control questionnaire was employed in the research. The Emotion Regulation constrict was measured using the FEEL-KJ scale. Various emotion control strategies were evaluated, and gender variations in latent emotion regulation variables of two different groups were investigated. Findings of the study showed that Emotion Regulation methods were used by girls more than boys.

Hanin and Nieuwenhoven (2020) examined into the impact of an intervention on learners' emotions and emotion control. The goal of the study was to build cognitive techniques for solving mathematical problems as well as a positive perception of problem-solving ability. The study's sample included 334 upper elementary children. The study's findings suggested that problem-solving abilities had significantly improved. Problem-solving involves three main aspects: cognitive, emotional and regulatory processes of emotions.

Akgül and Atalan (2021) researched on emotion control during Covid 19 circumstance. During Covid 19 pandemic, focused on anxiety symptoms in

teenagers and their parents. They also examined the effect of parental cyberchondria and emotion control in teenagers with anxiety disorder symptoms. The study included 155 teenagers and their parents as participants. The study discovered that parental cyberchondria and anxiety were associated with adolescent anxiety. During the Covid 19 period, two dimensions of cyberchondria, compulsion, and distress, along with worry also predicted anxiety in parents.

Liu et al. (2022) explorated the Processing characteristics of Automatic Emotion Regulation in children. Automatic Emotion Regulation was correlated with negative effect dimensions of temperament and social anxiety. Participants of the study was 75 students. Social anxiety Scale, Early Adolescent Temperament questionnaire and Automatic Emotion Regulation was recorded using an instrument. The result of the study revealed that social anxiety was significantly correlated with Emotion regulation. Findings also revealed that more importance should given to inspiration and empirical support for the promotion and intervention of Emotion Regulation in adolescent.

Conclusion

The researcher had a deep review through connected area and can locate that a few studies, which can contribute in the field of Critical Thinking, Academic Motivation and Emotion Regulation. It is, understand that Collaborative Problem Based Learning is an area which is still under the blanket. From the above cited related studies undertakes, following derivations can be deduced as, Collaborative Problem Based Learning has effect on student's motivation and Critical Thinking skills (Kairani et al., 2020). Tarmizi and Bayat (2012) analysed a research study on Collaborative Problem-Based Learning and role of Critical Thinking. Collaborative Problem Based Learning has positive effect on learning (Prayogi & Asyuri 2020; Dakabesi & Louise 2019; Suputra et al., 2019).

In the context of Critical Thinking, studies related to Critical Thinking and Problem-Based Learning which showed positive effects on Critical Thinking (Darhim et al. 2020). In the context of Academic Motivation, a positive effect of Academic Motivation on learning (Rao, 2010; Kumari & Chamundeswari, 2013; Gupta & Mili, 2016; Arulmoly & Branavan, 2017).

In the area of Emotion Regulation, adolescent's Emotion Regulation was reported (Alex et al., 2017; Hanin & Nieuwenhoven, 2020; Damaradzka & Fajkowska, 2018). Processing characteristics of Automatic Emotion Regulation in children which was related to temperament and social anxiety (Liu et al., 2022). Young et al. (2019) discussed positive and negative control of Emotions.

There is a research gap observed while reviewing.

1. Very few studies found in relation to Collaborative Problem Based Learning.
2. No research found in Indian or Kerala context that dealt with Collaborative Problem Based Learning in 3C3R model and other dependent variables.
3. Development of 3C3R model was rarely seen in the past researchers.

The Research Gap found in the study that there is no study found which relates the role of Collaborative Problem Based Learning on enhancing dependent variable such as Critical Thinking, Academic Motivation and Emotion Regulation. Thus it takes the need of exploring the rationale of the research.

Chapter 3

METHODOLOGY

- Objectives of the Study
- Variables of the Study
- Design of the Study
- Tools Used for the Study
- Experimental Phase
- Hypotheses of the Study
- Sample Selected for the Study
- Statistical Technique used for the Study

Method is the systematic approach or procedure adopted by the researcher for scientific research. Scientific research follows proper methods and steps adopted for collection of data and analysis of data. According to Kerlinger (1996) the researcher's choice of design, methods of observation, measurement methods and the types of analysis must be in congruent and must fit together. Methodology is the science of methods or principles of procedure. (Good, 1945)

The scientific procedure **is** adopted for the present study which aims to find out the Effectiveness of Collaborative Problem Based Learning on Critical Thinking, Academic Motivation and Emotion Regulation of secondary school students. This chapter describes about variables of the study, design of the study, tools used in the study, sample selected for the study and statistical techniques used to analyze the data.

Objectives of the Study

Major objective of the study is to develop Collaborative Problem Based Learning modules of 3C3R framework for Secondary School Students and to determine the effectiveness of Collaborative Problem-based Learning module on enhancing Critical Thinking, Academic Motivation and Emotion Regulation of secondary school students. Following minor objectives helps to analyse the major objectives.

Minor Objectives of the Study

1. To assess the Effectiveness of Collaborative Problem Based Learning modules of 3C3R framework on enhancing Critical Thinking and its components, viz.,
    a) Inference
    b) Recognition of Assumption

c) Deduction
d) Interpretation
e) Evaluation of Arguments

2. To assess the Effectiveness of Collaborative Problem Based Learning modules of 3C3R framework on enhancing Academic Motivation and its components, viz.,
   a) Intrinsic Motivation
   b) Extrinsic Motivation
   c) Amotivation
3. To assess the Effectiveness of Collaborative Problem Based Learning modules of 3C3R framework on enhancing Emotion Regulation and its components, viz.,
   a) Identifying
   b) Processing
   c) Expressing

Variables of the Study

Variables are the conditions or characteristics that an experimenter can manipulate. This experimental study is aimed to examine the effect of the independent variable on dependent variable. For the present study independent variable, dependent and control variable are present.

Dependent Variables

Dependent variables of the study are Critical Thinking, Academic Motivation and Emotion Regulation.

Independent Variable

Independent variables manipulate in order to affect the outcome of an experiment. For the present study, independent variables of the study is Collaborative Problem Based Learning, which is considered as an instructional strategy.

Collaborative Problem Based Learning

In the present study Collaborative Problem Based Learning is operationally defined as an instructional strategy, here a problem is to be presented for the student and has to be solved by active collaboration in groups and gathering information from various resources as part of self-regulated learning. Here Problem Based Learning takes place in collaborative learning group.

Control Variable

Academic achievement is the control variable of the study. The first terminal examination mark of 8^{th} standard students has taken as the score of academic achievement.

Categorical Variable

The gender of the student was taken as the categorical variable of the study. The total participants of the study were compared based on gender.

Design of the Study

For the present study, researcher adopted Pretest posttest Non equivalent group design, which is included in quasi experimental design. In this design, test units in both experimental and control groups were selected randomly. At the same time the experimental group is subjected to treatment, where as in control group, no treatment was implemented. In that group, students learned through existing method of teaching.

3C3R Frame work of Collaborative Problem Based Learning

Interdisciplinary topics in 8^{th} std biology were identified to develop 3C3R model of Collaborative Problem Based Learning and to know the effectiveness of

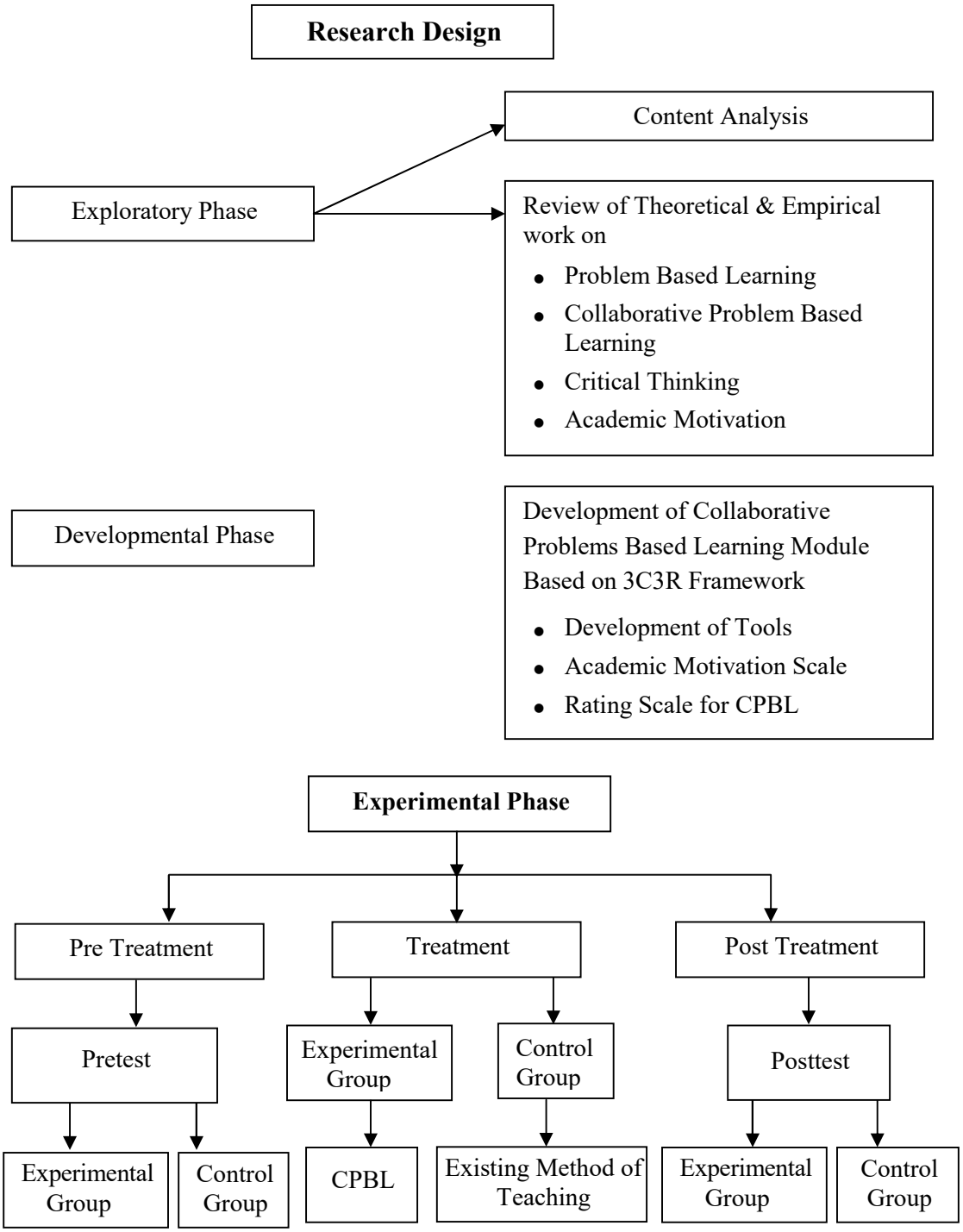
Collaborative Problem Based Learning on Critical Thinking, Academic Motivation and Emotion Regulation among secondary school students. Study employed Pretest posttest non equivalent design. The study was completed within three phases. Initially content analysis of 5^{th}, 6^{th}, 7^{th} std Social Science and Basic Science textbooks and 8^{th} std Basic Science textbooks were analysed. For the purpose of the study only concepts in each chapter were analysed. Details of content analysis are presented in Appendix I.

During second phase, reviewed theoretical and empirical works on selected dependent and independent variables to develop 3C3R model of Collaborative Problem Based Learning (CPBL) modules. After the detailed review process and content analysis, fifteen Collaborative Problem Based Learning (CPBL) modules were prepared. Collaborative Problem Based Learning used as an instructional strategy for experimental intervention program. Later constructivist lesson transcripts were prepared for select topics. Academic Motivation Scale, Emotion Regulation Scale were developed by the investigator in collaboration with the supervising teacher. Critical Thinking Test (Francis & Mustafa, 2011) was an adopted tool which is used for the study.

Third phase includes the experimental intervention by using quasi experimental pretest posttest design among participants. Afterwards pretest posttest were conducted to both experimental and control group. Based on the objectives of the study suitable statistical procedures were employed to analyze the data. Methodology of the study is described under Exploratory Phase, Developmental Phase and Experimental Phase. Outline of the Design of the study depicted in Figure 16.

Figure 16

Outline of the Design of the Study



Phase 1- Exploratory Phase

Exploratory Phase is the first phase of methodology. In this phase detailed analysis of the studies in the field of research in Collaborative Problem Based

Learning instructional strategy, Critical Thinking, Academic Motivation and Emotion Regulation were carried out. In this phase identification of interdisciplinary topics from 8th standard Basic Science textbook and it's connection with other discipline was identified through content analysis of 5th, 6th, 7th Standard Social Science textbooks and 5th, 6th, 7th and 8th Standard Basic Science textbooks.

Identification of Interdisciplinary Topics. Fifteen interdisciplinary topics were selected from three Biology chapters from 8th std Basic Science textbooks. Three chapters namely, 'Let's Regain Our Fields', 'Diversity for sustenance' and 'For the continuity of Generations', selected for Interdisciplinary contents and identified based on contents from the above lessons.

Content Analysis of Textbooks. In order to identify the interdisciplinary contents and it's connection with other discipline qualitative content analysis was done. It helped the researcher to identify the interdisciplinary contents in the 8thstd text book. Content analyzed were attached in appendices.

Phase 2: Developmental Phase

Developmental phase is the second phase of experimental procedure. This phase consisted of tool preparation and standardization. Tools used for the study are given below.

Tools used for the Study.

1 3C3R Model for Collaborative Problem-Based Learning modules (Linisha & Jaseena, 2019)

2 Critical Thinking Test (Francis & Mustafa, 2011)

3 Academic Motivation Scale (Linisha & Jaseena, 2019)

4 Emotion Regulation Scale (Linisha & Jaseena, 2019)

5 Rating Scale on Collaborative Problem-Based Learning (Linisha & Jaseena, 2019)

6 Lesson Transcript on the existing method of teaching (Linisha & Jaseena, 2019)

Developmental phase consisted the following stages.

1. Development and standardization of 3C3R model for Collaborative Problem Based Learning modules.
2. Preparation and standardization of Academic Motivation Scale.
3. Preparation and standardization of Emotion Regulation Scale
4. Rating Scale for Collaborative Problem Based Learning.

Collaborative Problem Based Learning. Collaborative Problem Based Learning is an instructional strategy. Here a problem is presented in front of the student and has to be solved by active collaboration in groups then gathering information from various resources as part of self-regulated learning. Thus Problem Based Learning takes place in a collaborative learning group. It is a Learner centered approach that empowers learners to conduct research, integrate theory and practice then apply knowledge and skills to develop a viable solution to a defined problem. For the purpose of the study interdisciplinary topics were selected for module preparation.

Basic principles of Problem Based Learning are given below.

- Learning is a process of new knowledge construction.
- Learning attains a Meta cognitive level and students were engaged to reflect up on the problem solving process.
- Learning involves group collaboration and social negotiations.

By analyzing various theories of Problem Based Learning, 3C3R Frame work of Collaborative Problem Based Learning selected for module preparation.

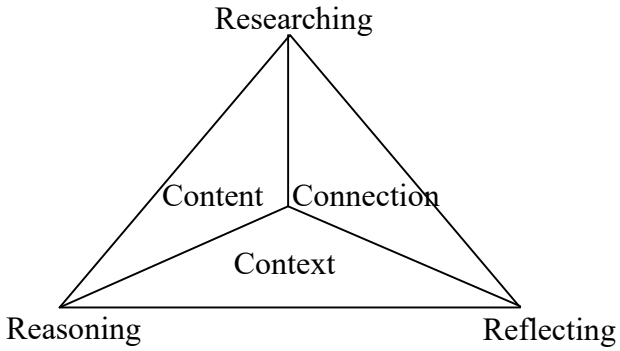
3C3R Model. Hung (2006) model follows the pattern of three structural elements such as **C**ontent, **C**ontext and **C**onnection and three process elements as **R**esearching, **R**easoning and **R**eflecting.

Researcher selected the topic and presented the content as a Problem in front of students. Content presented was from a particular context and also connected with other discipline. Main features of structural elements are given below.

Structural elements of 3C3R framework represented in Figure 17.

Figure 17

Structural Elements of 3C3R Framework



Content. There are several aspects in PBL environment; all these aspects were considered for the preparation of module. Setting goals and framing objectives of content (problem) was the first task of teacher. Content complexity and ill structuredness of the problem were the major parameter of PBL activities. Contents have to arrange in a simple to complex manner. Several aspects were considered while choosing content, which are given below.

- Learning goals attained by the students after completing the module.
- Focus on learning outcome of the students.
- Scope and relevance of the problem.
- Identifying different solution of problem which is interdisciplinary in nature.

Context. Context is the second structural element of the 3C3R model in CPBL. If the student learned particular content within a particular context, the knowledge and skills acquired through particular contextualization retained in a real

world situation. Information gained through contextualization creates a link between existing knowledge and newly constructed knowledge. Motivation of the students directly related to contextual learning. So content and motivation of students were important to instructional goals of PBL. Under contextualized situation, content may leads the learner to disconnect the link between newly formed knowledge with the already existing knowledge. The following basic aspects of the context are very important for 3C3R module preparation.

- Does the assigned problem is valid?
- The problem must be authentic or valid.
- The degree of contextualization of problem.
- The concept learned in a particular context can be applied to similar situations.
- Level of motivation of students and does the problem is important for them.

Next structural element is connection; it describes how the content connected with other discipline.

Connection. The third structural element of the 3C3R model for Collaborative Problem Based Learning is Connection**.** In CPBL environment students have to inter link the diverse sources in to an effective knowledge base network. Contents were arranged in a simple to complex and logical sequence. This will help the students to link concept within a particular context. Component Connection, connects or interlink the already existing knowledge with newly developed knowledge. While constructing the module, following aspects were considered.

- Identify the newness of the concept while constructing the module.
- How does the problem lead the students to test ideas in different context?

- Identify the concepts and objectives that overlap with other concept which learned earlier.

The processing components of Collaborative Problem Based Learning (CPBL) are **Researching, Reasoning and Reflecting.**

Researching. Researching is the first processing element of 3C3R frame work. Here problem is the felt difficulty of the learner. Understanding the problem is the first step in problem solving cycle. Given problem has to solve by learners through Critical Thinking, students were researching the necessary information related to the problem. Leaner's knowledge seeking ability leads to collect contextual information from different sources.

While preparing the module following aspects of Researching were considered for the content.

- Identify overall goal of the problem.
- Recognize the type of research needed.
- Students need a researching ability in order to collect authentic data. Formally students need to identify and investigate different sources of data.

Reasoning. Reasoning is the processing component, which promotes application of knowledge gathered from researching related information and the development of problem solving ability of the learner. Students analyze information, generate and test hypothesis and find out solutions to the problem or eliminate impulsive solutions. Reasoning process enables problem solvers to understand, deepen and expand their conceptual knowledge. Researching and Reasoning complements each other during an efficient, effective problem solving process. Researching and Reasoning were categorized as high, medium or low. Reasoning process help students to comprehend, analyze and apply the intended contents in to practice. While preparing the module, following dimensions were considered.

- What kind of information should be there in the module?
- Identify motivational aspects for encouraging the students.
- Inter connect new knowledge with previous knowledge.
- Think about the casual relationship between the terms and concepts. Generate and test hypotheses.

The third processing component is 'Reflecting'.

Reflecting. Here, learner reflects on the constructed knowledge throughout the problem solving process. Learner should organize and integrate their knowledge in to a systematic conceptual network. Cognitive abilities such as abstracting, summarizing and organizing knowledge enhances learners conceptual integration and retention of the content. By incorporating reflection component in a PBL module, it can promote inter dependence and meta cognitive skills among learners. Reflecting on learning point helped for developing self directed learning skill.

Reflecting optimizes the process of PBL and by ensuring the maximum effects of other components in PBL strategies. Here formative, summative and reflective processes were included. In Problem Based Learning, a problem must require following criteria.

- High information researching and high reasoning ability.
- High information researching and low reasoning.
- Low information researching and low reasoning.
- Low information researching and high reasoning ability.

For the purpose of the study fifteen Collaborative Problem Based Learning modules were prepared based on 3C3R frame work. Following, are major elements for preparation of the module.

1. Framing outline and learning outcome of the PBL module.

2. Preparation of the first draft of the CPBL Module.
3. Preparation of the Rating scale.
4. Content validation of the 3C3R module.
5. Presentation of the final form of the module.

During review process of Problem Based Learning, a study noted, which was analysed (Othman et al., 2013) and reported that, it was based on Five Ladders of Active Learning. These five ladders of active learning model modified with regard to Indian context. Detailed steps in the five ladders of active learning were given below:

Framing Learning Outcome and Outline for CPBL Module. For module preparation, interdisciplinary contents were selected from the 8^{th} Std biology text book. The contents were arranged in to five ladders of active learning in 3C3R frame work model. Contents were arranged in a way of simple to complex, known to unknown logical sequence. Teacher acts as facilitator and presented problem scenario to the learner. They have to undergo through five ladders of active learning in sequential order. Learning process was in the form of a Ladder which were inter connected. In each module, learning outcomes are arranged before going to the first ladder. Details of the steps in each ladder were given below.

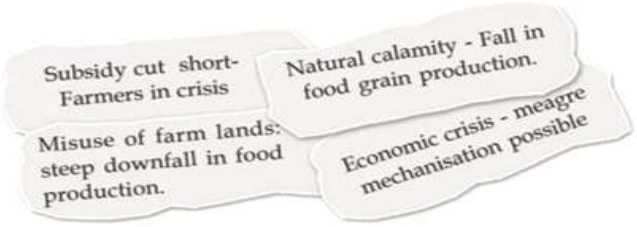
• ***Ladder I – Presentation of the Problem/Scenario.*** In the first ladder, teacher presented a problem or problem scenario to the learner. Presentation of the problem was the first step of the ladder. Learners arranged themselves to form collaborative learning groups. In step 2, learners in each group identified the problem presented by the teacher. Two active thinking points helped for identification of the problem, that are included as identification of facts (step 2) and generation of ideas (step-3) respectively. Step-4, is known as the Developmental phase. At the end of this ladder, reflection component was added in Ladder I.

Eg. Resources selected from 8th biology chapter 1- **Lets Regain Our Fields**. Here first module was **Food security**. Food scarcity was selected as the topic for introductory presentation.

Teacher presented the problem scenario with the help of a short film, '**Chicken ala carte'**. Learners were worked in collaborative learning groups. They were identified the problem, as Food scarcity. Group members identified facts, such as food security, food security act and Green revolution. They generate different ideas related to food security with the help of short film. Leaner identified the problem food scarcity. Learner underwent steps 1,2,3 and reached in to step-4. Step-4 is the developmental Phase. Which consisted of two activities.

Activity I : Food Scarcity.

Reasons for Food Scarcity.



Learners work in collaborative learning groups to find out the reason for food scarcity. They discussed every points related to food scarcity and prepared a report. Teacher facilitated the group work and motivated the students for learning process. One member in the group presented the report and reflected the ideas related to the concept. Food scarcity and its reason. They discussed the topic based on the following points.

Reasons for Food Scarcity.

- Crop failure due to natural calamities.
- Using agricultural land for non agricultural purposes
- Reducing the rate of subsidies.

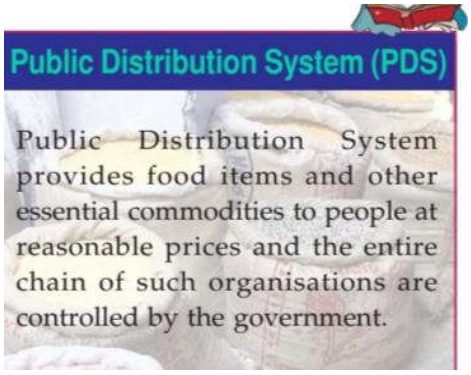
- Unable to purchase agricultural machines
- Climate change
- Unable to ensure crop insurance.
- Excessive use of fertilizers, reducing soil fertility.

Learners were asked to prepare a report on food scarcity and to reflect on concepts.

Activity II: Role of Science in Solving Food Scarcity. Learners worked in collaborative learning group to find out importance of science in solving the problems related to food scarcity. Teacher showed flash cards related to Green revolution in Kerala and Biography of Dr. M.S. Swaminathan, importance of public distribution system in Kerala. Then learners prepared notes on above topics and presented the report in group. At the end of each session students reflected on these ideas with the help of flow chart.

Flash Cards.

1) Flash card showing biography of Dr. M. S. Swaminathan
2) Flash card showing the importance of public distribution system.



Learners were asked to research on the topic of Green Revolution in Kerala and food scarcity Act etc. various ICT facilities were used for researching. All these activities were completed within one period. In class-2, learners reflect on perceived ideas which is step 5 in ladder-1. Then Ladder II started in the next period. Next class started with reflection of the perceived ideas. Later Learner climbed on Ladder 2.

• ***Ladder 2: Empowering Self-Regulated Learning (SRL).*** Ladder 2 was the stage for empowering self regulated learning. This ladder consisted of Self regulated learning activities such as summarizing the idea (step -2) Green revolution and Biography of Dr. M S Swaminathan. Preparation of notes(step -3 Note taking) on Food security bill and mapping (step -4) of Public distribution system in Kerala.

Public Distribution System.

Agencies	Commodities available
Civil Supplies Outlet	Rice, wheat, sugar, kerosene
Horticorp	Vegetables
Supplyco Super Market	All essential commodities
Nanma Store	
Neethi Store	
Labham Supplyco Market	
Maveli store	
Triveni Super Market	
Triveni Floating Super Market	

Step -5 is the phase of Reflection. Here learners reflect on above topic. Then move to ladder 3 which is as follows.

• ***Ladder III – Group Discussion Phase.*** Ladder III was group discussion phase, in this phase learners proceed through a meeting and reported the result of self-regulated learning activities. It was the first step in Ladder 3. It helped the learners to present the idea which was discussed. This step was the preparation stage for ladder IV. In step-2, Students reasoned about the topic as 'The consequence of Green Revolution in Kerala". They also reasoned about causes and reasons for population explosion, how to achieve food safety etc. All these topics were discussed in participants meeting. Then Summarized ideas were presented in Ladder

IV, Which is the preparation phase for the presentation of the products on self-regulated learning, which is in ladder 4.

• ***Ladder IV: Presentation of Product of Self –Regulated Learning.*** In this phase of presentation, participants presented the output of SRL which is the first step of this ladder. Peer assessment is carried out in step 2.

Step-2 -Peer Assessment.

1) Discussion on learning points
2) Single presentation of the ideas
3) Parallel presentation

Discussion on Learning Points. Learners discussed the ideas perceived from self regulated learning, here each point discussed with in group. All the points related to after effect of green revolution were discussed. Causes of population explosion and food safety were discussed.

Assessment of the learner which was carried out in two steps.

Single Presentation of the Ideas. One member from each group presented the ideas of discussion. Peer assessment was carried out through single presentation.

Parallel Presentation. Learners presented ideas in parallel groups. There was a possibility for peer assessment. Later teacher concluded all the learning points. Then learner moves in to ladder 5.

• ***Ladder V – Overall Reflection.*** Here, reflection of learned concepts was the first step in ladder 5. There are three types of Reflection.

Step -1. Reflection on homework/exercise – Leaner reflects on home work done.

Step- 2. Reflection on Summery of topic – Learner reflects the summary of the topic.

Step -3. Reflection of learning process.

- Summarising the ideas-Green revolution and biography of M.S. Swaminathan.
- Mapping of public distribution system.
- Note taking on the topic food security act.

Next step was asking review questions.

Step 4. Review Questions

Teacher inquired questions related to the topic.

1) Importance of food safety
2) Importance of food safety bill
3) Causes of food security
4) What is the need of public distribution system?

Step-5. Follow up Activities

Follow up activities were given, such as,

- Make a poster related to food safety.
- Role play showing the importance of agriculture.

Collaborative Problem Based Learning modules in Malayalam and English versions are presented in Appendices II and III respectively. Frame work of Collaborative Problem Based Learning based on 3C3R frame work summarized in the table 1.

Table 1

Frame Work of Collaborative Problem Based Learning on 3C3R Frame Work

Ladder I Presentation of the Problem	**Ladder II** Empowering Self Regulated Learning	**Ladder III** Group Discussion Phase	**Ladder IV** Presentation of the Product of SRL	**Ladder V** Overall **Reflection**
Step I Presentation of the Problem	Step I Self Directed Learning	Step I Group Meeting	Step I Presentation	Step I Refection Homework/exercise
Step II Identification of Facts	Step II Summerising the Ideas	Step II **Reasoning** about the Topic	Step II Peer Assessment	Step II Reflection on Topic
Step III Generation of Ideas	Step III Note Taking	Step III Preparation of Report	Step III Conclusion	Step III Reflection on Learning Process
Step IV Developmental Phase **Researching**	Step IV Mapping			Step IV Review Questions
Step V Reflection	Step V Reflection			Step V Follow up Activities

Standardization of 3C3R Model of Collaborative Problem Based Learning Module

Content validation of 3C3R Collaborative Problem Based Learning Module established through consulting CPBL modules with the expert in the field of education. A rating scale consisted of 14 statements with low, medium and high responses were given to the experts along with the module. Based on this rating scale, experts evaluated the accuracy of the module (Details of rating scale presented in Appendix IV and List of experts is appended as Appendix XVII). Dimension wise Details of Rating Scale for 3C3R Frame work of Collaborative Problem Based Learning Module represented in table 2.

Table 2

Details of Rating Scale for Evaluating 3C3R Frame Work of Collaborative Problem Based Learning Module

Sl No	Dimensions	Low	Medium	High
1.	Inter disciplinary in nature			
2.	Appropriate content			
3.	Learning Starts from problems / issues.			
4.	Presentation is simple			
5.	Activity based learning.			
6.	Comprehensiveness.			
7.	Students work in collaborative learning groups			
8.	Content presentation is sequential			
9.	Students can Research, Reason and Reflects on contents			
10.	Facilitates problem solving			
11.	Promotes Critical thinking			
12.	Scope for Emotion Regulation			
13.	It has the ability to create motivation and sustain interest			
14.	Follows principles of Problem Based Learning			

Fifteen modules were prepared based on 8th std biology content. Interdisciplinary content has taken to develop 3C3R Model learning modules. Collaborative learning technique such as Jigsaw, brain storming were used for collaborative learning environment, while conducting the experiment.

Tools Used for the Study

A rating scale for evaluating Collaborative Problem Based Learning, Critical Thinking Test, Academic Motivation and Emotion Regulation were used for the study. Among the tools one is adopted tool- Critical Thinking Test (Francis & Mustafa

2011). These tools developed and used to explore the effect of Collaborative Problem Based Learning module on Critical Thinking, Academic Motivation and Emotion Regulation among secondary school students which are as follows.

1. Academic Motivation Scale
2. Emotion Regulation Scale
3. Critical Thinking Test
4. Rating Scale for Evaluating CPBL Modules

Academic Motivation Scale

Academic Motivation is defined as student's desire as reflected in approach persistence and level of interest regarding academic subjects when the student's competence is judged as standard of performance of excellence (Wig et al., 2002)

The source of a person's motivation may be intrinsic that is derived from internal process, and or extrinsic, it is the result of external forces. Likewise, individual can be impelled to act by conscious and non conscious motives. Academic Motivation refers to the cause of behaviors that are use in some way related to academic functioning and success. Sub variables of Academic Motivation are:

a) Intrinsic motivation
b) Extrinsic motivation
c) Amotivation.

Details of the each sub variables are given below:

Intrinsic Motivation

Intrinsic motivation is defined as the doing of an activity for its inherent satisfaction rather than for some separable consequences. Intrinsic motivation has emerged as an important phenomenon for that can be systematically catalyzed or under mined by parent and teacher practices (Ryan & Stiller, 1991). An intrinsically

motivated person do work hard for rather than external proud, pressures or rewards. Components of intrinsic motivation are Intrinsic motivation to know. Intrinsic motivation towards accomplishment and intrinsic motivation towards experience stimulation.

Intrinsic Motivation to Know

This means, Intrinsic motivation refers to do an activity for itself. Intrinsically motivated persons derived satisfaction and pleasure from their participation in each activity. Exploration, curiosity to know, achieving learning goals, attaining intrinsic intellectuality and intrinsic motivation to learn were the sub components of intrinsic motivation to know. Examples of item under this component are given below:

- I make use of internet and newspapers for academic purposes.
- I usually utilize school library and internet facilities for extra reading.

Intrinsic Motivation towards Accomplishment

Here intrinsically motivated children interact with the surroundings; each children attain competency and to gain unique accomplishment. Items in this component are given below:

- I usually try to solve difficult homework by myself.
- If I don't understand what the teachers have taught me, I ask questions because it affects my marks.

Intrinsic Motivation towards Experience Stimulation

In intrinsic motivation, learners attain sensory pleasure, aesthetic experiences such as gardening and fun or excitement. Model items are given below

- I am interested in making and maintaining flower and vegetable gardens in school compound.
- I am not keen-on either conducting or participating in various events like science exhibitions, quiz competitions

Extrinsic Motivation

Extrinsic motivation has typically categorized as a pale and impoverished (even if powerful) form of motivation that contrasts with Intrinsic Motivation. There were four dimensions for extrinsic motivation, External regulation, Introjection, Identification and Integration.

External Regulation

In external regulation in order to satisfy external reward or to do something for reward contingency. Learner behaviour is regulated through external types of rewards and constraint. Model items are given below:

- I have never ever studied well thinking I may get gifts from my teachers.
- I do not make it a point to take part in co-curricular activities just for gaining the attention and appreciation of my teachers.

Introjected Regulation

Second type of extrinsic motivation is Introjected regulation. It is a type of quiet controlling internal regulation. Learner perform actions with pleasure to avoid guilty. Sometimes they attain ego-enhancement or pride. This type of extrinsic motivation focus on approval from self or others. Thus it is somewhat external aspect.

- I always try to avoid toxic friendships fearing bad reputation
- I always ensure that I surround myself with good students for good reputation

Identification

Identification is the self-determined and autonomous form of extrinsic motivation. Learners identified through the personal importance of behavior. In identification, behavior of a person valued and judged, there should be a conscious valuing of activity and self-enhancement goal. Extrinsic motives that are

internalized become regulated through identification. Examples of items in this component are given below:

- I do not attempt to be systematic in studies even when exams are around the corner.
- It inspires me a lot whenever I look through the life of great personalities of the world

Integrated Regulation

Integrated regulation is considered as the most autonomous form of extrinsic motivation. When a learner fully assimilated identification regulation then self integration occurs. One who internalizes the reason for an action then assimilates them to self. These component interconnected with identified regulation.

- I do not find it necessary to have a good character and persona all the time.
- I usually spend even my free time for academic activities.

Amotivation

Amotivation is a least autonomous form of extrinsic motivation. Amotivation is the state of mind lacking an intention to act. Lack of intentionality and a sense of personal causation are a motivated behaviour of a person. Amotivation refers to a general lack of motivation and direction.

- I am not good at keeping my textbooks and notebooks neat and clean.
- The appreciation I get from others does not boost my instinct to be brighter even more in studies.

Planning of the Scale

Based on theoretical dimensions, various subscales for Academic motivation are identified. Intrinsic motivation, Extrinsic motivation and Amotivation were the subscale. Each sub components in each subscale identified and proper selection of items were added.

Preparation of the Scale

Based on theoretical dimension various positive and negative statements in each component were selected. At the initial stage of the study, investigator developed 50 items for Extrinsic, Intrinsic and Amotivation components. Each positive and negative statement having five options for responding. 5 points likert's scale as strongly agree, agree, not decided, disagree and strongly disagree are the options. The scores of each responses were 5, 4, 3, 2 1 for positive statements and 1, 2, 3, 4, 5 for negative statement respectively. Maximum and minimum marks for the test as 140 and 1. At the initial stage 50 items were prepared, some of the items were modified and some are deleted after discussion with expert, then draft tool was prepared (A copy of draft Academic Motivation Scale in Malayalam and its English version as given in Appendices VII and VIII respectively). Summary of the Distribution of Items in Each Dimension for the Draft Academic Motivation Scale summarized in the table 3.

Table 3

Summary of the Distribution of Items in Each Dimension for the Draft Academic Motivation Scale

Sl. No.	Dimension	Statement number
1	Intrinsic Motivation	
	Intrinsic Motivation to Know	1,2,3,4,5,38,39,44,46
	Intrinsic Motivation to accomplishment	6.7,8,9,10,40,42
	Intrinsic Motivation to Experience stimulation	11,12,13,14,15,36,49
2	Extrinsic Motivation	
	External Regulation	16,17,18,19,20,35
	Identification	21,22,23,24,25
	Introjection	26,27,28,30
	Integration	29,43,45
3	Amotivation	31,32,33,34,37,41,47,48, 50

Scoring Procedure

Scoring key for each item in the scale was prepared. The respondents are required to put a tick mark on the column in the response sheet. Response ranges from strongly agree to strongly disagree. 5 point Likert's scale used for the scoring procedure. Scores for each response are 5, 4, 3, 2, 1 respectively positive responses and vice versa for negative responses.

Tryout and Refinement of the Statements

The draft tool was prepared for a representative sample of 370 secondary school students of Calicut and Kannur district. Instructions for recording responses were given and difficulties in the statements were identified.

Item Analysis

A total of 370 samples were taken for item analysis. All the scores were arranged in ascending order. 27% of samples that scored highest and assigned it as upper group. Similarly 27% sample of lowest scores were taken up the lower group. The characteristic of an item in a scale as the discriminating power of an item.

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

M_1 - Mean of upper group

M_2 - Mean of lower group

σ_1 - SD of upper group

σ_2 - SD of lower group

N_1 - Number of sample in the upper group

N_2 - Number of sample in the lower group

Details of Item Analysis of Academic Motivation Scale represented in table 4.

Table 4

Details of Item Analysis of Academic Motivation Scale

Item No.	Group	N	Mean	Std. Deviation	t-value
1*	Upper	100	4.3700	.89505	1.786
	Lower	100	4.1000	1.21854	
2*	Upper	100	3.3700	1.70356	1.612
	Lower	100	2.9900	1.62987	
3	Upper	100	4.5200	.71746	4.681
	Lower	99	3.8485	1.24017	
4	Upper	100	4.6100	.89775	10.438
	Lower	100	2.8300	1.44987	
5	Upper	100	4.5100	.83479	8.857
	Lower	100	3.0100	1.47364	
6	Upper	100	4.8300	.68246	10.274
	Lower	100	2.9600	1.68727	
7	Upper	100	4.2900	.94596	5.892
	Lower	100	3.3200	1.34750	
8	Upper	100	4.1500	1.24215	7.273
	Lower	100	2.7700	1.43446	
9	Upper	100	4.5900	.87727	5.319
	Lower	100	3.7500	1.31330	
10	Upper	100	4.8800	.40899	10.078
	Lower	100	3.2600	1.55453	
11	Upper	100	4.3100	1.08892	5.282
	Lower	100	3.3800	1.38374	
12	Upper	100	4.0100	1.21850	7.161
	Lower	100	2.6900	1.38312	
13	Upper	100	4.7400	.54346	11.098
	Lower	100	3.0600	1.41293	
14	Upper	100	3.9900	1.16771	6.111
	Lower	100	2.9100	1.32646	
15	Upper	100	4.8100	.56309	7.749
	Lower	100	3.6000	1.45644	
16	Upper	100	4.7100	.79512	11.544
	Lower	100	2.8200	1.43111	

Item No.	Group	N	Mean	Std. Deviation	t-value
17	Upper	100	4.3900	.80271	7.082
	Lower	100	3.2500	1.39534	
18	Upper	100	4.3300	.91071	9.938
	Lower	100	2.6700	1.40025	
19	Upper	100	4.0000	1.03475	4.181
	Lower	100	3.2300	1.52325	
20	Upper	100	4.4800	.88169	12.179
	Lower	100	2.5700	1.29689	
21	Upper	100	4.8700	.33800	9.923
	Lower	100	3.3100	1.53541	
22	Upper	100	4.6900	.82505	11.864
	Lower	100	2.6600	1.49896	
23	Upper	100	4.7100	.74257	9.316
	Lower	100	3.2600	1.36789	
24	Upper	100	4.4900	.82260	11.176
	Lower	100	2.7600	1.31133	
25	Upper	100	4.6700	.63652	9.783
	Lower	100	3.1400	1.42857	
26	Upper	100	4.2200	1.13333	8.503
	Lower	99	2.6768	1.41297	
27	Upper	100	4.5600	.97773	7.065
	Lower	100	3.3800	1.35423	
28	Upper	100	4.3500	1.00880	5.277
	Lower	100	3.4600	1.35154	
29	Upper	100	4.7600	.79290	11.148
	Lower	100	2.9500	1.41689	
30	Upper	100	4.2100	1.07586	6.273
	Lower	100	3.1100	1.38458	
31	Upper	100	3.7900	1.32798	6.862
	Lower	100	2.4400	1.45171	
32	Upper	100	4.3500	1.17529	9.119
	Lower	100	2.7300	1.33223	
33	Upper	100	4.9500	.21904	9.868
	Lower	100	3.6600	1.28880	

Item No.	Group	N	Mean	Std. Deviation	t-value
34	Upper	100	4.4400	1.13991	5.632
	Lower	99	3.4242	1.39307	
35*	Upper	100	2.6900	1.37580	0.306
	Lower	100	2.7500	1.39534	
36	Upper	100	4.5600	.85658	7.103
	Lower	100	3.4200	1.35721	
37	Upper	100	4.4300	.98734	10.071
	Lower	100	2.6500	1.46594	
38	Upper	100	4.3800	1.08040	7.624
	Lower	100	2.9600	1.51704	
39	Upper	100	2.0900	1.31882	3.299
	Lower	100	2.7600	1.54475	
40	Upper	100	4.4600	1.00925	6.434
	Lower	100	3.3100	1.47501	
41	Upper	100	4.5000	1.06837	10.991
	Lower	100	2.6600	1.28880	
42	Upper	100	3.9500	1.47282	2.782
	Lower	100	3.4100	1.26407	
43	Upper	100	3.7600	1.29584	2.866
	Lower	100	3.2200	1.36759	
44	Upper	100	4.7300	.50960	8.412
	Lower	100	3.4200	1.47148	
45	Upper	100	4.6400	.84710	9.462
	Lower	100	3.1100	1.37727	
46	Upper	100	4.6800	.69457	6.940
	Lower	100	3.7600	1.12923	
47	Upper	100	4.6600	.79417	11.424
	Lower	100	2.8000	1.42134	
48	Upper	100	4.6300	.91734	10.786
	Lower	100	2.7600	1.47107	
49	Upper	100	4.1200	1.21672	2.196
	Lower	100	3.7300	1.29377	
50	Upper	100	4.7100	.75605	10.893
	Lower	100	3.0300	1.34431	

* Denotes Rejected Items in the Scale

The draft scale consisted of 50 items. After items analysis, 47 items with t-value higher than 1.96 were selected for final scale. Copy of Final Scale in Malayalam and its translated version are given as Appendices IX and X respectively.

Validity of the Instrument

"Validity refers to the degree to which evidence and theory support the interpretation of test scores entailed be proposed uses of tests". "Validity is a unitary concept" (Joint Committee on Standards for Educational and Psychological Testing 1999 -P 499). Validity defined as degree to which all the accumulated supports the intended interpretation of test scores for proposed purpose. Draft tool was submitted to experts in the field of education. Necessary changes based on the recommendations were made in draft tool. Thus face validity was ensured. Content and construct validity were ensured using theoretical dimensions

Validity of Academic Motivation Scale. Validity of the Academic Motivation scale was ensured through content validity, concurrent validity and face validity.

Content Validity. Content validity refers to which the test actually measures or is specifically related to the traits for which was decided. For ensuring content validity adequate number of items were included in each subscale of the tool. More over the scale was given to the expert and they were asked to judge the appropriateness of the content.

Concurrent Validity. Concurrent validity of scale on Academic Motivation was estimated by correlating with Academic Motivation developed by (George & David, 2011). The correlation coefficient obtained is .78 indicating that the scale is valid to measure Academic motivation of secondary school students.

Face Validity. Final tool of Academic Motivation submitted before the expert in the field of education and established face validity. Experts in the field of Education certified that the scale is accurate for its objective.

Reliability of Academic Motivation Scale. Reliability is concerned with consistency, accuracy and predictability of the scale. It refers to the extent to which a measurement process free from random errors. When an obtained score is to be stable and trust worthy, then it is called reliable. Data collection tool must be a reliable one and it must have the ability to constantly gain same result when the tool is applied in same sample under the same condition.

Test-retest method was used to find out the reliability of the Academic Motivation Scale. The correlation between scores of students on the first test and second test was estimated. The obtained value of Cronbach Alpha for the Scale is .889 which guarantees the consistency of the scale. It is interpreted that higher the correlation co-efficient the more reliable the test.

Dictating Time Allotment

The draft tool was administered to the representative sample of 10 secondary school students. Directions were given and time taken for respondents was calculated. The average time taken for each student was noted which was 50 minutes, for administration.

Emotion Regulation Scale

Emotion Regulation involves extrinsic and intrinsic process responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features to accomplish one's goal. (Thompson, 1994)

'Emotion Regulation is a wide ranging term that describes explicit and implicit process that involves monitoring, evaluating, altering and modulating emotions' (Eisenberg & Spinrad, 2004).

Emotion Regulation Scale was used to assess the modulation of emotions in varying conditions of life. Identifying, Processing and Expressing are different dimensions of Emotion Regulation. Identifying is the basic level or lower level of Emotion Regulation. Processing is the modulation or regulation of emotions.

Processing is followed by expressing, which is the third aspects of Emotion Regulation. Expressing is the process of expressing once thought and feelings both externally and inwardly "and the development of cognitive and affective schemas." (Gergely & Unoka, 2008)

Planning of Emotion Regulation Scale

Emotion Regulation scale was prepared based on three theoretical dimensions such as Identifying, Processing and Expressing. Each dimension and the corresponding statements are as follows.

Identifying. Identifying is the basic level of Emotion Regulation. This is labelling and understanding emotions in relations to experiences and current situations.

- I can adjust my mental state according to the situation.
- I try to complete anything associated with my studies properly.

Processing. Processing means the factor, which modulate, refine and regulate emotions. Theoretical dimensions of Cognitive Emotion Regulation such as Rumination, Acceptance, Reappraisal and Self regulation are sub components of Processing dimensions which is included in Mentalised Affectivity Theory.

Rumination or Focus on Thought. Rumination refers to thinking about the feelings and thought associated with a negative event.

- I tend to show excitement in learning activities.
- I do not tend to live without a bad name in the society.

Positive Reappraisal. Positive reappraisal refers to thoughts of creating positive meaning to the event in terms of personal growth. Statements for instance are given below.

- I do not sense that everything in life has both good and bad sides.
- I try to gain knowledge from every experience and move forward.

Acceptance. Acceptance referring that thoughts of accepting what you have experienced and resigning yourself to what has happened.

- I do not believe that every problem faced during school life must be addressed.
- I try to appreciate my friends that helps me during problems.

Self Regulation. Self regulation is the ability to control once own emotions. Items in Self regulation are given as follows.

- I feel sad sometimes when my friends isolate me.
- I cannot control the distracting thoughts that comes to my mind while studying.

Expressing. Expressing is the process of showing once thought and feelings both externally and inwardly, it is the development of cognitive and affective schemas. Positive Refocusing, self blame, blaming others and catastrophising belongs to Expressing component.

Positive Refocusing. Subcomponent of Expressing enhances positive attitude in human beings.

- I do not value happy experiences more than difficulties.
- I do not try to be punctual even after scolded by the teacher for being late.

Self Blame. Blaming others and Catastrophising subcomponent enhance negatives in living beings. Self-Blame, means thoughts of putting the blame for what you have experienced by yourself.

- I tend to think and regret about problems with my friends
- I do not try to understand the pros and cons of any activity before engaging in it.

Blaming others. Blaming others means thoughts of putting the blame for what you have experienced on the environment or another person.

- I am backward in my studies because of the problematic atmosphere in my home
- I do not blame my teachers for my lower marks in examinations.

Catastrophising. Catastrophising, means thoughts of explicitly emphasizing the terror of what you have experienced.

- I set my mind to overcome any accidents and disasters ahead.
- I try and help people affected by natural calamities.

Preparation of the Scale

Based on the theoretical dimensions, both positive and negative items for dimensions of Identifying, Processing and Expressing were prepared. At the initial stage of the study 55 items were prepared. Each statements having five options for Responding; A five point likert' scale as strongly agree, agree, not decided, disagree and strongly disagree were the options. The maximum and minimum marks for the scale as 1 to 275 score. Responses range from 1 to 5 for positive statements and 5 to 1 for negative statements. Draft tool was administrated to the representative sample of 20 secondary school student (A copy of draft Emotional Regulation Scale in Malayalam and its English version are provided as Appendices XI and XII respectively). The average time taken for completing the scale was noted. Distribution of Items in Each Dimension for the Draft Emotion Regulation Scale summarized in the table 5.

Table 5

Summary of the Distribution of Items in Each Dimension for the Draft Emotion Regulation Scale

Sl. No.	Dimension	Statement Number
1	Identifying	1, 2, 3, 26, 27, 28, 34, 41, 42, 43, 44, 45
2	Processing	7, 8, 9, 14, 15, 16, 29, 23, 24, 25, 30, 31, 32, 33, 36, 37, 38, 39, 40, 46, 47, 48, 49, 50
3	Expressing	4, 5, 6, 10, 11, 12, 13, 17, 18, 19, 20, 21, 22, 32, 35, 51, 52, 53, 54, 55

Scoring Procedure

Investigator prepared scoring key for each items in the scale. Students are asked to put a tick mark for each response. Five point Likert scale was used for the

scoring procedure. The scores for each responses are 5,4,3,2,1, for positive statements and 1,2,3,4,5 for each negative statements.

Item Analysis

A pilot study was conducted for tool standardization. Data collected from 370 secondary school students. The responses were arranged in ascending order, high and low groups were selected from top and bottom subjects. Likert method was used for item analysis. t value was depicted here under. The item with t value greater than 1.96 selected, and the item with t value less than 1.96 rejected from the draft scale. Total 47 items were selected for final scale.

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

Where,

M_1 - mean of upper group

M_2 - mean of lower group

σ_1 - SD of upper group

σ_2 - SD of lower group

N_1 - Number of sample in the upper group

N_2 - Number of sample in the lower group

Item analysis of Emotion regulation scale was given in table 6.

Table 6

Item Analysis of Emotion Regulation Scale

Item No.	Group	N	Mean	Std. Deviation	t value
1	Upper	100	4.4700	.78438	2.095
	Lower	100	4.1700	1.19810	
2	Upper	100	3.9100	1.15553	4.696
	Lower	100	3.0700	1.36519	
3*	Upper	100	3.4100	1.45015	1.681
	Lower	100	3.7500	1.40974	

Item No.	Group	N	Mean	Std. Deviation	t value
4*	Upper	100	3.0700	1.65910	1.030
	Lower	100	2.8400	1.49558	
5	Upper	100	3.6000	1.37069	5.879
	Lower	100	2.4500	1.39534	
6	Upper	100	1.6300	1.05078	2.581
	Lower	100	2.1000	1.48732	
7	Upper	100	2.7300	1.65667	3.908
	Lower	100	1.9100	1.28782	
8	Upper	100	1.5500	1.10440	2.969
	Lower	100	2.1000	1.48732	
9	Upper	100	4.8900	.34510	13.595
	Lower	100	2.5700	1.67124	
10	Upper	100	4.5000	.93744	10.773
	Lower	100	2.5900	1.50484	
11	Upper	100	3.9300	1.22479	6.735
	Lower	100	2.7600	1.23190	
12	Upper	100	3.7300	1.36222	2.158
	Lower	100	3.3200	1.32482	
13	Upper	100	1.4200	.90095	3.122
	Lower	100	1.8800	1.16584	
14	Upper	100	4.4400	1.05715	3.560
	Lower	100	3.8100	1.41917	
15	Upper	100	4.8000	.44947	5.777
	Lower	100	3.9300	1.43727	
16	Upper	100	3.9600	1.37745	6.436
	Lower	100	2.6800	1.43464	
17	Upper	100	4.5500	.93609	4.240
	Lower	100	3.8200	1.44516	
18	Upper	100	3.9300	1.19979	3.064
	Lower	100	3.3200	1.58834	
19	Upper	100	4.6300	.83672	5.670
	Lower	100	3.7000	1.41064	

Item No.	Group	N	Mean	Std. Deviation	t value
20	Upper	100	4.5700	1.07548	5.670
	Lower	100	3.4400	1.67766	
21	Upper	100	4.6800	.56640	5.437
	Lower	100	3.8800	1.35795	
22	Upper	100	4.7600	.83024	17.478
	Lower	100	1.9600	1.37010	
23	Upper	100	3.6300	1.28437	2.434
	Lower	100	3.1400	1.55063	
24	Upper	100	4.3700	.97084	3.229
	Lower	100	3.8400	1.32360	
25	Upper	100	4.2400	1.22367	5.104
	Lower	100	3.2200	1.58005	
26	Upper	100	4.6800	.73691	5.359
	Lower	100	3.8400	1.38331	
27	Upper	100	2.0300	1.32920	2.868
	Lower	100	2.6000	1.47710	
28	Upper	100	3.1600	1.33878	5.634
	Lower	100	2.1500	1.19236	
29	Upper	100	4.1000	1.14150	8.762
	Lower	100	2.5400	1.36641	
30	Upper	100	4.2700	1.10878	8.395
	Lower	100	2.6600	1.56489	
31*	Upper	100	2.4500	1.65983	.463
	Lower	100	2.3500	1.38078	
32	Upper	100	4.3900	1.08148	5.972
	Lower	100	3.3300	1.40745	
33	Upper	100	4.6100	.82749	7.912
	Lower	100	3.2500	1.50672	
34	Upper	100	4.3400	1.07516	5.190
	Lower	100	3.3700	1.52855	
35	Upper	100	3.1400	1.44963	2.834
	Lower	100	2.5600	1.44474	

Item No.	Group	N	Mean	Std. Deviation	t value
36*	Upper	100	2.2700	1.39881	.652
	Lower	100	2.1400	1.42148	
37	Upper	100	4.5800	1.03651	9.314
	Lower	100	2.7000	1.73205	
38	Upper	100	4.2400	1.20705	3.426
	Lower	100	3.5900	1.46401	
39	Upper	100	3.7900	1.49946	5.927
	Lower	100	2.5500	1.45904	
40*	Upper	100	1.7700	1.17082	.707
	Lower	100	1.8900	1.23005	
41	Upper	100	4.3300	1.20651	10.126
	Lower	100	2.3300	1.56383	
42	Upper	100	4.2300	.93046	3.031
	Lower	100	3.7000	1.48051	
43	Upper	100	4.4700	.95827	6.668
	Lower	100	3.2100	1.62863	
44	Upper	100	4.1800	.99879	7.799
	Lower	100	2.7200	1.58325	
45	Upper	100	4.3500	1.20080	9.866
	Lower	100	2.4000	1.56992	
46*	Upper	100	1.5800	1.02671	1.95
	Lower	100	1.9200	1.40475	
47	Upper	100	4.7600	.69805	4.799
	Lower	100	4.0000	1.42134	
48	Upper	100	4.0800	1.30019	8.840
	Lower	100	2.2900	1.55242	
49	Upper	100	3.9600	1.30206	6.500
	Lower	100	2.6700	1.49784	
50	Upper	100	4.4100	.98571	4.036
	Lower	100	3.6800	1.51677	
51	Upper	100	4.7400	.79924	6.906
	Lower	100	3.4600	1.67223	

Item No.	Group	N	Mean	Std. Deviation	t value
52	Upper	100	4.5400	.75772	5.258
	Lower	100	3.6600	1.49220	
53	Upper	100	3.3500	1.64148	2.774
	Lower	100	2.7300	1.51661	
54	Upper	100	3.3900	1.42768	2.031
	Lower	100	2.9500	1.62912	
55*	Upper	100	2.3400	1.60944	.968
	Lower	100	2.1300	1.45404	

*Denotes rejected items in the scale

The draft scale consisted of 50 items. After items analysis, 47 items with t-value higher than 1.96 were selected for final scale. Copy of Final Scale in Malayalam and its translated version are given as Appendices IX and X respectively.

Validity

Validity is an important key to effective research. If a piece of research is invalid then it is worthless. (Cohen et al., 2007). For the preparation of Emotion regulation scale following validity measures were ensured**.**

Validity of Emotion Regulation Scale. Validity is defined as the degree to which all the accumulated supports the intended interpretation of test scores for proposed purpose. Draft tool was submitted to experts in the field of education. Necessary changes based on the recommendations were made in draft tool. Experts in the field of Education certified that the scale is accurate for its objective thus face validity was ensured. Content and construct validity were ensured using theoretical dimensions.

Content Validity. Content validity of the Emotion Scale was ensured by obtaining the judgment of experts. Their opinion was taken in to consideration while preparing the scale. For ensuring content validity adequate number of items

were included in each subscale of the tool. Modifications were made in the structure of items and alternative items were given according to experts suggestion.

Concurrent Validity. Emotion Regulation Scale correlated with Emotion Regulation Scale (Franco & Musthafa, 2011). Administered both the scale to a sample of 30 students and 'r' value calculated. Coefficient of correlation was r=.72, which showed that the prepared scale was good for what it is intended to measure.

Reliability of Emotion Regulation Scale. The goodness and objectivity of the tool was measured through reliability. Reliability is the degree of consistency to which measure what the investigator intended to measure. The consistency of the Emotional Regulation Scale was ensured through test retest method. The obtained value of Cronbach alpha for the Scale is .772 which guarantees the consistency of the scale. It is interpreted that higher the correlation co-efficient the more reliable the test.

Critical Thinking Test (Francis & Mustafa, 2011)

Critical thinking test was an adopted test developed by (Francis & Mustafa, 2011). Critical Thinking Test is used for assessing Critical Thinking Skill of Students. Five Sub dimension of the Critical Thinking Test (Francis & Mustafa, 2011) are given hereunder.

Test 1: Inference: Discriminating among degrees of truth or falsity of inferences drawn from given data.

Test 2: Recognition of Assumptions: Recognizing unstated assumptions or presuppositions in given statements or assertions.

Test 3: Deduction: Determining whether certain conclusions necessarily follow from information in given statements or premises.

Test 4: Interpretation: Weighing evidence and deciding if generalizations or conclusions based on the given data are warranted.

Test 5: Evaluation of Arguments: Distinguishing between arguments that are strong and relevant and those that are weak or irrelevant to a particular question at issue

A pilot study was conducted in 8th std students to identify the practical difficulty of the tool. Investigator gave clear idea about the test, (there was model items to respond). The average time taken by the student was noted. One hour was allotted to complete the response sheet.

Standardization of Critical Thinking Test

Critical thinking Test was already standardized by developers (& Francis & Mustafa 2011). Test consisted of five subscales with 17 questions. One mark for each correct response and no marks for incorrect response. A copy of Critical Thinking Test and its translated version are attached in Appendices XV and XVI respectively.

Validity

Content validity was established. The final test was submitted to subject expert in the field of education, and certified that the tool was good and competent for research purpose. “Cronnbachs alpha coefficient were computed both measurement. Cronbach’s α reliabilities at both measurements were acceptably high. None of the Cronbach’s α was below 0.75. At first measurement, Cronbach’s α reliabilities of the subscales ranged from 0.75 to 0.86 and at follow-up from 0.75 to 0.87.” (Francis & Mustafa, 2011). By using test retest method the obtained value of Cronbach alpha is between 0.75 to 0.86 which guarantee the consistency of the tool.

Experimental Phase

Experimental Phase is the major part of the research. In experimental phase the standardized tools were administered to control and experimental group. This phase of the study mainly focused to test the hypotheses of the study. Which are explained here under.

Hypotheses of the Study

1. There is no significant difference in the pretest scores of Critical Thinking and its components between the experimental and control groups for the total sample.
2. The mean posttest scores of Critical Thinking and its components for the experimental group are significantly higher than that of the control group for the total sample.
3. There is a significant difference in the mean pretest and posttest scores of Critical Thinking and its components between the experimental and control groups for the total sample and subsample based on gender.
4. Collaborative Problem Based Learning modules of 3C3R framework have significant effect on Critical Thinking and its components for total sample and subsample based on gender.
5. There is no significant difference in the mean pretest scores of Academic Motivation and its components between experimental and control groups for the total sample.
6. The mean posttest scores of Academic Motivation and its components for the experimental group are significantly higher than that of the control group for the total sample.
7. There exist a significant difference in the mean pretest and posttest scores of Academic Motivation and its components between the experimental and control group for the total sample and subsample based on gender

8. Collaborative Problem Based Learning modules of 3C3R framework have significant effect on Academic Motivation and its components for total sample and subsample based on gender.
9. There is no significant difference in the mean pretest scores of Emotion Regulation and its components between the experimental and control groups for the total sample.
10. The mean posttest scores of Emotion Regulation and its components for the experimental group are significantly higher than that of the control group for the total sample.
11. There are significant differences in the mean pre-posttest scores of Emotion Regulation and its components between experimental and control groups for the total sample and subsample based on gender.
12. Collaborative Problem Based Learning modules of 3C3R framework have significant effect on Emotion Regulation and its components for total sample and subsample based on gender.

Design for Experimentation Phase of the Study

Pretest- posttest non equivalent group design from the Quasi Experimental family was used for the study.

$$\begin{array}{c} O_1 \ X \ O_2 \\ \text{---------} \\ O_3 \ C \ O_4 \end{array}$$

O_1O_3 Pretest

O_2 O_4 Posttest

In this notation, " 'O' represents the process of observation or measurement. O_1 and O_2 denotes the Pretests and O_3 and O_4 designates the posttests. 'X' indicates the exposure of a group to an experimental treatment, the effects of which are to be measured (Campbell & Stanley, 1963)".

'C' denotes exposure of a group to a different treatment or no treatment. The dotted line indicates experimental and control group which are not equal by all means.

Sample Selected for the Study

As the population of the study is secondary school students in Kerala. The researcher selected two intact class groups from two different Government schools in the Calicut district for the study. The investigator selected a total of 89 students for the experiment using stratified sampling method. Govt. Higher secondary school Puthur and Govt. Vocational Higher secondary school Madappally were selected for the study. Forty-three students were in the experimental group, and forty-six students were in the control group. To avoid the experiment's practical difficulty, the researcher selected one 8th std class from one school for the experimental group and one class for the control group from another school.

Experimental phase is divided in to three phases.

1) Pretreatment phase
2) Treatment phase
3) Post treatment phase

Pretreatment Phase. Investigator selected two government schools in Calicut district. Govt. Vocational Higher Secondary School Madappally and Govt. Higher Secondary School Puthur. Researcher seek permission to collect data from each schools. 8^{th}std students of Govt. Higher Secondary School taken us experimental group and 8^{th} std students of Govt. Vocational Higher Secondary School taken as control group students. Experimental and control group were non equivalent in its nature. Investigator collected first term achievement scores in biology from the class teacher. These scores are taken as control variable of the study. Experimental and control group are in Malayalam medium. Before the

treatment phase investigator administrated Critical Thinking test. Academic Motivation scale and Emotion Regulation scale to control and experimental group. Pretest scores of Critical Thinking test, Academic Motivation and Emotion Regulation of secondary school students were collected.

Treatment Phase. Treatment phase is the most important phase in experimentation. In this phase, investigator utilized existing method of teaching in control group (Appendices V & VI) and administered Collaborative Problem Based Learning modules in experimental group (Appendices II & III). 3C3R frame work of Problem Based Learning was used in collaborative learning groups. Videos, text, audio, charts, flash cards, activities were also used in problem based learning class room. Investigator used 15 modules in Malayalam medium for treatment. Two periods were required to complete one module. Teacher factor taken as constant for experimentation. Inter-disciplinary nature of modules motivates the students, the role of the teacher was as a facilitator/mentor in Problem Based Learning. Students learned the content in collaborative learning groups. Jigsaw, Brain storming techniques were used in experimental groups. Formative evaluation of students done through peer evaluation and also used multiple choice questions. Reflection component of the module helped each student to evaluate themselves.

Post Treatment Phase. After completing the treatment phase, investigator administered Critical Thinking test, Academic Motivation and Emotion Regulation Scale to both group. Investigator collected posttest scores for each tool. Data collection completed within 3 month of experimental phase.

Statistical Technique used for the Study

Various statistical techniques were used for the study, which help us for drawing inferences, conclusion and make generalization of the result of the study. Nature and purpose of the study determined what kind of analysis needed for the study.

Preliminary analysis

As preliminary analysis the statistical constant of the variable of the study like mean, median, standard deviation, skewness and kurtosis were compared for experimental and control group for Pretest.

Major Analysis

The following major statistical analysis were used for the study

Test of Significance Difference between Mean Scores

"A t test is a type of statistical technique that is used to compare the means of two groups. It is one of the most widely used statistical hypothesis testes in studies (Yin et al., 2010).

There are two types of t test, one is the independent which is used when two groups under comparison are independent on each other. Second one is the paired t test in which two groups under comparison are dependent on each other.

ANCOVA

ANCOVA is explained as the statistical technique that combines ANOVA and regression. "ANCOVA determines the co variation (correlation) between the covariate (s) and the dependent variable scores, prior to determining whether the differences between experimental condition (dependent variable score) means are significant'' (Rutherford, 2000). "Aspects of the ANCOVA method is the relationship between the covariate (s) and dependent variable, up on which the adjusts mean depend is determined empirically from the data" (Rutherford, 2000).

Hedges' g

Hedges' g is a measure to find out effect size. Effect size gives idea about how much one group differ from another group.

The Hedges's g formula is

$$\text{Hedge's g} = \frac{M_1 - M_2}{SD^*}$$

Where

M_1-M_2= difference in means

SD* Pooled standard deviation.

A research finding is valid and reliable depending on the appropriateness of methodology followed in the study.

Chapter 4

ANALYSIS AND INTERPRETATION

- Effectiveness of Collaborative Problem Based Learning on Critical Thinking
- Effectiveness of Collaborative Problem Based Learning on Academic Motivation
- Effectiveness of Collaborative Problem Based Learning on Emotion Regulation

This chapter presents the analysis and interpretation of the data selected for the study. The major objective of the study is to find the effectiveness of Collaborative Problem Based Learning on Critical Thinking, Academic Motivation and Emotion Regulation of Secondary School Students in Kerala. Data for the study were collected from 43 students in the experimental group and 46 students in the control group. The data collected was analyzed using suitable statistical techniques which are given in this chapter. The details of analysis of the data and the derived results are presented in three sections under the following headings.

- Effectiveness of Collaborative Problem Based Learning on Critical Thinking
- Effectiveness of Collaborative Problem Based Learning on Academic Motivation
- Effectiveness of Collaborative Problem Based Learning on Emotion Regulation

Each section consists of preliminary analysis, pretest score comparison between experimental and control group, posttest score comparison between experimental and control group, pretest and posttest comparison between experimental and control groups for male and female students, pretest – posttest comparison of experimental and control group, pretest – posttest comparison of experimental and control group for male and female students, ANCOVA and effect size calculation.

Effectiveness of Collaborative Problem based Learning on Critical Thinking

Preliminary Analysis

Preliminary analysis was conducted to find the distribution of scores of Critical Thinking. Important descriptive statistics like mean, median, mode, SD, kurtosis, SE of kurtosis, skewness and SE of skewness of total sample were calculated.

Statistical indices of distribution of pretest scores and posttest scores of Critical Thinking and its components obtained for the experimental group are indicated in table 7.

Table 7

Statistical Indices of Distribution of the Pretest Scores and Posttest Scores of Critical Thinking and its Components for the Experimental Group

Group	Variable	Mean	Median	Mode	Std. Deviation	Skewness	Kurtosis
Pretest	Inference	1.23	1.00	1.00	0.57	-0.01	-0.24
	Recognition of Assumptions	1.35	1.00	1.00	0.65	0.05	-0.07
	Deduction	1.19	1.00	1.00	0.59	-0.05	-0.19
	Interpretation	1.07	1.00	1.00	0.63	-0.05	-0.36
	Evaluation of Arguments	0.81	1.00	0.00	0.79	0.35	-1.32
	Critical Thinking	5.65	6.00	6.00	2.13	-0.03	-0.64
Posttest	Inference	2.09	2.00	2.00	0.75	-0.51	0.07
	Recognition of Assumptions	2.44	3.00	3.00	0.88	-0.14	-0.67
	Deduction	2.16	2.00	2.00	0.81	-0.59	-0.43
	Interpretation	1.93	2.00	2.00	0.74	-0.26	-0.13
	Evaluation of Arguments	1.88	2.00	2.00	0.85	-0.26	-0.63
	Critical Thinking	10.51	11.00	12.00	2.58	-0.92	0.53

SE of Skewness- 0.36; SE of Kurtosis- 0.71

Table 7 shows that mean (1.23), median (1), and mode (1) of pretest scores of inference are almost equal. The indices of skewness (-0.01) and kurtosis (-0.24) indicate the distribution is negatively skewed and platykurtic. Mean (1.35), median (1), and mode (1) of pretest scores of component Recognition of assumptions are almost equal. The indices of skewness (0.05) and kurtosis (-0.07) indicate the

distribution is positively skewed and platykurtic. Mean (1.19), median (1), and mode (1) of pretest scores of component Deduction are almost equal. The indices of skewness (-0.05) and kurtosis (-0.19) indicate the distribution is negatively skewed and platykurtic. Mean (1.07), median (1), and mode (1) of pretest scores of component Interpretation are almost equal. The indices of skewness (-0.05) and kurtosis (-0.36) indicate the distribution is negatively skewed and platykurtic. Mean (.81), median (1), and mode (0) of pretest scores of component Evaluation of arguments are almost equal. The indices of skewness (0.35) and kurtosis (-1.32) indicate the distribution is positively skewed and platykurtic. Mean (5.65), median (6), and mode (6) of pretest scores of Critical Thinking are almost equal. The indices of skewness (-0.03) and kurtosis (-0.64) indicate the distribution is negatively skewed and platykurtic.

Table 7 shows that mean (2.09), median (2), and mode (2) of posttest scores of component Inference are almost equal. The indices of skewness (-0.51) and kurtosis (0.07) indicate the distribution is negatively skewed and leptokurtic. Mean (2.44), median (3), and mode (3) of posttest scores of component Recognition of assumptions are almost equal. The indices of skewness (-0.14) and kurtosis (-0.67) indicate the distribution is negatively skewed and platykurtic. Mean (2.16), median (2), and mode (2) of posttest scores of component Deduction are almost equal. The indices of skewness (-0.59) and kurtosis (-0.43) indicate the distribution is negatively skewed and platykurtic. Mean (1.93), median (2), and mode (2) of posttest scores of component Interpretation are almost equal. The indices of skewness (-0.26) and kurtosis (-0.13) indicate the distribution is negatively skewed and platykurtic. Mean (1.88), median (2), and mode (2) of posttest scores of component Evaluation of arguments are almost equal. The indices of skewness (-0.26) and kurtosis (-.63) indicate the distribution is negatively skewed and platykurtic. Mean (10.51), median (11), and mode (12) of posttest scores of Critical Thinking are almost equal. The indices of skewness (-0.92) and kurtosis (0.53) indicate the distribution is negatively skewed and leptokurtic.

The graphical representations of the pretest and posttest scores of the variable Critical Thinking and its components of experimental group are presented in figure 18 and figure 19 respectively.

Figure 18

Smoothed Frequency Curves of Pretest Scores of Critical Thinking and its Components in Experimental Group

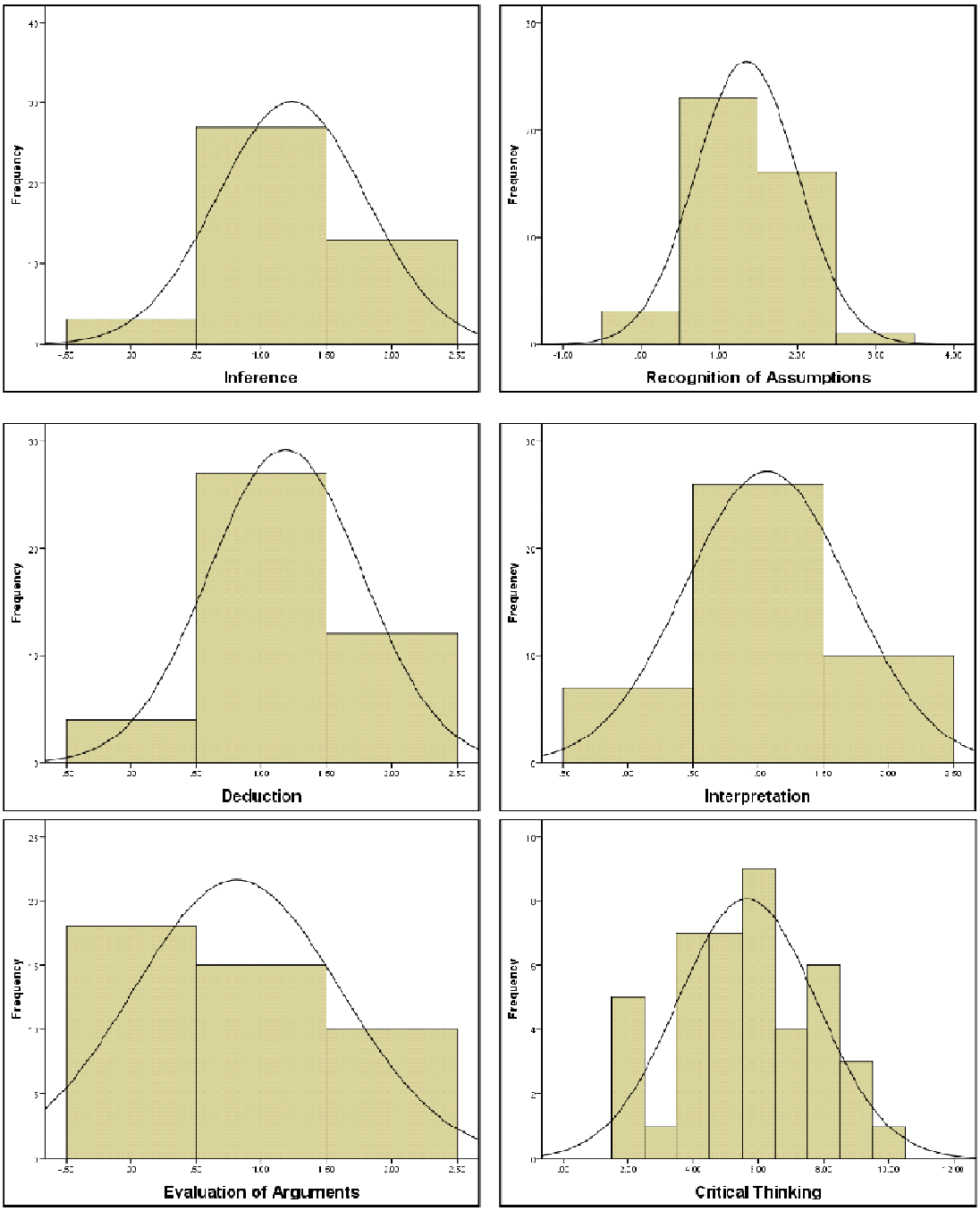
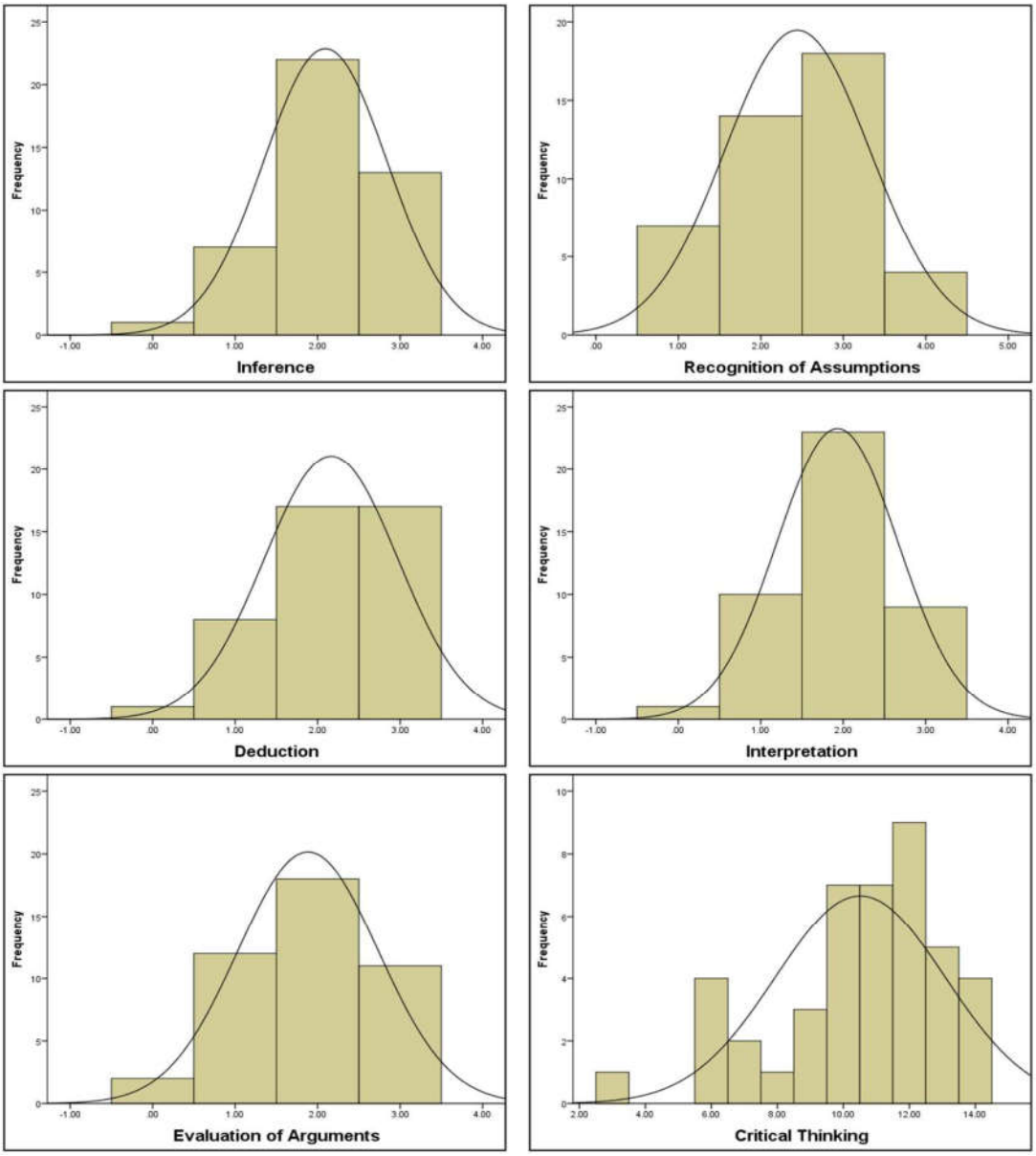


Figure 19

Smoothed Frequency Curves of Posttest Scores of Critical Thinking and its Components in Experimental Group



Both the statistical constants and graphical representations of the pretest and posttest score of Critical Thinking and its components for the experimental group reveals that the distributions are approximately normal.

Statistical indices of distribution the pretest scores and posttest scores of Critical Thinking and its components obtained for the control group are indicated in table 8.

Table 8

Statistical Indices of Distribution the Pretest Scores and Posttest Scores of Critical Thinking and its Components for the Control Group

Group	Variable	Mean	Median	Mode	Std. Deviation	Skewness	Kurtosis
Pretest	Inference	1.11	1.00	1.00	0.71	-0.16	-0.92
	Recognition of Assumptions	1.33	1.00	1.00	0.67	-0.02	-0.16
	Deduction	1.24	1.00	1.00	0.64	-0.25	-0.59
	Interpretation	1.07	1.00	1.00	0.68	-0.08	-0.75
	Evaluation of Arguments	0.87	1.00	0.00	0.83	0.25	-1.52
	Critical Thinking	5.61	6.00	6.00	2.18	-0.24	0.15
Posttest	Inference	1.26	1.00	1.00	0.53	0.17	-0.30
	Recognition of Assumptions	1.48	1.00	1.00	0.55	0.51	-0.90
	Deduction	1.39	1.00	1.00	0.54	0.01	-1.08
	Interpretation	1.20	1.00	1.00	0.58	-0.03	-0.19
	Evaluation of Arguments	0.98	1.00	1.00	0.75	0.04	-1.15
	Critical Thinking	6.30	6.00	5.00	1.49	0.38	-0.57

SE of Skewness- 0.35, SE of Kurtosis- 0.69

Table 8 shows that mean (1.11), median (1), and mode (1) of pretest scores of inference are almost equal. The indices of skewness (-0.16) and kurtosis (-0.92) indicate the distribution is negatively skewed and platykurtic. Mean (1.33), median (1), and mode (1) of pretest scores of component Recognition of assumptions are almost equal. The indices of skewness (-0.02) and kurtosis (-0.16) indicate the distribution is negatively skewed and platykurtic. Mean (1.24), median (1), and mode (1) of pretest scores of component Deduction are almost equal. The indices of skewness (-0.25) and kurtosis (-0.59) indicate the distribution is negatively skewed and platykurtic. Mean (1.07), median (1), and mode (1) of pretest scores of

component Interpretation are almost equal. The indices of skewness (-0.08) and kurtosis (-0.75) indicate the distribution is negatively skewed and platykurtic. Mean (.87), median (1), and mode (0) of pretest scores of component Evaluation of arguments are almost equal. The indices of skewness (0.25) and kurtosis (-1.52) indicate the distribution is positively skewed and platykurtic. Mean (5.61), median (6), and mode (6) of pretest scores of Critical Thinking are almost equal. The indices of skewness (-0.24) and kurtosis (0.15) indicate the distribution is negatively skewed and leptokurtic.

Table 8 shows that mean (1.26), median (1), and mode (1) of posttest scores of inference are almost equal. The indices of skewness (0.17) and kurtosis (-0.30) indicate the distribution is positively skewed and platykurtic. Mean (1.48), median (1), and mode (1) of posttest scores of component Recognition of Assumptions are almost equal. The indices of skewness (0.51) and kurtosis (0.90) indicate the distribution is positively skewed and platykurtic. Mean (1.39), median (1), and mode (1) of posttest scores of component Deduction are almost equal. The indices of skewness (0.01) and kurtosis (-1.08) indicate the distribution is positively skewed and platykurtic. Mean (1.20), median (1), and mode (1) of posttest scores of interpretation are almost equal. The indices of skewness (-0.03) and kurtosis (-0.19) indicate the distribution is negatively skewed and platykurtic. Mean (.98), median (1), and mode (1) of posttest scores of component Evaluation of Arguments are almost equal. The indices of skewness (0.04) and kurtosis (-1.15) indicate the distribution is positively skewed and platykurtic. Mean (6.30), median (6), and mode (5) of posttest scores of Critical Thinking are almost equal. The indices of skewness (0.38) and kurtosis (-0.57) indicate the distribution is positively skewed and platykurtic.

The graphical representations of the pretest and posttest scores of the variable Critical Thinking and its components of control group are presented in figure 20 and figure 21 respectively

Figure 20

Smoothed Frequency Curves of Pretest Scores of Critical Thinking and its Components in Control Group

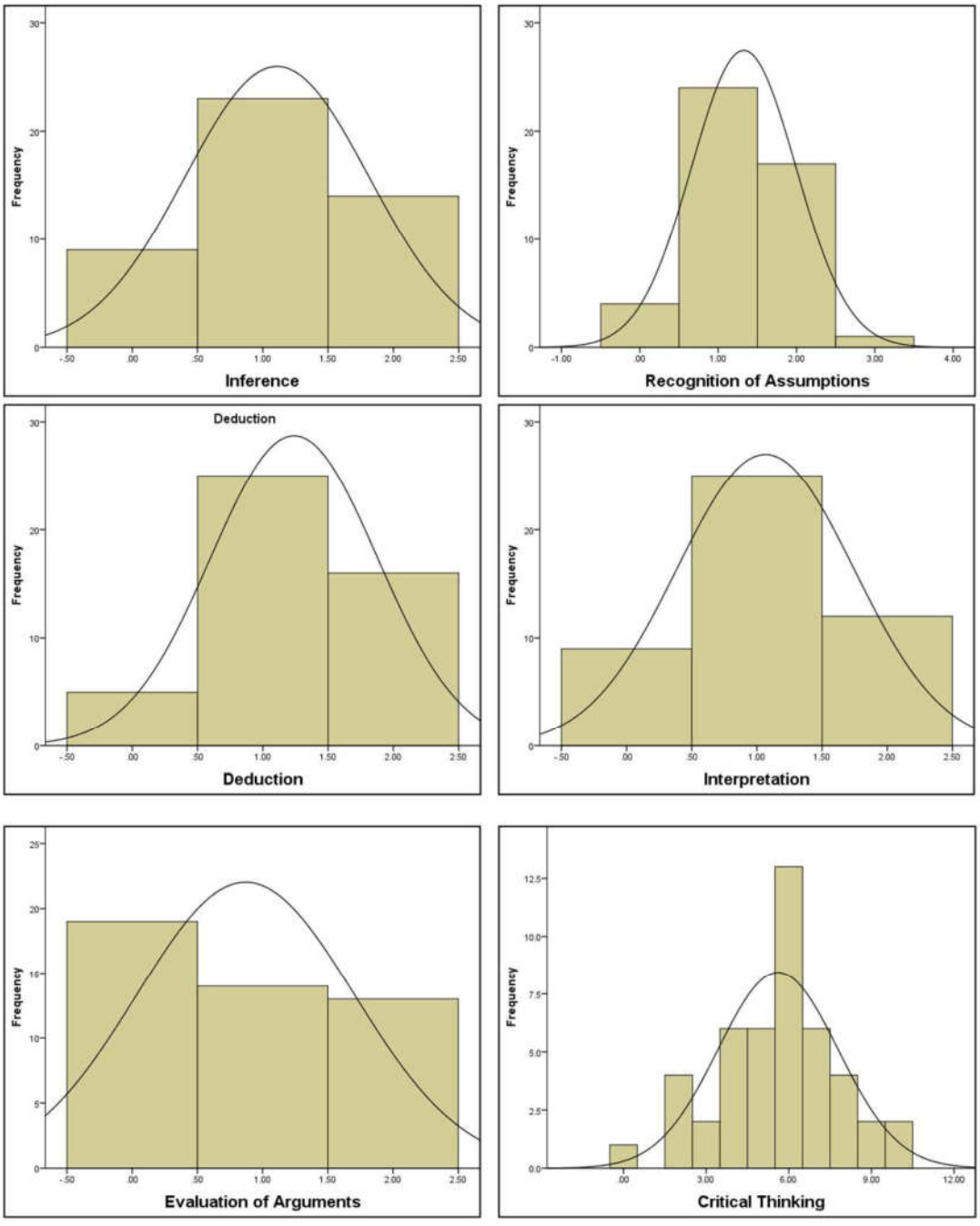
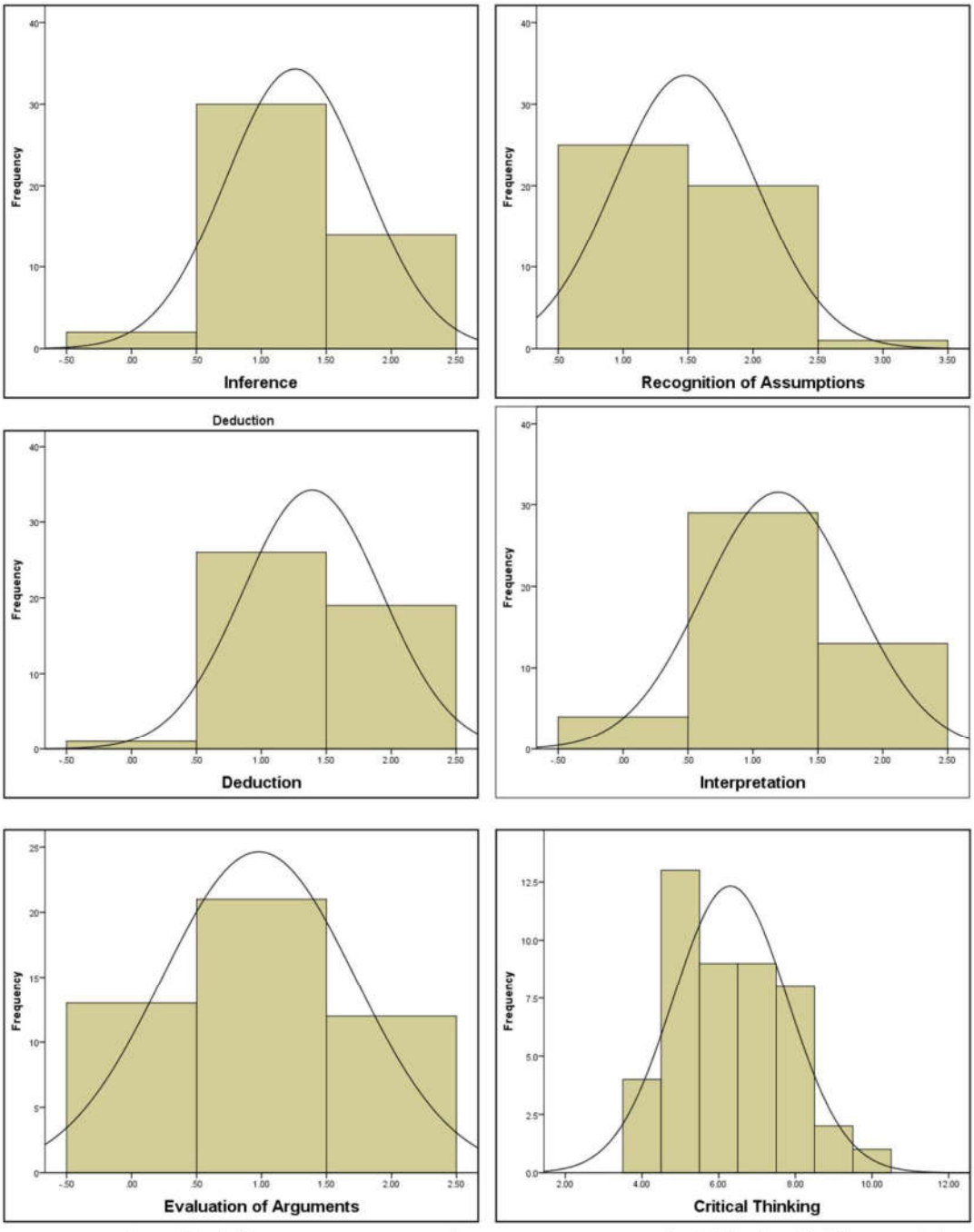


Figure 21

Smoothed Frequency Curves of Posttest Scores of Critical Thinking and its Components in the Control Group



Both the statistical constants and graphical representations of the pretest and posttest score of Critical Thinking and its components in control group revealed that distributions are approximately normal.

Comparison of Mean Scores of Pretest on Critical Thinking and its Components in Experimental and Control Groups

The mean scores of the initial level of Critical Thinking and its components (pretest) in experimental and control groups were compared using a two-tailed test of significance of difference between means for large independent groups. The details of data and results are presented in Table 9.

Table 9

Details of Comparison of Mean Pretest Scores on Critical Thinking and its Components in Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Inference	Experimental group	43	1.23	0.57	.906
	Control group	46	1.11	0.71	
Recognition of Assumptions	Experimental group	43	1.35	0.65	.163
	Control group	46	1.33	0.67	
Deduction	Experimental group	43	1.19	0.59	.407
	Control group	46	1.24	0.64	
Interpretation	Experimental group	43	1.07	0.63	.033
	Control group	46	1.07	0.68	
Evaluation of Arguments	Experimental group	43	0.81	0.79	.322
	Control group	46	0.87	0.83	
Critical Thinking	Experimental group	43	5.65	2.13	.093
	Control group	46	5.61	2.18	

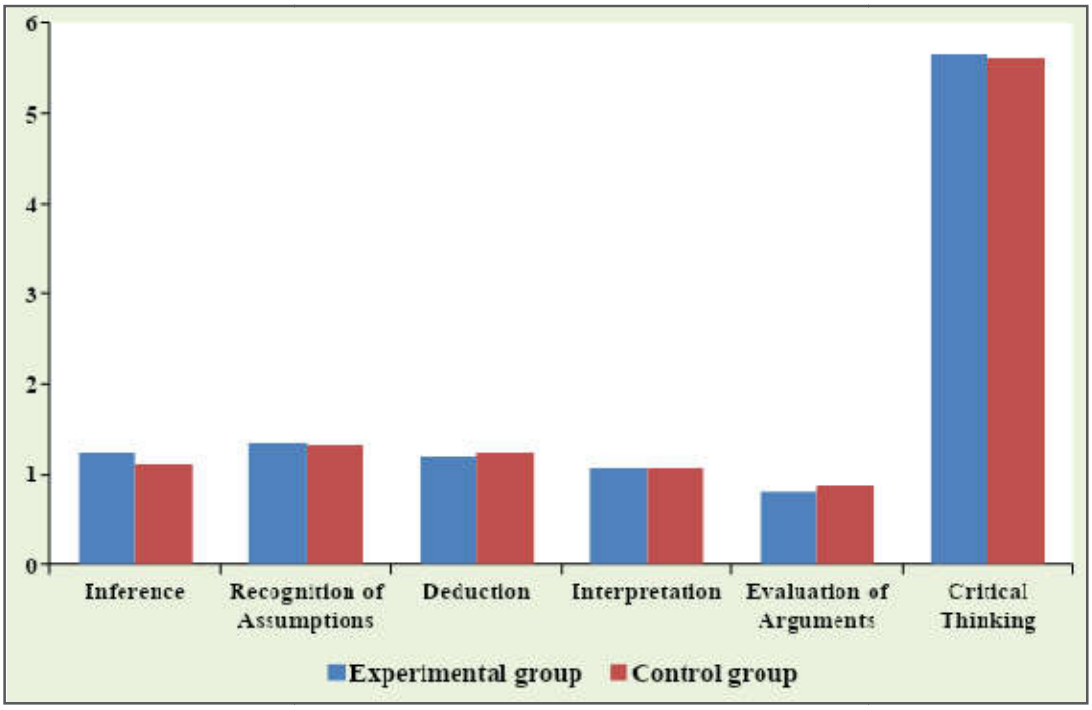
Table 9 shows that experimental and control group do not differ significantly in their mean pretest scores on Critical Thinking ($t = .093$, $p > 0.05$) and its components Inference ($t = .906$, $p > 0.05$), Recognition of Assumptions ($t = .163$, $p > 0.05$), Deduction ($t = .407$, $p > 0.05$), Interpretation ($t = .033$, $p > 0.05$) and Evaluation of Arguments ($t = .322$, $p > 0.05$). It is clear that the initial level mean scores of Critical Thinking and its components Inference, Recognition of

Assumptions, Deduction, Interpretation and Evaluation of Arguments of the experimental group and control group are almost equal.

The graphical representation of the comparison of pretest mean scores of Critical Thinking and its components viz., Inference, Recognition of Assumptions, Deduction, Interpretation and Evaluation of Arguments of the experimental group and control group is shown in figure 22

Figure 22

Mean Pretest Scores on Critical Thinking and its Components in Experimental and Control Groups



Comparison of Mean Posttest Scores of Critical Thinking and its Components in Experimental and Control Groups

The mean posttest scores on Critical Thinking and its components viz., Inference, Recognition of Assumptions, Deduction, Interpretation and Evaluation of Arguments of experimental and control groups were compared using the two-tailed test of significance of difference between means for large independent samples. Data and results of the analysis are presented in table 10.

Table 10

Details of Comparison of Mean Posttest Scores on Critical Thinking and its Components in Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Inference	Experimental group	43	2.09	0.75	6.05**
	Control group	46	1.26	0.53	
Recognition of Assumptions	Experimental group	43	2.44	0.88	6.24**
	Control group	46	1.48	0.55	
Deduction	Experimental group	43	2.16	0.81	5.31**
	Control group	46	1.39	0.54	
Interpretation	Experimental group	43	1.93	0.74	5.23**
	Control group	46	1.20	0.58	
Evaluation of Arguments	Experimental group	43	1.88	0.85	5.35**
	Control group	46	0.98	0.75	
Critical Thinking	Experimental group	43	10.51	2.58	9.51**
	Control group	46	6.30	1.49	

** Significant at 0.01 level

From table 10, it is clear that the critical ratio for the posttest mean score of component Inference is 6.05 for experimental and control groups. This value is higher than the tabled value (2.58) for significance at .01 level. Therefore the posttest mean scores on component Inference of the experimental group (2.09) is higher than that of control group (1.26). It is understood that during posttest, students taught with Collaborative Problem Based Learning have higher score in inference compared to that of students taught with conventional methods.

Table 10 revealed that the critical ratio for the posttest mean score on component Recognition of Assumptions is 6.24 for experimental and control groups. This value is higher than the tabled value (2.58) for significance at .01 level. Therefore the posttest mean scores on component Recognition of Assumptions of the experimental group (2.44) is higher than that of the control group (1.48). It is

clear, in the posttest, students taught with Collaborative Problem Based Learning have higher score in component Recognition of Assumptions compared to that of students taught with conventional methods.

Table 10 showed that the critical ratio for the posttest mean score on component Deduction is 5.31 for experimental and control groups. This value is higher than the tabled value (2.58) for significance at .01 level. Therefore the posttest mean scores on component Deduction of the experimental group (2.16) is higher than that of the control group (1.39). It is interpreted that, in the posttest, students who taught with Collaborative Problem Based Learning have higher score in component Deduction compared to that of students taught with conventional methods.

Table 10 revealed that the critical ratio for the posttest mean score on component Interpretation is 5.23 for experimental and control groups. This value is higher than the tabled value (2.58) for significance at .01 level. Therefore the posttest mean scores on interpretation of the experimental group (1.93) is higher than that of the control group (1.20). It is understood that in the posttest, students taught with collaborative problem based learning have higher score in interpretation compared to that of students taught with conventional methods.

Table 10 showed that the critical ratio for the posttest mean score on component Evaluation of Arguments is 5.35 for experimental and control groups. This value is higher than the tabled value (2.58) for significance at .01 level. Therefore the posttest mean scores on component Evaluation of Arguments of the experimental group (1.88) is higher than that of the control group (.98).It is interpreted that, in the posttest, students taught with collaborative problem based learning have higher score in component Evaluation of Arguments compared to that of students taught with conventional method.

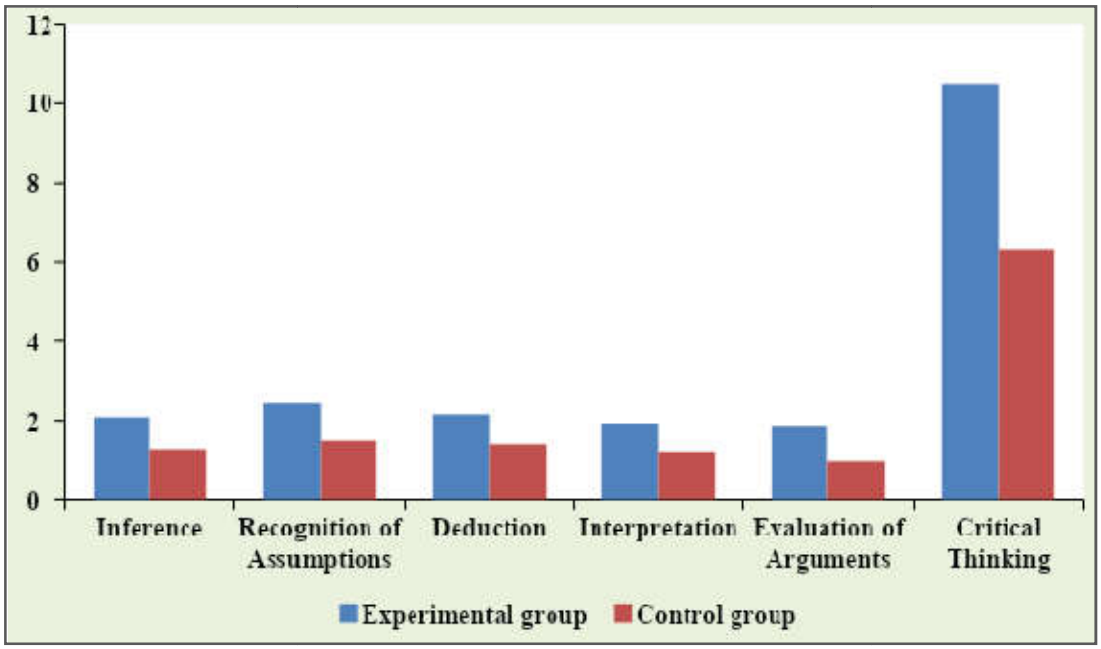
Table 10 showed that the critical ratio for the posttest mean score on Critical Thinking is 9.51 for experimental and control groups. This value is higher than the

tabled value (2.58) for significance at .01 level. Therefore the posttest mean scores on Critical Thinking of the experimental group (10.51) is higher than that of the control group (6.30).It is clear that, in the posttest, students taught with collaborative problem based learning have higher score in Critical Thinking compared to that of students taught with conventional method.

The graphical representation of the comparison of posttest mean scores of Critical Thinking and its components in experimental group and control group is shown in figure 23.

Figure 23

Mean Posttest Scores on Critical Thinking and its Components in Experimental and Control Groups



Comparison of Mean Pretest and Posttest Scores of Critical Thinking and its Components between Male Students in Experimental and Control Groups

Data and results of the comparison of mean pretest scores of Critical Thinking and its components between male students in experimental and Control groups are presented in table 11.

Table 11

Details of Comparison of Mean Pretest Scores on Critical Thinking and its Components between Male Students in Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Inference	Experimental group	26	1.27	0.53	1.71
	Control group	34	1.00	0.65	
Recognition of Assumptions	Experimental group	26	1.35	0.56	.143
	Control group	34	1.32	0.64	
Deduction	Experimental group	26	1.08	0.56	.077
	Control group	34	1.09	0.57	
Interpretation	Experimental group	26	1.12	0.65	.013
	Control group	34	1.12	0.69	
Evaluation of Arguments	Experimental group	26	0.88	0.77	1.36
	Control group	34	0.62	0.74	
Critical Thinking	Experimental group	26	5.69	1.93	1.05
	Control group	34	5.15	2.02	

Table 11 shows that experimental and control group of male students do not differ significantly in their mean pretest scores on Critical Thinking ($t= 1.05$, $p > 0.05$) and its components Inference ($t= 1.71$, $p > 0.05$), Recognition of Assumptions ($t= .143$, $p > 0.05$), Deduction ($t= .077$, $p > 0.05$), Interpretation ($t= .013$, $p > 0.05$) and Evaluation of Arguments ($t= 1.36$, $p > 0.05$) (table value of $t (58) = 2.00$ at 0.05 level of significance).It is clear that, the initial level mean scores of Critical Thinking and its components Inference, Recognition of Assumptions, Deduction, Interpretation and Evaluation of Arguments of male students in experimental group and control group are almost equal.

Data and results of the comparison of mean posttest scores of Critical Thinking and its components between male students in experimental and Control groups are presented in table 12.

Table 12

Details of Comparison of Mean Posttest Scores on Critical Thinking and its Components between Male Students in Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Inference	Experimental group	26	2.15	0.67	6.33**
	Control group	34	1.18	0.52	
Recognition of Assumptions	Experimental group	26	2.38	0.80	5.56**
	Control group	34	1.44	0.50	
Deduction	Experimental group	26	2.19	0.80	5.69**
	Control group	34	1.24	0.50	
Interpretation	Experimental group	26	1.81	0.63	3.72**
	Control group	34	1.24	0.55	
Evaluation of Arguments	Experimental group	26	1.88	0.91	5.55**
	Control group	34	0.76	0.65	
Critical Thinking	Experimental group	26	10.42	2.27	9.94**
	Control group	34	5.85	1.26	

** Significant at 0.01 level

From table 12, it is clear that the critical ratio for the posttest mean score on component Inference is 6.33 for experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (58) = 2.66). Hence the posttest mean scores on component Inference of the male students in experimental group (2.15) is higher than that of control group (1.18). It is understood that, in the posttest, male students taught with collaborative problem based learning have higher score in component Inference compared to that of male students taught with conventional method.

Table 12 revealed that the critical ratio for the posttest mean score on component Recognition of Assumptions is 5.56 for experimental and control groups. This value is higher than the tabled value for significance at .01 level. Therefore the

posttest mean scores on component Recognition of Assumptions of the male students in experimental group (2.38) is higher than that of control group (1.44). It is understood that, in the posttest, male students taught with collaborative problem based learning have higher score in component Recognition of Assumptions compared to that of male students taught with conventional method.

Table 12 showed that the critical ratio for the posttest mean score on component Deduction is 5.69 for experimental and control groups. This value is higher than the tabled value for significance at .01 level. Therefore the posttest mean scores on component Deduction of the male students in experimental group (2.19) is higher than that of the control group (1.24). It is clear that, in the posttest, male students taught with collaborative problem based learning have higher score in component Deduction compared to that of male students taught with conventional method.

Table 12 revealed that the critical ratio for the posttest mean score on component Interpretation is 3.72 for experimental and control groups. This value is higher than the tabled value for significance at .01 level. Therefore the posttest mean scores on component Interpretation of the experimental group (1.81) is higher than that of the control group (1.24). It is understood that, in the posttest, male students taught with collaborative problem based learning have higher score in component Interpretation compared to that of male students taught with conventional method.

Table 12 showed that the critical ratio for the posttest mean score on component Evaluation of Arguments is 5.55 for experimental and control groups. This value is higher than the tabled value for significance at .01 level. Therefore the posttest mean scores on component Evaluation of Arguments of the male students in experimental group (1.88) is higher than that of the control group (.76). It is clear that, in the posttest, male students taught with collaborative problem based learning have higher score in component Evaluation of Arguments compared to that of male students taught with conventional method.

Table 12 showed that the critical ratio for the posttest mean score on Critical Thinking is 9.94 for experimental and control groups. This value is higher than the tabled value for significance at .01 level. Therefore the posttest mean scores on Critical Thinking for male students in experimental group (10.42) is higher than that of the control group (5.85).It is understood that, in the posttest, male students taught with collaborative problem based learning have higher score in Critical Thinking compared to that of male students who taught with conventional method.

Comparison of Mean Pretest and Posttest Scores of Critical Thinking and its Components between Female Students in Experimental and Control Groups

Data and results of the comparison of mean pretest scores of Critical Thinking and its components between female students in experimental and Control groups are presented in table 13.

Table 13

Details of Comparison of Mean Pretest Scores on Critical Thinking and its Components between Female Students in Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Inference	Experimental group	17	1.18	0.64	.905
	Control group	12	1.42	0.79	
Recognition of Assumptions	Experimental group	17	1.35	0.79	.066
	Control group	12	1.33	0.78	
Deduction	Experimental group	17	1.35	0.61	1.33
	Control group	12	1.67	0.65	
Interpretation	Experimental group	17	1.00	0.61	.348
	Control group	12	0.92	0.67	
Evaluation of Arguments	Experimental group	17	0.71	0.85	2.98**
	Control group	12	1.58	0.67	
Critical Thinking	Experimental group	17	5.59	2.45	1.51
	Control group	12	6.92	2.15	

** Significant at 0.01 level

Table 13 shows that female students in experimental and control group do not differ significantly in their mean pretest scores on Critical Thinking (t= 1.51, p > 0.05) and its components Inference (t= .905, p > 0.05), Recognition of Assumptions (t= .066, p > 0.05), Deduction (t= 1.33, p > 0.05) and Interpretation (t= .348, p > 0.05) (table value of t (27) = 2.05 at 0.05 level of significance). It is clear that, the initial level mean scores of Critical Thinking and its components Inference, Recognition of Assumptions, Deduction and Interpretation for female students in experimental group and control group are almost equal. Table also revealed that there exists a significant difference in mean pretest scores of evaluation of arguments between female experimental and control groups (t= 2.98, p< 0.05).

Data and results of the comparison of mean posttest scores of Critical Thinking and its components between female students in experimental and Control groups are presented in table 14.

Table 14

Details of Comparison of Mean Posttest Scores on Critical Thinking and its Components between Female Students in Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Inference	Experimental group	17	2.00	0.87	1.78
	Control group	12	1.50	0.52	
Recognition of Assumptions	Experimental group	17	2.53	1.01	2.84**
	Control group	12	1.58	0.67	
Deduction	Experimental group	17	2.12	0.86	1.07
	Control group	12	1.83	0.39	
Interpretation	Experimental group	17	2.12	0.86	3.49**
	Control group	12	1.08	0.67	
Evaluation of Arguments	Experimental group	17	1.88	0.78	1.08
	Control group	12	1.58	0.67	
Critical Thinking	Experimental group	17	10.65	3.06	3.23**
	Control group	12	7.58	1.38	

** Significant at 0.01 level

Table 14 shows that experimental and control group of female students do not differ significantly in their mean posttest scores on component Inference (t= 1.78, p > 0.05), Deduction (t= 1.07, p > 0.05) and Evaluation of Arguments (t= 1.08, p > 0.05) (table value of t (27) = 2.05 at 0.05 level of significance).. In the posttest, female students taught with collaborative problem based learning and female students with conventional methods had almost equal scores on component Inference, Deduction and Evaluation of Arguments.

Table 14 shows that the critical ratio for the posttest mean score on component Recognition of Assumption is 2.84 for female students in experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (27) = 2.77).Therefore the posttest mean scores on component Recognition of Assumption of the female students in experimental group (2.53) is higher than that of control group (1.58). In the posttest, female students taught with collaborative problem based learning have higher score in component Recognition of Assumption compared to that of female students taught with conventional method.

Table 14 shows that the critical ratio for the posttest mean score on component Interpretation is 3.49 for female students in experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (27) = 2.77). Therefore the posttest mean scores on component Interpretation of the female students in experimental group (2.12) is higher than that of the control group (1.08). In the posttest, female students taught with collaborative problem based learning have higher score in component Interpretation compared to that of female students taught with conventional method.

Table 14 shows that the critical ratio for the posttest mean score on Critical Thinking is 3.23 for female students in experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (27) = 2.77). Therefore the posttest mean scores on Critical Thinking of the female students

in experimental group (10.65) is higher than that of the control group (7.58). In the posttest, female students taught with collaborative problem based learning have higher score in Critical Thinking compared to that of female students taught with conventional method.

Comparison of Mean Scores of Pretest and Posttest on Critical Thinking and its Components in Experimental Group

The mean scores of Critical Thinking and its components in both pre- test and posttest for the experimental group were compared using paired samples. Data and results of the analysis is presented in table 15.

Table 15

Details of Comparison of Mean Scores of Critical Thinking and its Components in Pretest and Posttest in Experimental Group (N= 43)

Variable	Group	Mean	SD	r	t value
Inference	Posttest	2.09	0.75	0.282	7.02**
	Pretest	1.23	0.57		
Recognition of Assumptions	Posttest	2.44	0.88	0.306	7.78**
	Pretest	1.35	0.65		
Deduction	Posttest	2.16	0.81	0.084	6.65**
	Pretest	1.19	0.59		
Interpretation	Posttest	1.93	0.74	0.164	6.35**
	Pretest	1.07	0.63		
Evaluation of Arguments	Posttest	1.88	0.85	0.566	9.13**
	Pretest	0.81	0.79		
Critical Thinking	Posttest	10.51	2.58	0.729	17.90**
	Pretest	5.65	2.13		

** Significant at 0.01 level

Table 15 shows that the critical ratio for mean score on component Inference is 7.02 and coefficient of correlation is .282. The t-value is greater than the tabled value at .01 level of significance. Obtained values of mean scores indicate that the

mean score component Inference in posttest is higher than that in pretest among the students taught with collaborative problem based learning.

From table 15 it is clear that the critical ratio for mean score on component Recognition of Assumptions is 7.78 and coefficient of correlation is .306. The t-value is greater than the tabled value at .01 level of significance. Obtained values of mean scores indicate that the mean score of component Recognition of Assumptions in posttest is higher than that in pretest among the students taught with collaborative problem based learning.

Table 15 shows that the critical ratio for mean score on component Deduction is 6.65 and coefficient of correlation is .084. The t-value is greater than the tabled value at .01 level of significance. Obtained values of mean scores indicate that the mean score of component Deduction in posttest is higher than that in pretest among the students taught with collaborative problem based learning.

Table 15 shows that the critical ratio for mean score on component Interpretation is 6.35 and coefficient of correlation is .164. The t-value is greater than the tabled value at .01 level of significance. Obtained values of mean scores indicate that the mean score of component Interpretation in posttest is higher than that in pretest among the students taught with collaborative problem based learning.

Table 15 shows that the critical ratio for mean score on component Evaluation of Arguments is 9.13 and coefficient of correlation is .566. The t-value is greater than the tabled value at .01 level of significance. Obtained values of mean scores indicate that the mean score of component Evaluation of Arguments in posttest is higher than that in pretest among the students taught with collaborative problem based learning

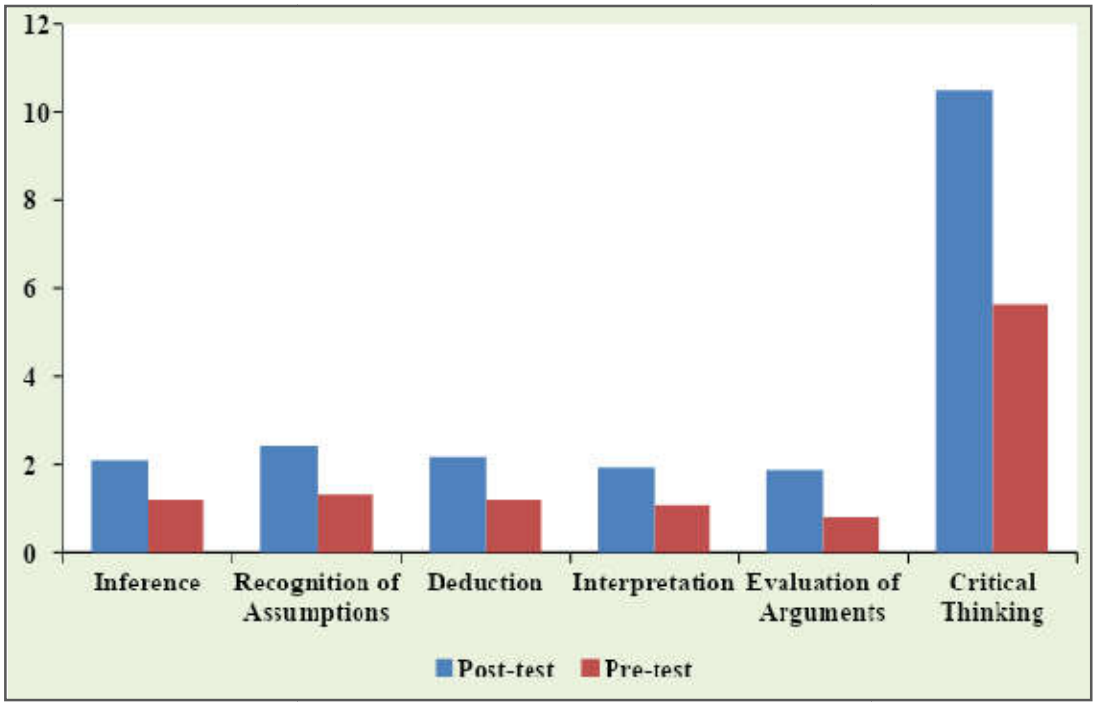
From table 15 it is clear that the critical ratio for mean score on Critical Thinking is 17.90 and coefficient of correlation is .729. The t-value is greater than

the tabled value at .01 level of significance. Obtained values of mean scores indicate that the mean score of Critical Thinking in posttest is higher than that in pretest among the students taught with collaborative problem based learning.

Graphical representation of comparison of mean scores of Critical Thinking and its components in pretest and posttest for the experimental group is presented in figure 24.

Figure 24

Graphical Representation of Comparison of Mean Scores of Critical Thinking and its Components in Pretest and Posttest for the Experimental Group



Comparison of Mean Scores of Critical Thinking and its Components in Pretest and Posttest of the Male Students in Experimental Group

Data and results of the analysis of comparison of mean scores of Critical Thinking and its components in pretest and posttest of the male students in Experimental group is presented in table 16.

Table 16

Details of Comparison of Mean Scores of Critical Thinking and its Components in Pretest and Posttest of the Male Students in Experimental Group (N= 26)

Variable	Group	Mean	SD	r	t value
Inference	Posttest	2.15	0.67	0.33	6.34**
	Pretest	1.27	0.53		
Recognition of Assumptions	Posttest	2.38	0.80	0.49	7.35**
	Pretest	1.35	0.56		
Deduction	Posttest	2.19	0.80	-0.12	5.51**
	Pretest	1.08	0.56		
Interpretation	Posttest	1.81	0.63	0.44	5.20**
	Pretest	1.12	0.65		
Evaluation of Arguments	Posttest	1.88	0.91	0.56	6.37**
	Pretest	0.88	0.77		
Critical Thinking	Posttest	10.42	2.27	0.73	15.18**
	Pretest	5.69	1.93		

** Significant at 0.01 level

From table 16 it is clear that the critical ratio for mean score on inference is 6.34 and coefficient of correlation is .33. The t-value is greater than the tabled value at .01 level of significance (table value of t (25) = 2.79). Obtained values of mean scores indicate that the mean score of component Inference in posttest is higher than that in pretest among the male students taught with collaborative problem based learning.

Table 16 shows that the critical ratio for mean score on component Recognition of Assumptions is 7.35 and coefficient of correlation is .49. The t-value is greater than the tabled value at .01 level of significance (table value of t (25) = 2.79). Obtained values of mean scores indicate that the mean score of component Recognition of Assumptions in posttest is higher than that in pretest among the male students taught with collaborative problem based learning.

From table 16 it is clear that the critical ratio for mean score on component Deduction is 5.51 and coefficient of correlation is 0.12. The t-value is greater than

the tabled value at .01 level of significance (table value of t (25) = 2.79). Obtained values of mean scores indicate that the mean score of component Deduction in posttest is higher than that in pretest among the male students taught with collaborative problem based learning.

Table 16 shows that the critical ratio for mean score on component Interpretation is 5.20 and coefficient of correlation is 0.44. The t-value is greater than the tabled value at .01 level of significance (table value of t (25) = 2.79). Obtained values of mean scores indicate that the mean score of component Interpretation in posttest is higher than that in pretest among the male students taught with collaborative problem based learning.

From table 16 it is clear that the critical ratio for mean score on component Evaluation of Arguments is 6.37 and coefficient of correlation is 0.56. The t-value is greater than the tabled value at .01 level of significance (table value of t (25) = 2.79). Obtained values of mean scores indicate that the mean score of component Evaluation of Arguments in posttest is higher than that in pretest among male students taught with collaborative problem based learning.

Table 16 revealed that the critical ratio for mean score on Critical Thinking is 15.18 and coefficient of correlation is 0.73. The t-value is greater than the tabled value at .01 level of significance (table value of t (25) = 2.79). Obtained values of mean scores indicate that the mean score of Critical Thinking in posttest is higher than that in pretest among the male students taught with collaborative problem based learning.

Comparison of Mean Scores of Critical Thinking and its Components in Pretest and Posttest of Female Students in Experimental Group

Data and results of the analysis of comparison of mean scores of critical thinking and its components in pretest and posttest of female students in experimental group is presented in Table 17.

Table 17

Details of Comparison of Mean Scores of Critical Thinking and its Components in Pretest and Posttest of Female Students in Experimental Group (N= 17)

Variable	Group	Mean	SD	r	t value
Inference	Posttest	2.00	0.87	0.23	3.57**
	Pretest	1.18	0.64		
Recognition of Assumptions	Posttest	2.53	1.01	0.14	4.09**
	Pretest	1.35	0.79		
Deduction	Posttest	2.12	0.86	0.40	3.79**
	Pretest	1.35	0.61		
Interpretation	Posttest	2.12	0.86	-0.12	4.15**
	Pretest	1.00	0.61		
Evaluation of Arguments	Posttest	1.88	0.78	0.60	6.67**
	Pretest	0.71	0.85		
Critical Thinking	Posttest	10.65	3.06	0.74	10.05**
	Pretest	5.59	2.45		

** Significant at 0.01 level

From table 17 it is clear that the critical ratio for mean score on component Inference is 3.57 and coefficient of correlation is .23. The t-value is greater than the tabled value at .01 level of significance (table value of t (16) = 2.92). Obtained values of mean scores indicate that the mean score of component Inference in posttest is higher than that in pretest among female students taught with collaborative problem based learning.

Table 17 reveals that the critical ratio for mean score on component Recognition of Assumptions is 4.09 and coefficient of correlation is .14. The t-value is greater than the tabled value at .01 level of significance (table value of t (16) = 2.92). Obtained values of mean scores indicate that the mean score of component Recognition of Assumptions in posttest is higher than that in pretest among the female students taught with collaborative problem based learning.

Table 17 shows that the critical ratio for mean score on component Deduction is 3.79 and coefficient of correlation is .40. The t-value is greater than the

tabled value at .01 level of significance (table value of t (16) = 2.92). Obtained values of mean scores indicate that the mean score of component Deduction in posttest is higher than that in pretest among the female students taught with collaborative problem based learning.

Table 17 shows that the critical ratio for mean score on component Interpretation is 4.15 and coefficient of correlation is .12. The t-value is greater than the tabled value at .01 level of significance (table value of t (16) = 2.92). Obtained values of mean scores indicate that the mean score of component Interpretation in posttest is higher than that in pretest among the female students taught with collaborative problem based learning.

Table 17 reveals that the critical ratio for mean score on component Evaluation of Argument is 6.67 and coefficient of correlation is .60. The t-value is greater than the tabled value at .01 level of significance (table value of t (16) = 2.92). Obtained values of mean scores indicate that the mean score of component Evaluation of Arguments in posttest is higher than that in pretest among the female students taught with collaborative problem based learning.

From table 17 it is clear that the critical ratio for mean score on Critical Thinking is 10.05 and coefficient of correlation is .74. The t-value is greater than the tabled value at .01 level of significance (table value of t (16) = 2.92). Obtained values of mean scores indicate that the mean score of Critical Thinking in posttest is higher than that in pretest among the female students taught with collaborative problem based learning.

Comparison of Mean Scores of Critical Thinking and its Components in Pretest and Posttest of Control Group

The mean scores of Critical Thinking and its components in both pre- test and posttest for the control group were compared using paired samples. Data and results of the analysis are presented in table 18.

Table 18

Details of Comparison of Mean Scores of Critical Thinking and its Components in Pretest and Posttest of Control Group (N= 46)

Variable	Group	Mean	SD	r	t value
Inference	Posttest	1.26	0.53	-0.19	1.07
	Pretest	1.11	0.71		
Recognition of Assumptions	Posttest	1.48	0.55	-0.13	1.12
	Pretest	1.33	0.67		
Deduction	Posttest	1.39	0.54	0.05	1.27
	Pretest	1.24	0.64		
Interpretation	Posttest	1.20	0.58	0.30	1.18
	Pretest	1.07	0.68		
Evaluation of Arguments	Posttest	0.98	0.75	0.71	1.22
	Pretest	0.87	0.83		
Critical Thinking	Posttest	6.30	1.49	0.44	2.32*
	Pretest	5.61	2.18		

* Significant at 0.05 level

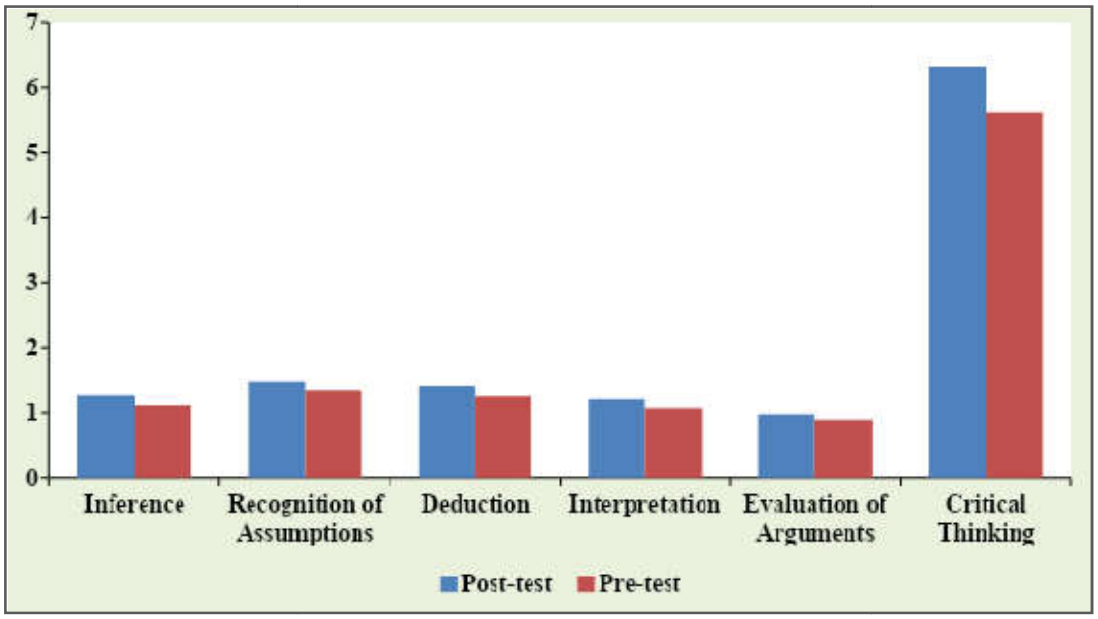
From table 18 it is clear that the critical ratio for mean score on Critical Thinking is 2.32 and coefficient of correlation is .44. The t-value is greater than the tabled value at .05 level of significance. Obtained values of mean scores indicate that the mean score of Critical Thinking in posttest is higher than that in pretest among the students taught with conventional methods.

Table 18 shows that pretest and posttest scores of control group do not differ significantly in their mean scores on component Inference ($t= 1.07$, $p > 0.05$), Recognition of Assumptions ($t = 1.12$, $p > 0.05$), Deduction ($t= 1.27$, $p > 0.05$), Interpretation ($t = 1.18$, $p > 0.05$) and Evaluation of Arguments ($t= 1.22$, $p > 0.05$) It is obtained that, there is no significant difference in the mean pretest and posttest scores of component Inference, Recognition of Assumptions, Deduction, Interpretation and Evaluation of Arguments for students taught with conventional method.

Graphical representation of comparison of mean scores of Critical Thinking and its components viz., Inference, Recognition of Assumptions, Deduction, Interpretation and Evaluation of Arguments in pretest and posttest for the control group is presented in figure 25.

Figure 25

Graphical Representation of Comparison of Mean Scores of Critical Thinking and its Components in Pretest and Posttest for the Control Group



Comparison of Mean Scores of Critical Thinking and its Components in Pretest and Posttest for the Male Students in Control Group

Data and results of the analysis of is present comparison of mean scores of Critical Thinking and its components in pretest and posttest for the male students in control group presented in table 19.

Table 19

Details of Comparison of Mean Scores of Critical Thinking and its Components in Pretest and Posttest for the Male Students in Control Group (N= 34)

Variable	Group	Mean	SD	r	t value
Inference	Posttest	1.18	0.52	-0.18	1.14
	Pretest	1.00	0.65		
Recognition of Assumptions	Posttest	1.44	0.50	-0.36	0.73
	Pretest	1.32	0.64		
Deduction	Posttest	1.24	0.50	-0.18	1.04
	Pretest	1.09	0.57		
Interpretation	Posttest	1.24	0.55	0.16	0.85
	Pretest	1.12	0.69		
Evaluation of Arguments	Posttest	0.76	0.65	0.69	1.54
	Pretest	0.62	0.74		
Critical Thinking	Posttest	5.85	1.26	0.22	1.94
	Pretest	5.15	2.02		

Table 19 shows that pretest and posttest scores of male students of control group do not differ significantly in their mean scores on Critical Thinking ($t= 1.94$, $p > 0.05$) and its components Inference ($t= 1.14$, $p > 0.05$), Recognition of Assumptions ($t= 0.73$, $p > 0.05$), Deduction ($t= 1.04$, $p > 0.05$), Interpretation ($t= .85$, $p > 0.05$) and Evaluation of Arguments ($t= 1.54$, $p > 0.05$).It is clear that there is no significant difference in the mean pretest and posttest scores of Critical Thinking and its components for male students taught with conventional method.

Comparison of Mean Scores of Critical Thinking and its Components in Pretest and Posttest for the Female Students in Control Group

Data and results of the analysis of comparison of mean scores of Critical Thinking and its components in pretest and posttest for the female students in control group is presented in table 20.

Table 20

Details of Comparison of Mean Scores of Critical Thinking and its Components in Pretest and Posttest for the Female Students in Control Group (N= 12)

Variable	Group	Mean	SD	r	t value
Inference	Posttest	1.50	0.52	-0.55	0.25
	Pretest	1.42	0.79		
Recognition of Assumptions	Posttest	1.58	0.67	0.29	1.00
	Pretest	1.33	0.78		
Deduction	Posttest	1.83	0.39	-0.24	0.69
	Pretest	1.67	0.65		
Interpretation	Posttest	1.08	0.67	0.63	1.00
	Pretest	0.92	0.67		
Evaluation of Arguments	Posttest	1.58	0.67	0.39	0.01
	Pretest	1.57	0.67		
Critical Thinking	Posttest	7.58	1.38	0.54	1.27
	Pretest	6.92	2.15		

Table 20 shows that pretest and posttest scores of female students in control group do not differ significantly in their mean scores on Critical Thinking ($t= 1.27$, $p > 0.05$) and its components Inference ($t= 0.25$, $p > 0.05$), Recognition of Assumptions ($t= 1.00$, $p > 0.05$), Deduction ($t= 0.69$, $p > 0.05$), Interpretation ($t= 1.00$, $p > 0.05$) and Evaluation of Arguments ($t= 0.01$, $p > 0.05$) (table value of $t(11) = 2.20$ at 0.05 level of significance). It means that, there is no significant difference in the mean pretest and posttest scores of Critical Thinking and its components for female students taught with conventional method.

Comparison of Mean Posttest Scores on Critical Thinking and its Components in Experimental and Control Group with first Terminal Exam Mark as Covariates

To find the effectiveness of collaborative problem based learning on enhancing Critical Thinking and its components, conducted ANCOVA with the first terminal exam mark as covariate. ANCOVA helps the investigator to assess the

effect of the independent variable on the dependent variable more accurately by explaining the unexplained variance in terms of covariate.

Details of ANCOVA of posttest score on component Inference by groups with first terminal exam mark as covariate is presented in table 21.

Table 21

Summary of ANCOVA of Posttest Score on Component Inference by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	15.40	2	7.703	18.15
Intercept	69.19	1	69.19	163.11
First terminal exam mark	.015	1	.015	.035
Group	12.94	1	12.94	30.52**
Error	36.48	86	.424	
Total	298.00	89		
Corrected Total	51.88	88		

** Significant at 0.01 level

It is clear from table 15 that the obtained F -ratio is 30.52, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1,86) is 6.9 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of component Inference of the experimental group is 2.09 is significantly greater than the control group which is 1.25. Therefore collaborative problem based learning has significant effect in enhancing component Inference.

Details of ANCOVA of posttest score on component Recognition of Assumptions by groups with first terminal exam mark as covariate is presented in table 22.

Table 22

Summary of ANCOVA of Posttest Score on Recognition of Assumptions by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	20.65	2	10.32	19.28
Intercept	94.52	1	94.52	176.48
First terminal exam mark	.020	1	.020	.038
Group	17.36	1	17.36	32.42**
Error	46.06	86	.536	
Total	403.00	89		
Corrected Total	66.71	88		

** Significant at 0.01 level

It is clear from table 22 that the obtained F-ratio is 32.42, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1,86) is 6.9 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Recognition of Assumptions of the experimental group is 2.45 is significantly greater than the control group which is 1.47. Therefore collaborative problem based learning has significant effect in enhancing component Recognition of Assumptions.

Details of ANCOVA of posttest score on component Deduction by groups with first terminal exam mark as covariate is presented in table 23.

Table 23

Summary of ANCOVA of Posttest Score on Component Deduction by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	13.25	2	6.62	13.96
Intercept	73.48	1	73.48	154.92
First terminal exam mark	.024	1	.024	.05
Group	10.37	1	10.37	21.88**
Error	40.79	86	.474	
Total	331.00	89		
Corrected Total	54.04	88		

** Significant at 0.01 level

It is clear from table 23 that the obtained F -ratio is 21.88, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1,86) is 6.9 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of component Deduction of the experimental group is 2.15 is significantly greater than the control group which is 1.40. Therefore collaborative problem based learning has significant effect in enhancing component deduction.

Details of ANCOVA of posttest score on component Interpretation by groups with first terminal exam mark as covariate is presented in table 24.

Table 24

Summary of ANCOVA of Posttest Score on Interpretation by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	12.05	2	6.025	13.64
Intercept	55.48	1	55.486	125.66
First terminal exam mark	.058	1	.058	.132
Group	9.16	1	9.162	20.75**
Error	37.97	86	.442	
Total	264.00	89		
Corrected Total	50.02	88		

** Significant at 0.01 level

It is clear from table 24 that the obtained F -ratio is 20.75, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 86) is 6.9 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of component Interpretation of the experimental group is 1.92 is significantly greater than the control group which is 1.21. Hence collaborative problem based learning has significant effect in enhancing component Interpretation.

Details of ANCOVA of posttest score on component Evaluation of Arguments by groups with first terminal exam mark as covariate is presented in table 25.

Table 25

Summary of ANCOVA of posttest score on Evaluation of Arguments by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	20.81	2	10.40	16.94
Intercept	31.73	1	31.73	51.68
First terminal exam mark	2.59	1	2.59	4.21
Group	10.04	1	10.04	16.36**
Error	52.80	86	.614	
Total	252.00	89		
Corrected Total	73.61	88		

** Significant at 0.01 level

It is clear from table 25 that the obtained F -ratio is 16.36, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1,86) is 6.9 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks.

Further, the adjusted mean score of component Evaluation of Arguments of the experimental group is 1.80 is significantly greater than the control group which is 1.06. Therefore collaborative problem based learning has significant effect in enhancing Evaluation of Arguments.

Details of ANCOVA of posttest scores on Critical Thinking by groups with first terminal exam mark as covariate is presented in table 26.

Table 26

Summary of ANCOVA of Posttest Score on Critical Thinking by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	396.43	2	198.21	45.40
Intercept	1575.74	1	1575.74	360.93
First terminal exam mark	3.02	1	3.02	.693
Group	295.28	1	295.28	67.63**
Error	375.45	86	4.36	
Total	6958.00	89		
Corrected Total	771.88	88		

** Significant at 0.01 level

It is clear from table 26 that the obtained F -ratio is 67.63, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1,86) is 6.9 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Critical Thinking of the experimental group is 10.42 is significantly greater than the control group which is 6.34. Therefore collaborative problem based learning has significant effect in enhancing Critical Thinking.

Details of ANCOVA of posttest score on Inference of male students by groups with first terminal exam mark as covariate is presented in table 27.

Table 27

Summary of ANCOVA of Posttest Score on Inference of Male Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	14.09	2	7.04	19.79
Intercept	43.84	1	43.84	123.10
First terminal exam mark	.024	1	.024	.069
Group	10.46	1	10.46	29.37**
Error	20.30	57	.356	
Total	188.00	60		
Corrected Total	34.40	59		

** Significant at 0.01 level

It is clear from table 27 that the obtained F -ratio is 29.37, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 57) is 7.1 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of male students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Inference of male experimental group is 2.14 is significantly greater than the control group which is 1.90. Therefore collaborative problem based learning has significant effect in enhancing component Inference among male students.

Details of ANCOVA of posttest score on Recognition of Assumptions of male students by groups with first terminal exam mark as covariate is presented in table 28.

Table 28

Summary of ANCOVA of Posttest Score on Recognition of Assumptions of Male Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	13.11	2	6.55	15.23
Intercept	60.61	1	60.61	140.82
First terminal exam mark	.001	1	.001	.002
Group	10.29	1	10.29	23.90**
Error	24.53	57	.430	
Total	243.00	60		
Corrected Total	37.65	59		

** Significant at 0.01 level

It is clear from table 28 that the obtained F -ratio is 23.90, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 57) is 7.1 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of male students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Recognition of Assumptions of male students in experimental group is 2.39 is significantly greater than the control group which is 1.44. Hence collaborative problem based learning has significant effect in enhancing Recognition of Assumptions of male students.

Details of ANCOVA of posttest score on component Deduction of male students by groups with first terminal exam mark as covariate is presented in table 29.

Table 29

Summary of ANCOVA of Posttest Score on Deduction of Male Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	13.50	2	6.75	15.93
Intercept	47.16	1	47.16	111.32
First terminal exam mark	.010	1	.010	.023
Group	10.19	1	10.19	24.06**
Error	24.14	57	.424	
Total	201.00	60		
Corrected Total	37.65	59		

** Significant at 0.01 level

It is clear from table 29 that the obtained F -ratio is 24.06, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 57) is 7.1 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of male students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Deduction of male students in experimental group is 2.18 which is significantly greater than the control group which is 1.24. Therefore collaborative problem based learning has significant effect in enhancing component Deduction among male students.

Details of ANCOVA of posttest score on Interpretation of male students by groups with first terminal exam mark as covariate is presented in table 30.

Table 30

Summary of ANCOVA of Posttest Score on Interpretation of Male Students by Groups with First Terminal Exam Mark as Covariate

Source	Type III Sum of Squares	df	Mean Square	F
Corrected Model	5.150	2	2.57	7.40
Intercept	32.36	1	32.36	93.02
First terminal exam mark	.323	1	.323	.927
Group	2.78	1	2.78	8.01**
Error	19.83	57	.348	
Total	157.00	60		
Corrected Total	24.98	59		

** Significant at 0.01 level

It is clear from table 30 that the obtained F -ratio is 8.01, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 57) is 7.1 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of male students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Interpretation of male students in experimental group is 1.76 is significantly greater than the control group which is 1.27. Hence collaborative problem based learning has significant effect in enhancing component Interpretation among male students.

Details of ANCOVA of posttest score on Evaluation of Arguments for male students by groups with first terminal exam mark as covariate is presented in table 31.

Table 31

Summary of ANCOVA of Posttest Score on Evaluation of Arguments for Male Students by Groups with First Terminal Exam Mark as Covariate

Source	Type III Sum of Squares	df	Mean Square	F
Corrected Model	18.88	2	9.441	15.65
Intercept	23.36	1	23.36	38.75
First terminal exam mark	.404	1	.404	.669
Group	12.18	1	12.18	20.21**
Error	34.36	57	.603	
Total	147.00	60		
Corrected Total	53.250	59		

** Significant at 0.01 level

It is clear from table 31 that the obtained F -ratio is 20.21, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 57) is 7.1 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of male students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Evaluation of Arguments of male students in experimental group is 1.83 is significantly greater than the control group which is 0.80. Hence collaborative problem based learning has significant effect in enhancing Evaluation of Arguments among male students.

Details of ANCOVA of posttest scores on critical thinking of male students by groups with first terminal exam mark as covariate is presented in table 32.

Table 32

Summary of ANCOVA of Posttest Score on Critical Thinking of Male Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	309.76	2	154.88	49.43
Intercept	1011.10	1	1011.10	322.74
First terminal exam mark	2.038	1	2.038	.651
Group	218.90	1	218.90	69.87**
Error	178.57	57	3.13	
Total	4170.00	60		
Corrected Total	488.33	59		

** Significant at 0.01 level

It is clear from table 32 that the obtained F -ratio is 69.87, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 57) is 7.1at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of male students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of critical thinking of male students in experimental group is 10.31 is significantly greater than the control group which is 5.94. Hence collaborative problem based learning has significant effect in enhancing Critical Thinking of male students.

Details of ANCOVA of posttest score on component Inference for female students by groups with first terminal exam mark as covariate is presented in table 33.

Table 33

Summary of ANCOVA of Posttest Score on Inference for Female Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	2.189	2	1.095	1.95
Intercept	23.07	1	23.07	41.17
First terminal exam mark	.431	1	.431	.769
Group	2.130	1	2.13	3.80
Error	14.56	26	.560	
Total	110.00	29		
Corrected Total	16.75	28		

It is clear from table 33 that the obtained F -ratio is 3.80, is less than the tabled value at 0.05 level of significance. The table value of F ratio for df (1,26) is 4.23 at 0.05 level of significance. This means that there is no significant difference in the posttest scores of female students in the experimental and control groups after they have been adjusted for difference in the first terminal exam marks. Therefore the collaborative problem based learning has no significant effect in enhancing Inference among female students.

Details of ANCOVA of posttest score on recognition of Assumptions for female students by groups with first terminal exam mark as covariate is presented in table 34.

Table 34

Summary of ANCOVA of Posttest Score on Recognition of Assumptions for Female Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	6.57	2	3.28	4.09
Intercept	29.43	1	29.43	36.66
First terminal exam mark	.276	1	.276	.344
Group	6.52	1	6.52	8.12**
Error	20.87	26	.803	
Total	160.00	29		
Corrected Total	27.44	28		

** Significant at 0.01 level

It is clear from table 34 that the obtained F -ratio is 8.12, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 26) is 7.72 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of female students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of recognition of assumptions of female students experimental group is 2.55 is significantly greater than the control group which is 1.55. Thus collaborative problem based learning have significant effect in enhancing recognition of assumptions among female students.

Details of ANCOVA of posttest score on deduction of female students by groups with first terminal exam mark as covariate is presented in table 35.

Table 35

Summary of ANCOVA of Posttest Score on Deduction of Female Students by Groups with First Terminal Exam Mark as Covariate

Source	Type III Sum of Squares	df	Mean Square	F
Corrected Model	.895	2	.448	.888
Intercept	27.78	1	27.78	55.13
First terminal exam mark	.327	1	.327	.649
Group	.787	1	.787	1.56
Error	13.10	26	.504	
Total	130.00	29		
Corrected Total	14.00	28		

It is clear from table 35 that the obtained F -ratio is 1.56, is less than the tabled value at 0.05 level of significance. The table value of F ratio for df (1,26) is 4.23 at 0.05 level of significance. This means that there is no significant difference in the posttest scores of female students in the experimental and control groups after they have been adjusted for difference in the first terminal exam marks. Thus collaborative problem based learning has no significant effect in enhancing component deduction of female students.

Details of ANCOVA of posttest score on interpretation of female students by groups with first terminal exam mark as covariate is presented in table 36.

Table 36

Summary of ANCOVA of Posttest Score on Interpretation of Female Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	7.67	2	3.83	6.03
Intercept	17.64	1	17.64	27.74
First terminal exam mark	.148	1	.148	.232
Group	7.49	1	7.49	11.78**
Error	16.53	26	.636	
Total	107.00	29		
Corrected Total	24.20	28		

** Significant at 0.01 level

It is clear from table 36 that the obtained F -ratio is 11.78, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 26) is 7.72 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of female students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Interpretation of the female students in experimental group is 2.14 is significantly greater than the control group which is 1.06. Therefore collaborative problem based learning has significant effect in enhancing component Interpretation among female students.

Details of ANCOVA of posttest score on Evaluation of Arguments for female students by groups with first terminal exam mark as covariate is presented in table 37.

Table 37

Summary of ANCOVA of Posttest Score on Evaluation of Arguments for Female Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	1.304	2	.652	1.21
Intercept	11.87	1	11.87	22.03
First terminal exam mark	.675	1	.675	1.25
Group	.272	1	.272	.505
Error	14.00	26	.539	
Total	105.00	29		
Corrected Total	15.31	28		

It is clear from table 37 that the obtained F-ratio is .539, is less than the tabled value at 0.05 level of significance. The table value of F ratio for df (1, 26) is 4.23 at 0.05 level of significance. This means that there is no significant difference in the posttest scores of female students in the experimental and control groups after they have been adjusted for difference in the first terminal exam marks. Thus the collaborative problem based learning has no significant effect in enhancing Evaluation of Arguments of female students.

Details of ANCOVA of posttest scores on Critical Thinking of female students by groups with first terminal exam mark as covariate is presented in table 38.

Table 38

Summary of ANCOVA of Posttest Score on Critical Thinking of Female Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	67.76	2	33.88	5.21
Intercept	535.75	1	535.75	82.39
First terminal exam mark	1.733	1	1.733	.266
Group	66.57	1	66.57	10.24**
Error	169.06	26	6.50	
Total	2788.000	29		
Corrected Total	236.828	28		

** Significant at 0.01 level

It is clear from table 38 that the obtained F -ratio is 10.24, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 26) is 7.72 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of female students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of critical thinking of the female experimental group is 10.71 is significantly greater than the control group which is 7.49.Therefore collaborative problem based learning has significant effect in enhancing Critical Thinking among female students.

Effect Size of the Treatment on Scores of Critical Thinking and its Components

The effect size of the collaborative problem based learning on Critical Thinking and its components viz., Inference, Recognition of Assumptions, Deduction, Interpretation and Evaluation of Arguments in posttest of both experimental and control group was calculated for total sample, male and female. The data and results of the total sample are presented in table 39.

Table 39

Data and Result on the Effect Size of the Collaborative Problem based Learning on Critical Thinking and its Components

Variable	Group	N	Mean	SD	Hedges g	r- value
Inference	Experimental group	43	2.09	0.75	1.28	.54
	Control group	46	1.26	0.53		
Recognition of Assumptions	Experimental group	43	2.44	0.88	1.31	.55
	Control group	46	1.48	0.55		
Deduction	Experimental group	43	2.16	0.81	1.12	.49
	Control group	46	1.39	0.54		
Interpretation	Experimental group	43	1.93	0.74	1.09	.48
	Control group	46	1.20	0.58		
Evaluation of Arguments	Experimental group	43	1.88	0.85	1.12	.49
	Control group	46	0.98	0.75		
Critical Thinking	Experimental group	43	10.51	2.58	1.99	.71
	Control group	46	6.30	1.49		

The Hedges g obtained for the mean posttest scores of Inference between experimental and control groups is 1.28 with an effect size .54 which is greater than the value needed for large effect ($r \geq .5$) indicates a large effect of the collaborative problem based learning on Inference. Thus collaborative problem based learning has a large effect in enhancing Inference among secondary school students.

The Hedges g obtained on the mean posttest scores of Recognition of Assumptions between experimental and control groups is 1.31 with an effect size .55 which is greater than the value needed for large effect ($r \geq .5$) indicates a large effect of collaborative problem based learning on Recognition of Assumptions. Therefore collaborative problem based learning has a large effect in enhancing Recognition of Assumptions among secondary school students.

The Hedges g obtained on the mean posttest scores of Deduction between experimental and control groups is 1.12 with an effect size .49 which is greater than the value needed for medium effect ($r \geq .3$) indicates a medium effect of the collaborative problem based learning on deduction. Therefore collaborative problem based learning has a medium effect in enhancing Deduction among secondary school students.

The Hedges g obtained on the mean posttest scores of Interpretation between experimental and control groups is 1.09 with an effect size .48 which is greater than the value needed for medium effect ($r \geq .3$) indicates a medium effect of the collaborative problem based learning on interpretation. Therefore collaborative problem based learning has a medium effect in enhancing Interpretation among secondary school students.

The Hedges g obtained on the mean posttest scores of Evaluation of Arguments between experimental and control groups is 1.12 with an effect size .49 which is greater than the value needed for medium effect ($r \geq .3$) indicates a medium effect of the collaborative problem based learning on evaluation of arguments.

Therefore collaborative problem based learning has a medium effect in enhancing Evaluation of Arguments among secondary school students.

The Hedges g obtained on the mean posttest scores of Critical Thinking between experimental and control groups is 1.99 with an effect size .71 which is greater than the value needed for very large effect ($r \geq .7$) indicates a very large effect of the collaborative problem based learning on Critical Thinking. So collaborative problem based learning has a large effect in enhancing Critical Thinking among secondary school students.

The data and result of the effect size of Collaborative Problem Based Learning on Critical Thinking and its components for male sample is presented in table 40

Table 40

Data and Result of the Effect Size of the Collaborative Problem based Learning on Critical Thinking and its Components for Male Sample

Variable	Group	N	Mean	SD	Hedges g	r-value
Inference	Experimental group	26	2.15	0.67	1.62	.63
	Control group	34	1.18	0.52		
Recognition of Assumptions	Experimental group	26	2.38	0.80	1.43	.58
	Control group	34	1.44	0.50		
Deduction	Experimental group	26	2.19	0.80	1.45	.58
	Control group	34	1.24	0.50		
Interpretation	Experimental group	26	1.81	0.63	.96	.43
	Control group	34	1.24	0.55		
Evaluation of Arguments	Experimental group	26	1.88	0.91	1.43	.58
	Control group	34	0.76	0.65		
Critical Thinking	Experimental group	26	10.42	2.27	2.55	.78
	Control group	34	5.85	1.26		

The Hedges g obtained on the mean posttest scores of Inference between experimental and control groups is 1.62 with an effect size .63 which is greater than the value needed for large effect ($r \geq .5$) indicates a large effect of the collaborative problem based learning on Inference. Thus collaborative problem based learning has a large effect in enhancing Inference among secondary school male students.

The Hedges g obtained on the mean posttest scores of Recognition of Assumptions between experimental and control groups is 1.43 with an effect size .58 which is greater than the value needed for large effect ($r \geq .5$) indicates a large effect of the collaborative problem based learning on Recognition of Assumptions. Therefore collaborative problem based learning has a large effect in enhancing Recognition of Assumptions among secondary school male students.

The Hedges g obtained on the mean posttest scores of Deduction between experimental and control groups is 1.45 with an effect size .58 which is greater than the value needed for large effect ($r \geq .5$) indicates a large effect of the collaborative problem based learning on Deduction. So collaborative problem based learning has a large effect in enhancing Deduction among secondary school male students.

The Hedges g obtained on the mean posttest scores of Interpretation between experimental and control groups is .96 with an effect size .43 which is greater than the value needed for medium effect ($r \geq .3$) indicates a medium effect of the collaborative problem based learning on Interpretation. Thus collaborative problem based learning has a medium effect in enhancing Interpretation among secondary school male students.

The Hedges g obtained on the mean posttest scores of Evaluation of Arguments between experimental and control groups is 1.43 with an effect size .58 which is greater than the value needed for large effect ($r \geq .5$) indicates a large effect of the collaborative problem based learning on Evaluation of Arguments. Thus collaborative problem based learning has a large effect in enhancing Evaluation of Arguments among secondary school male students.

The Hedges g obtained on the mean posttest scores of Critical Thinking between experimental and control groups is 2.55 with an effect size .78 which is greater than the value needed for very large effect ($r \geq .5$) indicates a very large effect of the collaborative problem based learning on Critical Thinking. Therefore collaborative problem based learning has a very large effect in enhancing Critical Thinking among secondary school male students.

The data and result on the effect size of the Collaborative Problem Based Learning on Critical Thinking and its components for female sample is presented in table 41

Table 41

Data and Result for the Effect Size of the Collaborative Problem Based Learning on Critical Thinking and its Components for Female Sample

Variable	Group	N	Mean	SD	Hedges g	r-value
Recognition of Assumptions	Experimental group	17	2.53	1.01	1.04	.48
	Control group	12	1.58	0.67		
Interpretation	Experimental group	17	2.12	0.86	1.28	.56
	Control group	12	1.08	0.67		
Critical Thinking	Experimental group	17	10.65	3.06	1.18	.54
	Control group	12	7.58	1.38		

The Hedges g obtained on the mean posttest scores of Recognition of Assumptions between experimental and control groups is 1.04 with an effect size .48 which is greater than the value needed for medium effect ($r \geq .3$) indicates a medium effect of the collaborative problem based learning on Recognition of Assumptions. Hence collaborative problem based learning has medium effect in enhancing Recognition of Assumptions among secondary school female students.

The Hedges g obtained on the mean posttest scores of Interpretation between experimental and control groups is 1.28 with an effect size .56 which is greater than

the value needed for large effect ($r \geq .5$) indicates a large effect of the collaborative problem based learning on Interpretation. Therefore collaborative problem based learning has a large effect in enhancing Interpretation among secondary school female students.

The Hedges g obtained on the mean posttest scores of Critical Thinking between experimental and control groups is 1.18 with an effect size .54 which is greater than the value needed for large effect ($r \geq .5$) indicates a large effect of the collaborative problem based learning on Critical Thinking. Consequently collaborative problem based learning has a large effect in enhancing critical thinking among secondary school female students. The findings of the study also supported by Saputra et al., (2019), which reported that Jigsaw collaboration and Problem based learning enhanced Critical Thinking in children.

Effectiveness of Collaborative Problem Based Learning on Academic Motivation

Preliminary Analysis

As a first stage of the analysis, preliminary analysis was conducted to find the distribution of scores of Academic Motivation. Important descriptive statistics like mean, median, mode, SD, kurtosis, SE of kurtosis, skewness and SE of skewness of the total sample were calculated.

Statistical indices of distribution the pretest scores and posttest scores of Academic Motivation and its components obtained for the experimental group are indicated in table 42.

Table 42

Statistical Indices of Distribution the Pretest Scores and Posttest Scores of Academic Motivation and its Components Obtained for the Experimental Group

Group	Variable	Mean	Median	Mode	Std. Deviation	Skewness	Kurtosis
Pretest	Intrinsic Motivation	80.53	81.00	81.00	9.54	-0.46	0.06
	Extrinsic Motivation	64.33	65.00	73.00	10.01	-0.69	-0.07
	Amotivation	35.05	36.00	39.00	6.04	-0.59	-0.27
	Academic Motivation	179.91	183.00	183.00	23.03	-0.61	0.06
Posttest	Intrinsic Motivation	89.42	89.00	83.00	6.59	-0.40	0.47
	Extrinsic Motivation	72.02	74.00	74.00	8.06	-1.12	0.85
	Amotivation	39.65	40.00	43.00	4.48	-1.13	1.11
	Academic Motivation	201.09	203.00	194.00	16.27	-0.89	1.23

SE of Skewness- 0.36, SE of Kurtosis- 0.71

Table 42 shows that mean (80.53), median (81), and mode (81) of pretest scores of component Intrinsic Motivation are almost equal. The indices of skewness (-0.46) and kurtosis (0.06) indicate the distribution is negatively skewed and leptokurtic. Mean (64.33) and median (65) of pretest scores of Extrinsic Motivation are almost equal and mode (81) is slightly deviated. The indices of skewness (-0.69) and kurtosis (-0.07) indicate the distribution is negatively skewed and platykurtic. Mean (35.05), median (36) and mode (39) of pretest scores of Amotivation are almost equal. The indices of skewness (-0.59) and kurtosis (-0.27) indicate the distribution is negatively skewed and platykurtic. Mean (179.91), median (183) and mode (183) of pretest scores of Academic Motivation are almost equal. The indices of skewness (-0.61) and kurtosis (0.06) indicate the distribution is negatively skewed and leptokurtic.

Table 42 shows that mean (89.42), median (89), and mode (83) of posttest scores of Intrinsic Motivation are almost equal. The indices of skewness (-0.40) and

kurtosis (0.47) indicate the distribution is negatively skewed and leptokurtic. Mean (72.02), median (74) and mode (74) of posttest scores of Extrinsic Motivation are almost equal. The indices of skewness (-1.12) and kurtosis (0.85) indicate the distribution is negatively skewed and leptokurtic. Mean (39.65), median (40) and mode (40) of posttest scores of Amotivation are almost equal. The indices of skewness (-1.13) and kurtosis (1.11) indicate the distribution is negatively skewed and leptokurtic. Mean (201.09), median (203) and mode (194) of posttest scores of Academic Motivation are almost equal. The indices of skewness (-0.89) and kurtosis (1.23) indicate the distribution is negatively skewed and leptokurtic.

The graphical representations of the pretest and posttest scores of the variable Academic Motivation and its components of experimental group are presented in figure 26 and figure 27 respectively.

Figure 26

Smoothed Frequency Curves of Pretest Scores of Academic Motivation and its Components in the Experimental Group

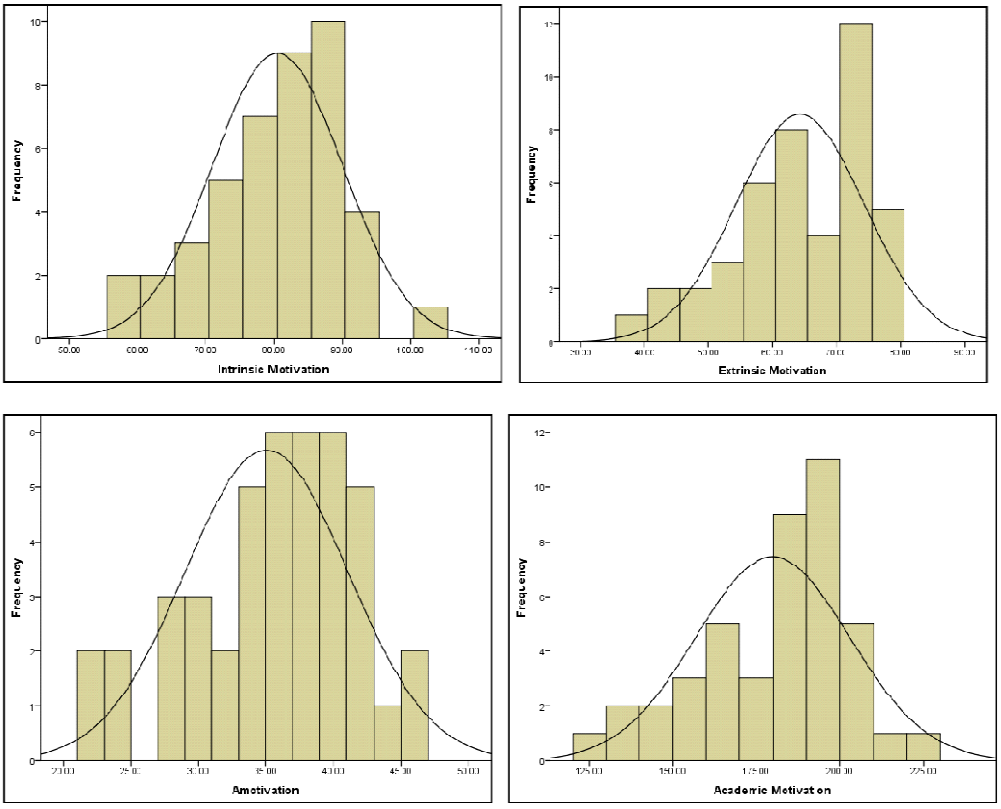
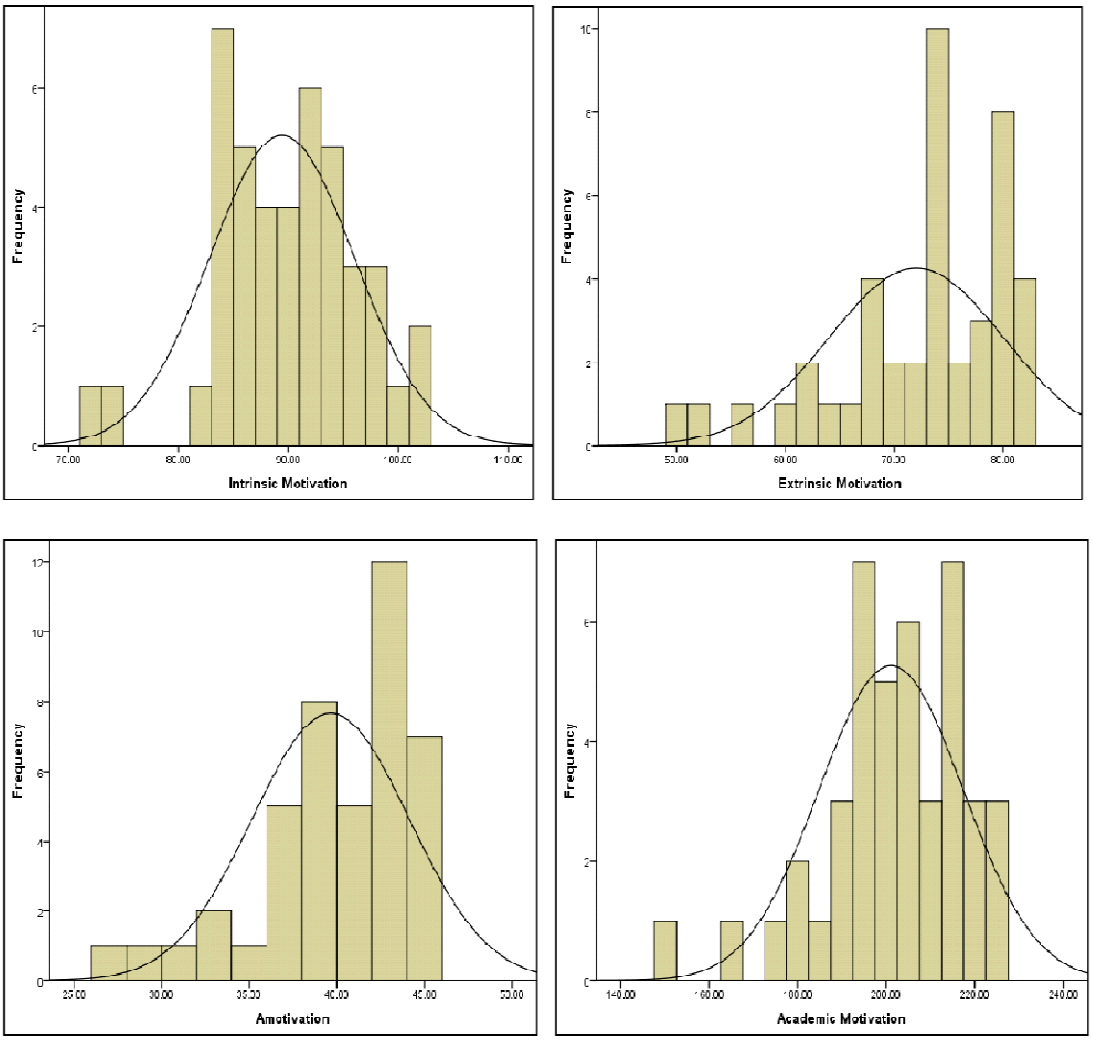


Figure 27

Smoothed Frequency Curves of Posttest Scores of Academic Motivation and its Components for Students in the Experimental Group



Both the statistical constants and graphical representations of the pretest and posttest score of Academic Motivation and its components of the experimental group reveals that the distributions are approximately normal.

Statistical indices of distribution the pretest scores and posttest scores of Academic Motivation and its components obtained for the control group are indicated in table 43.

Table 43

Statistical Indices of Distribution the Pretest Scores and Posttest Scores of Academic Motivation and its Components Obtained for the Control Group

Group	Variable	Mean	Median	Mode	Std. Deviation	Skewness	Kurtosis
Pretest	Intrinsic Motivation	77.00	78.50	79.00	10.80	-0.34	0.28
	Extrinsic Motivation	62.30	62.00	68.00	9.42	0.04	-0.14
	Amotivation	32.48	33.00	38.00	6.08	-0.47	-0.51
	Academic Motivation	171.78	172.00	179.00	21.27	0.16	-0.32
Posttest	Intrinsic Motivation	79.20	79.50	77.00	9.92	-0.02	-0.61
	Extrinsic Motivation	62.41	62.00	52.00	10.12	-0.09	-0.58
	Amotivation	32.61	32.00	32.00	6.51	-0.33	-0.61
	Academic Motivation	174.22	169.50	198.00	23.44	0.26	-1.01

SE of Skewness- 0.35, SE of Kurtosis- 0.69

Table 43 shows that mean (77), median (78.50), and mode (79) of pretest scores of Intrinsic Motivation are almost equal. The indices of skewness (-0.34) and kurtosis (0.28) indicate the distribution is negatively skewed and leptokurtic. Mean (62.30), median (62) mode (68) of pretest scores of Extrinsic Motivation are almost equal. The indices of skewness (0.04) and kurtosis (-0.14) indicate the distribution is positively skewed and platykurtic. Mean (32.48), median (33) and mode (38) of pretest scores of Amotivation are almost equal. The indices of skewness (-0.47) and kurtosis (-0.51) indicate the distribution is negatively skewed and platykurtic. Mean (171.78), median (172) and mode (179) of pretest scores of Academic Motivation are almost equal. The indices of skewness (0.16) and kurtosis (-0.32) indicate the distribution is negatively skewed and platykurtic.

Table 43 shows that mean (79.20), median (79.50), and mode (77) of posttest scores of Intrinsic Motivation are almost equal. The indices of skewness (-0.02) and kurtosis (-0.61) indicate the distribution is negatively skewed and platykurtic. Mean

(62.41) and median (62) of posttest scores of Extrinsic Motivation are almost equal and mode (52) slightly deviated from mean and median. The indices of skewness (-0.09) and kurtosis (-0.58) indicate the distribution is negatively skewed and platykurtic. Mean (32.61), median (32) and mode (32) of posttest scores of Amotivation are almost equal. The indices of skewness (-0.33) and kurtosis (-0.61) indicate the distribution is negatively skewed and platykurtic. Mean (174.22) and median (169.50) of posttest scores of Academic Motivation are almost equal and mode (194) is slightly deviated from mean and median. The indices of skewness (0.26) and kurtosis (-1.01) indicate the distribution is positively skewed and leptokurtic.

The graphical representations of the pretest and posttest scores of the variable Academic Motivation and its components of control group are presented in figure 28 and figure 29 respectively

Figure 28

Smoothed Frequency Curves of Pretest Scores of Academic Motivation and its Components of Students in Control Group

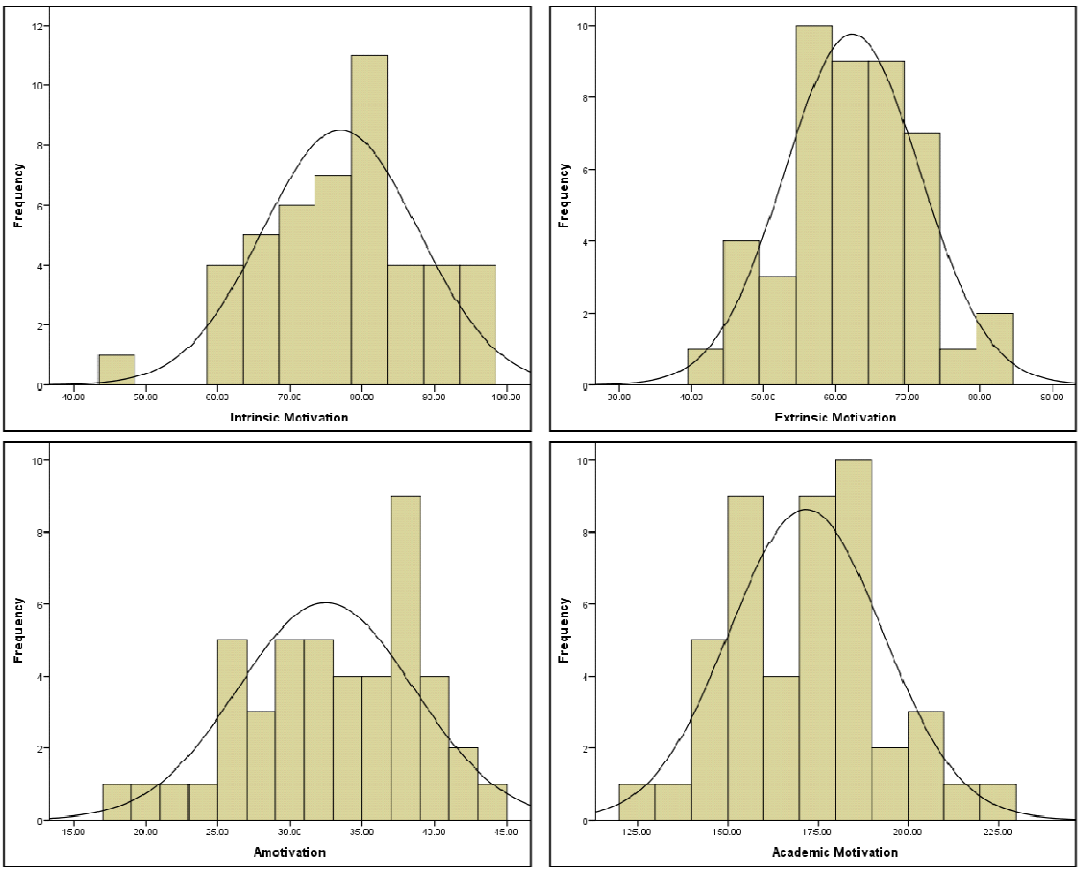
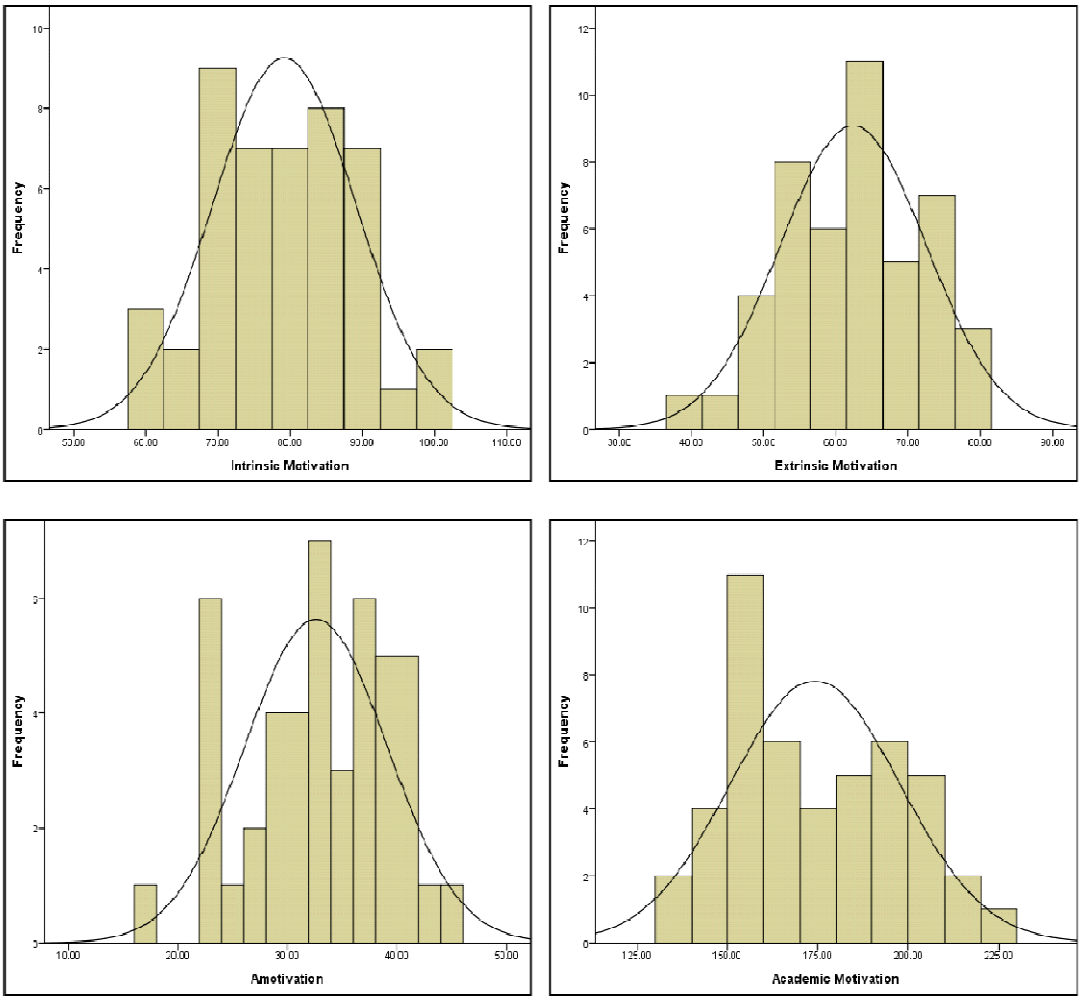


Figure 29

Smoothed Frequency Curves of Posttest Scores of Academic Motivation and its Components of Students in the Control Group



Comparison of Mean Scores of Pretest on Academic Motivation and its Components in Experimental and Control Groups

The mean scores of the initial level of Academic Motivation and its components (pretest) of experimental and control groups were compared using a two-tailed test of significance of difference between means for large independent groups. The details of the data and results are presented in table 44.

Table 44

Details of Comparison of Mean Pretest Scores on Academic Motivation and its Components in Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Intrinsic Motivation	Experimental group	43	80.53	9.54	1.63
	Control group	46	77.00	10.80	
Extrinsic Motivation	Experimental group	43	64.33	10.01	.981
	Control group	46	62.30	9.42	
Amotivation	Experimental group	43	35.05	6.04	1.99*
	Control group	46	32.48	6.08	
Academic Motivation	Experimental group	43	179.91	23.03	1.73
	Control group	46	171.78	21.27	

* Significant at 0.05 level

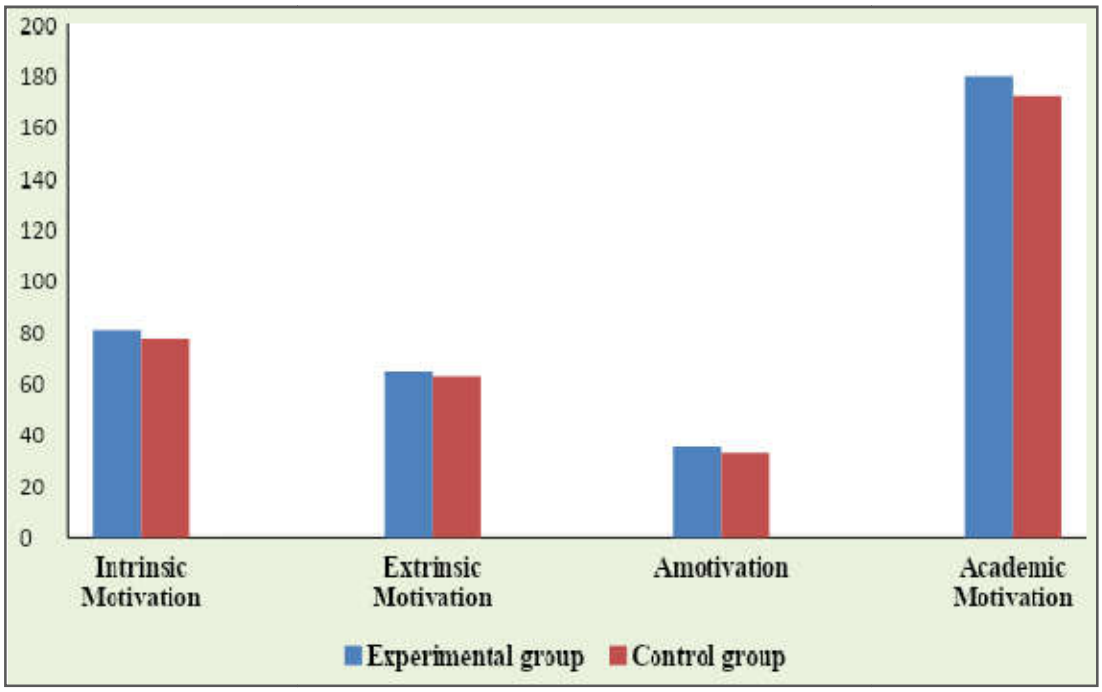
Table 44 shows that experimental and control group do not differ significantly in their mean pretest scores on Academic Motivation ($t= 1.73$, $p> 0.05$) and its components Intrinsic Motivation ($t= 1.63$, $p > 0.05$) and Extrinsic Motivation ($t= .981$, $p > 0.05$). It is interpreted that, initial level mean scores of Academic Motivation and its components Intrinsic Motivation and Extrinsic Motivation in the experimental group and control group are almost equal.

Table 44 also reveals that experimental and control groups differ significantly in their mean pretest scores on Amotivation ($t= 1.99$, $p < 0.05$). That is, two groups differ significantly in the initial level mean scores of Amotivation. Further mean scores on Amotivation shows that higher mean score is for experimental group. That is, experimental group excel in mean score of Amotivation than the control group.

The graphical representation of the comparison of pretest mean scores of Academic Motivation and its components viz., Intrinsic Motivation, Extrinsic Motivation and Amotivation of the experimental group and control group is shown in figure 30.

Figure 30

Mean Pretest Scores on Academic Motivation and its Components of Experimental and Control Groups



Comparison of Mean Posttest Scores of Academic Motivation and its Components in Experimental and Control Groups

The mean posttest scores on Academic Motivation and its components viz., Intrinsic Motivation, Extrinsic Motivation and Amotivation in experimental and control groups were compared using the two-tailed test of significance of difference between means for large independent samples. Data and results of the analysis are presented in table 45.

Table 45

Details of Comparison of Mean Posttest Scores on Academic Motivation and its Components of Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Intrinsic Motivation	Experimental group	43	89.42	6.59	5.76**
	Control group	46	79.20	9.92	
Extrinsic Motivation	Experimental group	43	72.02	8.06	4.93**
	Control group	46	62.41	10.12	
Amotivation	Experimental group	43	39.65	4.48	5.98**
	Control group	46	32.61	6.51	
Academic Motivation	Experimental group	43	201.09	16.27	6.32**
	Control group	46	174.22	23.44	

** Significant at 0.01 level

From table 45, it is clear that the critical ratio for the posttest mean score on Intrinsic Motivation is 5.76 for experimental and control groups. This value is higher than the tabled value (2.58) for significance at .01 level. Hence the posttest mean scores on Intrinsic Motivation in the experimental group (89.42) is higher than that of the control group (79.20). It is understood that, in the posttest, students taught with collaborative problem based learning have higher score in Intrinsic Motivation compared to that of students taught with conventional method.

Table 45 shows that the critical ratio for the posttest mean score on Extrinsic Motivation is 4.93 for experimental and control groups. This value is higher than the tabled value (2.58) for significance at .01 level. Hence the posttest mean scores on Extrinsic Motivation of the experimental group (72.02) is higher than that of the control group (62.41). It is interpreted that, in the posttest, students taught with collaborative problem based learning have higher score in Extrinsic Motivation compared to that of students taught with conventional method.

From table 45, it is clear that the obtained critical ratio for the posttest mean score on Amotivation is 5.98 for experimental and control groups. This value is higher than the tabled value (2.58) for significance at .01 level. Hence the posttest

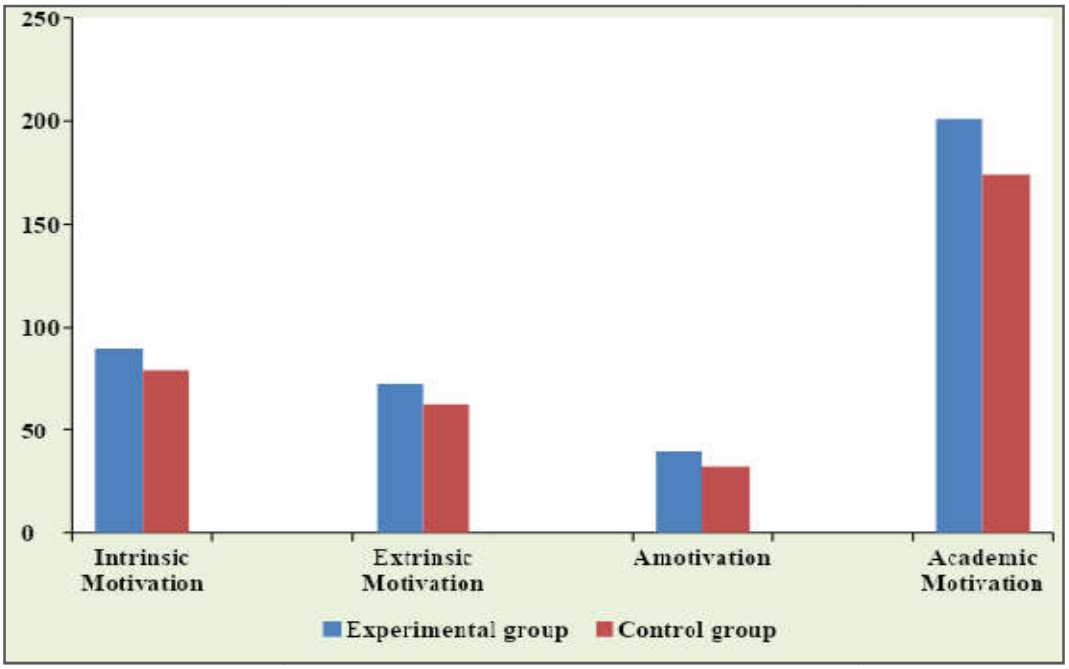
mean scores on Amotivation of the experimental group (39.65) is higher than that of control group (32.61).It is obtained that in the posttest, students taught with collaborative problem based learning have higher score in Amotivation compared to that of students taught with conventional method.

Table 45 shows that the critical ratio for the posttest mean score on Academic Motivation is 6.32 for experimental and control groups. This value is higher than the tabled value (2.58) for significance at .01 level. Therefore the posttest mean scores on Academic Motivation of the experimental group (201.09) is higher than that of the control group (174.22). It is clear that in the posttest, students taught with collaborative problem based learning have higher score in Academic Motivation compared to that of students taught with conventional method.

The graphical representation of the comparison of posttest mean scores of Academic Motivation and its components viz., Intrinsic Motivation, Extrinsic Motivation and Amotivation in the experimental group and control group is shown in figure 31.

Figure 31

Mean Posttest Scores on Academic Motivation and its Components of Experimental and Control Groups



Comparison of Mean Pretest and Posttest Scores of Academic Motivation and its Components between Male Students in Experimental and Control Groups

Data and results of the comparison of mean pretest scores of Academic Motivation and its components between male students in experimental and Control groups are presented in table 46.

Table 46

Details of Comparison of Mean Pretest Scores on Academic Motivation and its Components between Male Students in Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Intrinsic Motivation	Experimental group	26	80.62	9.62	1.41
	Control group	34	76.62	11.70	
Extrinsic Motivation	Experimental group	26	64.92	10.00	.853
	Control group	34	62.62	10.65	
Amotivation	Experimental group	26	34.35	5.77	1.21
	Control group	34	32.50	5.89	
Academic Motivation	Experimental group	26	179.88	22.99	1.35
	Control group	34	171.74	23.08	

Table 46 shows that male students in experimental and control group do not differ significantly in their mean pretest scores on Academic Motivation ($t= 1.35$, $p > 0.05$) and its components Intrinsic Motivation ($t= 1.41$, $p > 0.05$), Extrinsic Motivation ($t= .853$, $p > 0.05$) and Amotivation ($t= 1.21$, $p > 0.05$) (table value of $t (58) = 2.00$ at 0.05 level of significance) It is clear that in the initial level mean scores of Academic Motivation and its components Intrinsic Motivation, Extrinsic Motivation and Amotivation of the male students in experimental and control group are almost equal.

Data and results of the comparison of mean posttest scores of Academic Motivation and its components between male students in experimental and Control groups are presented in table 47.

Table 47

Details of Comparison of Mean Posttest Scores on Academic Motivation and its Components between Male Students in Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Intrinsic Motivation	Experimental group	26	89.81	6.23	4.53**
	Control group	34	79.44	10.30	
Extrinsic Motivation	Experimental group	26	73.38	7.95	4.44**
	Control group	34	62.53	10.35	
Amotivation	Experimental group	26	39.46	4.44	4.94**
	Control group	34	32.32	6.73	
Academic Motivation	Experimental group	26	202.65	16.10	5.19**
	Control group	34	174.29	24.02	

** Significant at 0.01 level

Table 47 shows that the critical ratio for the posttest mean score on Intrinsic Motivation is 4.53 for experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (58) = 2.66). Hence the posttest mean scores on Intrinsic Motivation of male students in experimental group (89.81) is higher than that of the control group (79.44)It is understood that in the posttest, male students taught with collaborative problem based learning have higher score in Intrinsic Motivation compared to that of male students taught with conventional method.

From Table 47, it is clear that the critical ratio for the posttest mean score on Extrinsic Motivation is 4.44 for male students in experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (58) = 2.66).Therefore the posttest mean scores on Extrinsic Motivation of the male experimental group (73.38) is higher than that of the control group (62.53).It is clear that in the posttest, male students taught with collaborative problem based learning have higher score in Extrinsic Motivation compared to that of male students taught with conventional method.

From table 47, it is clear that the obtained critical ratio for the posttest mean score on Amotivation is 4.94 for male students in experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (58) = 2.66). Hence the posttest mean scores on Amotivation of the experimental group (39.46) is higher than that of control group (32.32).It is understood that, in the posttest, male students taught with collaborative problem based learning have higher score in Amotivation compared to that of male students taught with conventional method.

Table 47 shows that the critical ratio for the posttest mean score on Academic Motivation is 5.19 for male students in experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (58) = 2.66).. Thus the posttest mean scores on Academic Motivation in the experimental group (202.65) is higher than that of the control group (174.29).It is clear that, in the posttest, male students taught with collaborative problem based learning have higher score on Academic Motivation compared to that of male students taught with conventional method.

Comparison of Mean Pretest and Posttest Scores of Academic Motivation and its Components between Female Students of Experimental and Control Groups

Data and results of the comparison of mean pretest scores of Academic Motivation and its components between female students of experimental and Control groups are presented in table 48.

Table 48

Details of Comparison of Mean Pretest Scores on Academic Motivation and its Components between Female Students of Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Intrinsic Motivation	Experimental group	17	80.41	9.70	.682
	Control group	12	78.08	8.04	
Extrinsic Motivation	Experimental group	17	63.41	10.27	.627
	Control group	12	61.42	4.62	
Amotivation	Experimental group	17	36.12	6.46	1.48
	Control group	12	32.42	6.87	
Academic Motivation	Experimental group	17	179.94	23.78	1.02
	Control group	12	171.92	15.89	

Table 48 shows that experimental and control group of female students do not differ significantly in their mean pretest scores on Academic Motivation (t= 1.02, $p > 0.05$) and its components Intrinsic Motivation (t= .682, $p > 0.05$), Extrinsic Motivation (t= .627, $p > 0.05$) and Amotivation (t= 1.48, $p > 0.05$) (table value of t (27) = 2.05 at 0.05 level of significance). It is understood that, the initial level mean scores of Academic Motivation and its components Intrinsic Motivation, Extrinsic Motivation and Amotivation of the female students in experimental group and control group are almost equal.

Data and results of the comparison of mean posttest scores of Academic Motivation and its components between female students in experimental and control groups are presented in table 49.

Table 49

Details of Comparison of Mean Posttest Scores on Academic Motivation and its Components between Female Students of Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Intrinsic Motivation	Experimental group	17	88.82	7.26	3.39**
	Control group	12	78.50	9.16	
Extrinsic Motivation	Experimental group	17	69.94	8.01	2.36*
	Control group	12	62.08	9.88	
Amotivation	Experimental group	17	39.94	4.66	3.28**
	Control group	12	33.42	6.07	
Academic Motivation	Experimental group	17	198.71	16.72	3.38**
	Control group	12	174.00	22.73	

** Significant at 0.01 level, * Significant at 0.05 level

Table 49 shows that the critical ratio for the posttest mean score on Intrinsic Motivation is 3.39 for female students in experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (27) = 2.77). Hence the posttest mean scores on Intrinsic Motivation of the female students in experimental group (88.82) is higher than that of the control group (78.50).It is clear that, in the posttest, female students taught with collaborative problem based learning have higher score in Intrinsic Motivation compared to that of female students taught with conventional method.

From Table 49, it is clear that the critical ratio for the posttest mean score on Extrinsic Motivation is 2.36 for female students in experimental and control groups. This value is higher than the tabled value for significance at .05 level (table value of t (27) = 2.05).Therefore the posttest mean scores on Extrinsic Motivation of the female students in experimental group (69.94) is higher than that of the control group (62.08). It is clear that, in the posttest, female students taught with

collaborative problem based learning have higher score in Extrinsic Motivation compared to that of female students taught with conventional method.

From table 49, it is clear that the obtained critical ratio for the posttest mean score on Amotivation is 3.28 for female students in experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (27) = 2.77).Thus the posttest mean scores on Amotivation of the experimental group (39.94) is higher than that of control group (33.42).It is understood that, in the posttest, female students taught with collaborative problem based learning have higher score on Amotivation compared to that of female students taught with conventional method.

Table 49 shows that the critical ratio for the posttest mean score on Academic Motivation is 3.38 for female students in experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (27) = 2.77). Thus the posttest mean scores on Academic Motivation of the experimental group (198.71) is higher than that of the control group (174.00).It is understood that, in the posttest, female students taught with collaborative problem based learning have higher score in Academic Motivation compared to that of female students taught with conventional method.

Comparison of Mean Scores of Pretest and Posttest on Academic Motivation and its Components in the Experimental Group

The mean scores of Academic Motivation and its components viz., Intrinsic Motivation, Extrinsic Motivation and Amotivation in both pre- test and posttest for the experimental group were compared using paired sample t test. Data and results of the analysis is presented in table 50.

Table 50

Details of Comparison of Mean Scores of Academic Motivation and its Components in Pretest and Posttest of Experimental Group (N= 43)

Variable	Group	Mean	SD	r	t value
Intrinsic Motivation	Posttest	89.42	6.59	.641	7.94**
	Pretest	80.53	9.54		
Extrinsic Motivation	Posttest	72.02	8.06	.685	6.82**
	Pretest	64.33	10.01		
Amotivation	Posttest	39.65	4.48	.607	6.21**
	Pretest	35.05	6.04		
Academic Motivation	Posttest	201.09	16.27	.651	7.93**
	Pretest	179.91	23.03		

** Significant at 0.01 level

Table 50 shows that the critical ratio for mean score on Intrinsic Motivation is 7.94 and coefficient of correlation is .641. The t-value is greater than the table value of t (27) = 2.05 at .01 level of significance. Obtained values of mean scores indicate that the mean score of Intrinsic Motivation in posttest is higher than that in pretest among the students taught with collaborative problem based learning.

Table 50 shows that the critical ratio for mean score on Extrinsic Motivation is 6.82 and coefficient of correlation is .685. The t-value is greater than the tabled value at .01 level of significance. Obtained values of mean scores indicate that the mean score of Extrinsic Motivation in posttest is higher than that in pretest among the students taught with collaborative problem based learning.

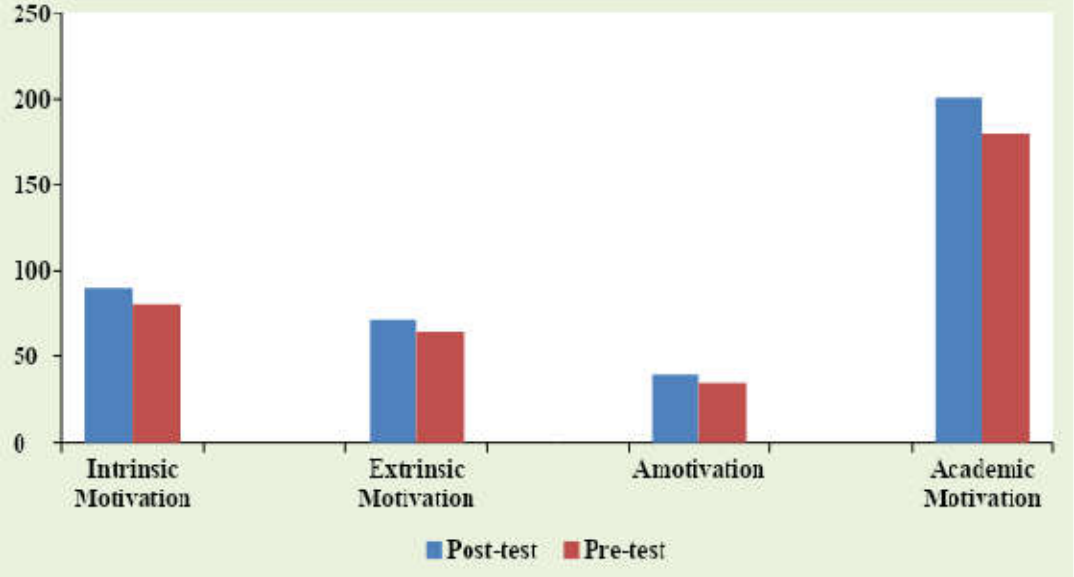
From table 50, it is clear that the critical ratio for mean score on Amotivation is 6.21 and coefficient of correlation is .607. The t-value is greater than the tabled value at .01 level of significance. Obtained values of mean scores indicate that the mean score of Amotivation in posttest is higher than that in pretest among the students taught with collaborative problem based learning.

Table 50 shows that the critical ratio for mean score on Academic Motivation is 7.93 and coefficient of correlation is .651. The t-value is greater than the tabled value at .01 level of significance. Obtained values of mean scores indicate that the mean score of Academic Motivation in posttest is higher than that in pretest among the students taught with collaborative problem based learning.

Graphical representation of comparison of mean scores of Academic Motivation and its components viz., Intrinsic Motivation, Extrinsic Motivation and Amotivation in pretest and posttest for the experimental group is presented in figure 32.

Figure 32

Graphical Representation of Comparison of Mean Scores of Academic Motivation and its Components in Pretest and Posttest for the Experimental Group



Comparison of Mean Scores of Pretest and Posttest on Academic Motivation and its Components for the Male Students in Experimental Group

Data and results of the analysis of comparison of mean scores of pretest and posttest on Academic Motivation and its components for the male students in the experimental group is presented in table 51.

Table 51

Details of Comparison of Mean Scores of Academic Motivation and its Components in Pretest and Posttest for the Male Students in Experimental Group (N= 26)

Variable	Group	Mean	SD	R	t value
Intrinsic Motivation	Posttest	89.81	6.23	.639	6.33**
	Pretest	80.62	9.62		
Extrinsic Motivation	Posttest	73.38	7.95	.579	5.11**
	Pretest	64.92	10.00		
Amotivation	Posttest	39.46	4.44	.551	5.24**
	Pretest	34.35	5.77		
Academic Motivation	Posttest	202.65	16.10	.568	6.06**
	Pretest	179.88	22.99		

** Significant at 0.01 level

Table 51 shows that the critical ratio for mean score on Intrinsic Motivation is 6.33 and coefficient of correlation is .639. The t-value is greater than the tabled value at .01 level of significance (table value of t (25) = 2.79). Obtained values of mean scores indicate that the mean score of Intrinsic Motivation in posttest is higher than that in pretest among male students taught with collaborative problem based learning.

Table 51 shows that the critical ratio for mean score on Extrinsic Motivation is 5.11 and coefficient of correlation is .579. The t-value is greater than the tabled value at .01 level of significance (table value of t (25) = 2.79). Obtained values of mean scores indicate that the mean score of Extrinsic Motivation in posttest is higher than that in pretest among the male students taught with collaborative problem based learning.

From table 51, it is clear that the critical ratio for mean score on Amotivation is 5.24 and coefficient of correlation is .551. The t-value is greater than the tabled value at .01 level of significance (table value of t (25) = 2.79). Obtained values of

mean scores indicate that the mean score of Amotivation in posttest is higher than that in pretest among the male students taught with collaborative problem based learning.

Table 51 shows that the critical ratio for mean score on Academic Motivation is 6.06 and coefficient of correlation is .568. The t-value is greater than the tabled value at .01 level of significance (table value of t (25) = 2.79). Obtained values of mean scores indicate that the mean score of Academic Motivation in posttest is higher than that in pretest among the male students taught with collaborative problem based learning.

Comparison of Mean Scores of Pretest and Posttest on Academic Motivation and its Components for Female Students in Experimental Group

Data and results of the analysis of comparison of mean scores of pretest and posttest on Academic Motivation and its components for the female students in the experimental group is presented in table 52.

Table 52

Details of Comparison of Mean Scores of Academic Motivation and its Components in Pretest and Posttest for the Female Students in Experimental Group (N= 17)

Variable	Group	Mean	SD	r	t value
Intrinsic Motivation	Posttest	88.82	7.26	.649	4.66**
	Pretest	80.41	9.70		
Extrinsic Motivation	Posttest	69.94	8.01	.849	4.92**
	Pretest	63.41	10.27		
Amotivation	Posttest	39.94	4.66	.682	3.33**
	Pretest	36.12	6.46		
Academic Motivation	Posttest	198.71	16.72	.785	5.20**
	Pretest	179.94	23.78		

** Significant at 0.01 level

Table 52 shows that the critical ratio for mean score on Intrinsic Motivation is 4.66 and coefficient of correlation is .649. The t-value is greater than the tabled value at .01 level of significance (table value of t (16) = 2.92). Obtained values of mean scores indicate that the mean score of Intrinsic Motivation in posttest is higher than that in pretest among the female students taught with collaborative problem based learning.

Table 52 shows that the critical ratio for mean score on Extrinsic Motivation is 4.92 and coefficient of correlation is .849. The t-value is greater than the tabled value at .01 level of significance (table value of t (16) = 2.92). Obtained values of mean scores indicate that the mean score of Extrinsic Motivation in posttest is higher than that in pretest among female students taught with collaborative problem based learning.

From table 52, it is clear that the critical ratio for mean score on Amotivation is 3.33 and coefficient of correlation is .682. The t-value is greater than the tabled value at .01 level of significance (table value of t (16) = 2.92). Obtained values of mean scores indicate that the mean score of Amotivation in posttest is higher than that in pretest among the female students taught with collaborative problem based learning.

Table 52 shows that the critical ratio for mean score on Academic Motivation is 5.20 and coefficient of correlation is .785. The t-value is greater than the tabled value at .01 level of significance (table value of t (16) = 2.92). Obtained values of mean scores indicate that the mean score of Academic Motivation in posttest is higher than that in pretest among the female students taught with collaborative problem based learning.

Comparison of Mean Scores of Pretest and Posttest on Academic Motivation and its Components in Control Group

The mean scores of Academic Motivation and its components viz., Intrinsic Motivation, Extrinsic Motivation and Amotivation in both pre- test and posttest for

the control group was compared using paired sample t test. Data and results of the analysis are presented in table 53.

Table 53

Details of Comparison of Mean Scores of Academic Motivation and its Components in Pretest and Posttest in Control Group (N= 46)

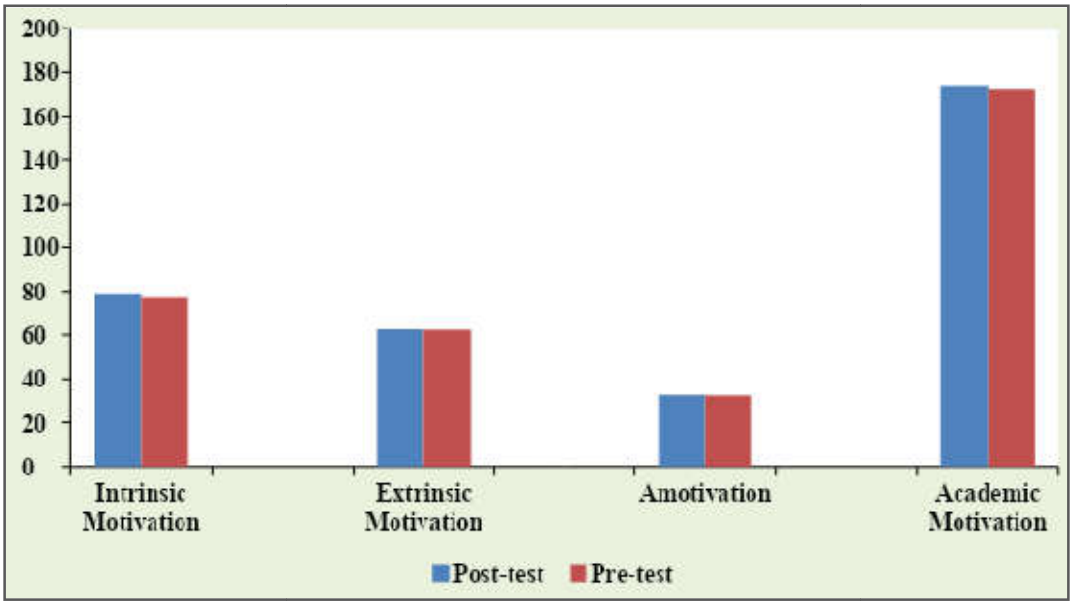
Variable	Group	Mean	SD	r	t value
Intrinsic Motivation	Posttest	79.20	9.92	.286	1.20
	Pretest	77.00	10.80		
Extrinsic Motivation	Posttest	62.41	10.12	0.279	.063
	Pretest	62.30	9.42		
Amotivation	Posttest	32.61	6.51	.409	.129
	Pretest	32.48	6.08		
Academic Motivation	Posttest	174.22	23.44	.40	.672
	Pretest	171.78	21.27		

Table 53 shows that pretest and posttest scores of control group do not differ significantly in their mean scores on Academic Motivation (t= .672, p > 0.05, r= .40) and its components Intrinsic Motivation (t= 1.2, p > 0.05, r = .286), Extrinsic Motivation (t= .063, p > 0.05, r= .279) and Amotivation (t = .129, p > 0.05, r= .409). It is understood that, there is no significant difference in the mean pretest and posttest scores of Academic Motivation and its components for students taught with conventional method.

Graphical representation of comparison of mean scores of Academic Motivation and its components viz., Intrinsic Motivation, Extrinsic Motivation and Amotivation in pretest and posttest for the control group is presented in figure 33.

Figure 33

Graphical Representation of Comparison of Mean Scores of Academic Motivation and its Components in Pretest and Posttest for the Control Group



Comparison of Mean Scores of Pretest and Posttest on Academic Motivation and its Components for the Male Students in Control Group

Data and results of the analysis of comparison of mean scores of pretest and posttest on Academic Motivation and its components for the male students in the control group is presented in table 54.

Table 54

Details of Comparison of Mean Scores of Academic Motivation and its Components in Pretest and Posttest for the Male Students in Control Group (N= 34)

Variable	Group	Mean	SD	r	t value
Intrinsic Motivation	Posttest	79.44	10.30	.427	1.39
	Pretest	76.62	11.70		
Extrinsic Motivation	Posttest	62.53	10.35	.371	.044
	Pretest	62.62	10.65		
Amotivation	Posttest	32.32	6.73	.591	.179
	Pretest	32.50	5.89		
Academic Motivation	Posttest	174.29	24.02	.540	.66
	Pretest	171.74	23.08		

Table 54 shows that pretest and posttest scores of male students of control group do not differ significantly in their mean scores on Academic Motivation (t= .66, p > 0.05, r= .540) and its components Intrinsic Motivation (t= 1.39, p > 0.05, r= .427) , Extrinsic Motivation (t= .044, p > 0.05, r= .371) and Amotivation (t= .179, p > 0.05, r= .591).It is clear that there is no significant difference in the mean pretest and posttest scores of Academic Motivation and its components for male students taught with conventional method.

Comparison of Mean Scores of Pretest and Posttest on Academic Motivation and its Components of the Female Students in Control Group

Data and results of the analysis of comparison of mean scores of pretest and posttest on Academic Motivation and its components of the female students in the control group is presented in table 55.

Table 55

Details of Comparison of Mean Scores of Academic Motivation and its Components in Pretest and Posttest of the Female Students in Control Group (N= 12)

Variable	Group	Mean	SD	r	t value
Intrinsic Motivation	Posttest	78.50	9.16	-.376	.101
	Pretest	78.08	8.04		
Extrinsic Motivation	Posttest	62.08	9.88	-.316	.19
	Pretest	61.42	4.62		
Amotivation	Posttest	33.42	6.07	-.096	.361
	Pretest	32.42	6.87		
Academic Motivation	Posttest	174.00	22.73	-.229	.236
	Pretest	171.92	15.89		

Table 55 shows that pretest and posttest scores of female students of control group do not differ significantly in their mean scores on Academic Motivation (t= .236, p > 0.05, r= -.229) and its components Intrinsic Motivation (t= .101, p > 0.05, r= -.316) , Extrinsic Motivation (t= .19, p > 0.05, r= -.316) and Amotivation (t=

.361, p > 0.05, r= -.096) (table value of t (11) = 2.20 at 0.05 level of significance).It is estimated that, there is no significant difference in the mean pretest and posttest scores of Academic Motivation and its components for female students taught with conventional method.

Comparison of Mean Posttest Scores on Academic Motivation and its Components in Experimental and Control Group with First Terminal Exam Mark as Covariates

To find the effectiveness of collaborative problem based learning on enhancing Academic Motivation and its components, conducted ANCOVA with the first terminal exam mark as covariate.

Details of ANCOVA of posttest score on Intrinsic Motivation by groups with first terminal exam mark as covariate is presented in table 56.

Table 56

Summary of ANCOVA of Posttest Score on Intrinsic Motivation by Groups with First Terminal Exam Mark as Covariate

Source	Type III Sum of Squares	df	Mean Square	F
Corrected Model	2381.65	2	1190.82	16.53
Intercept	165137.83	1	165137.83	2292.57
First terminal exam mark	58.98	1	58.98	.819
Group	1622.19	1	1622.19	22.52**
Error	6194.72	86	72.03	
Total	638578.00	89		
Corrected Total	8576.38	88		

** Significant at 0.01 level

It is clear from table 56 that the obtained F -ratio is 22.52, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 86) is 6.9 at 0.01 level of significance. The significant F- ratio shows that the means of

posttest scores of students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, adjusted mean score of Intrinsic Motivation of the experimental group is 89.02 is significantly greater than the control group which is 79.57. Therefore collaborative problem based learning has significant effect in enhancing Intrinsic Motivation.

Details of ANCOVA of posttest score on Extrinsic Motivation by groups with first terminal exam mark as covariate is presented in table 57.

Table 57

Summary of ANCOVA of Posttest Score on Extrinsic Motivation by Groups with First Terminal Exam Mark as Covariate

Source	Type III Sum of Squares	df	Mean Square	F
Corrected Model	2114.60	2	1057.300	12.500
Intercept	104008.68	1	104008.68	1229.66
First terminal exam mark	62.011	1	62.011	.733
Group	1412.41	1	1412.41	16.69**
Error	7274.11	86	84.583	
Total	409580.00	89		
Corrected Total	9388.71	88		

** Significant at 0.01 level

It is clear from table 57 that the obtained F -ratio is 16.69, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 86) is 6.9 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Extrinsic Motivation of the experimental group is 71.62, is significantly greater than the control group which is 62.79. Thus

collaborative problem based learning has significant effect in enhancing Extrinsic Motivation.

Details of ANCOVA of posttest score on Amotivation by groups with first terminal exam mark as covariate is presented in table 58.

Table 58

Summary of ANCOVA of Posttest Score on Amotivation by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	1338.24	2	669.12	22.88
Intercept	26842.54	1	26842.54	917.97
First terminal exam mark	235.98	1	235.98	8.07
GROUP	549.32	1	549.32	18.78**
Error	2514.73	86	29.24	
Total	119269.00	89		
Corrected Total	3852.98	88		

** Significant at 0.01 level

It is clear from table 58 that the obtained F -ratio is 18.78, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 86) is 6.9 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Amotivation of the experimental group is 38.85 is significantly greater than the control group which is 33.35. Therefore collaborative problem based learning has significant effect in enhancing Amotivation.

Details of ANCOVA of posttest scores on academic motivation by groups with first terminal exam mark as covariate is presented in table 59.

Table 59

Summary of ANCOVA of Posttest Score on Academic Motivation by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	17008.72	2	8504.36	20.97
Intercept	796935.20	1	796935.20	1965.05
First terminal exam mark	955.81	1	955.81	2.35
Group	10260.92	1	10260.92	25.30**
Error	34877.63	86	405.55	
Total	3170863.00	89		
Corrected Total	51886.36	88		

** Significant at 0.01 level

It is clear from table 59 that the obtained F -ratio is 25.30, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 86) is 6.9 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Academic Motivation of the experimental group is 199.49 is significantly greater than the control group which is 175.72. Therefore collaborative problem based learning has significant effect in enhancing Academic Motivation.

Details of ANCOVA of posttest scores on Intrinsic Motivation of male students by groups with first terminal exam mark as covariate is presented in table 60.

Table 60

Summary of ANCOVA of Posttest Score on Intrinsic Motivation of Male Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	1592.12	2	796.061	10.17
Intercept	119563.06	1	119563.060	1527.49
First terminal exam mark	8.809	1	8.809	.113
Group	1331.32	1	1331.328	17.01**
Error	4461.61	57	78.274	
Total	428742.00	60		
Corrected Total	6053.73	59		

** Significant at 0.01 level

It is clear from the table 60 that the obtained F -ratio is 17.01, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 57) is 7.1 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of male students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Intrinsic Motivation of experimental group is 90.04 is significantly greater than control group which is 79.26. Therefore collaborative problem based learning has significant effect in enhancing Intrinsic Motivation among male students.

Details of ANCOVA of posttest score on Extrinsic Motivation of male students by groups with first terminal exam mark as covariate is presented in table 61.

Table 61

Summary of ANCOVA of posttest score on Extrinsic Motivation of Male Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	1736.11	2	868.05	9.67
Intercept	75972.23	1	75972.23	847.00
First terminal exam mark	.001	1	.001	.000
Group	1349.09	1	1349.09	15.04**
Error	5112.62	57	89.69	
Total	278068.00	60		
Corrected Total	6848.73	59		

** Significant at 0.01 level

It is clear from the table 61 that the obtained F -ratio is 15.04, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 57) is 7.1 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of male students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Extrinsic Motivation of experimental group is 73.38 is significantly greater than control group which is 62.53. Therefore collaborative problem based learning has significant effect in enhancing Extrinsic Motivation among male students.

Details of ANCOVA of posttest score on Amotivation of male students by groups with first terminal exam mark as covariate is presented in table 62.

Table 62

Summary of ANCOVA of Posttest Score on Amotivation of Male Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	783.69	2	391.84	11.43
Intercept	19799.68	1	19799.68	577.90
First terminal exam mark	33.01	1	33.01	.964
Group	460.11	1	460.11	13.42**
Error	1952.88	57	34.26	
Total	77997.00	60		
Corrected Total	2736.58	59		

** Significant at 0.01 level

It is clear from the table 62 that the obtained F -ratio is 13.42, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 57) is 7.1 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of male students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Amotivation of experimental group is 39.01 is significantly greater than control group which is 32.67. Therefore collaborative problem based learning has significant effect in enhancing Amotivation among male students.

Details of ANCOVA of posttest score on Academic Motivation of male students by groups with first terminal exam mark as covariate is presented in table 63.

Table 63

Summary of ANCOVA of Posttest Score on Academic Motivation of Male Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	11857.49	2	5928.74	13.25
Intercept	580828.22	1	580828.22	1298.06
First terminal exam mark	7.85	1	7.85	.018
Group	8961.94	1	8961.94	20.02**
Error	25505.08	57	447.45	
Total	2126163.00	60		
Corrected Total	37362.58	59		

** Significant at 0.01 level

It is clear from table 63 that the obtained F -ratio is 20.02, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 57) is 7.1 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of male students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Academic Motivation of the experimental group is 202.43 is significantly greater than the control group which is 174.46. Therefore collaborative problem based learning has significant effect in enhancing Academic Motivation of male students.

Details of ANCOVA of posttest scores on Intrinsic Motivation of female students by groups with first terminal exam mark as covariate is presented in table 64.

Table 64

Summary of ANCOVA of posttest score on Intrinsic Motivation of female students by groups with first terminal exam mark as covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	1085.02	2	542.51	9.86
Intercept	34362.56	1	34362.56	624.70
First terminal exam mark	335.32	1	335.31	6.09
Group	437.25	1	437.25	7.94**
Error	1430.15	26	55.01	
Total	209836.00	29		
Corrected Total	2515.17	28		

** Significant at 0.01 level

It is clear from table 64 that the obtained F -ratio is 7.94, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 26) is 7.72 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of female students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Intrinsic Motivation of the experimental group is 87.96 is significantly greater than the control group which is 79.72. consequently collaborative problem based learning has significant effect in enhancing Intrinsic Motivation of female students.

Details of ANCOVA of posttest scores on Extrinsic Motivation of female students by groups with first terminal exam mark as covariate is presented in table 65.

Table 65

Summary of ANCOVA of Posttest Score on Extrinsic Motivation of Female Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	718.77	2	359.38	5.14
Intercept	20768.43	1	20768.43	297.43
First terminal exam mark	284.42	1	284.42	4.07
Group	227.08	1	227.08	3.25
Error	1815.43	26	69.82	
Total	131512.00	29		
Corrected Total	2534.20	28		

It is clear from table 65 that the obtained F -ratio is 3.25, is less than the tabled value at 0.05 level of significance. The table value of F ratio for df (1, 26) is 4.23 at 0.05 level of significance. This means that there is no significant difference in the posttest scores of female students in experimental and control groups after they have been adjusted for difference in the first terminal exam marks. consequently collaborative problem based learning has no effect on enhancing Extrinsic Motivation among female students.

Details of ANCOVA of posttest score on Amotivation of female students by groups with first terminal exam mark as covariate is presented in table 66.

Table 66

Summary of ANCOVA of Posttest Score on Amotivation of Female Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	571.37	2	285.68	15.47
Intercept	5436.55	1	5436.55	294.51
First terminal exam mark	271.92	1	271.91	14.73
Group	139.07	1	139.07	7.53*
Error	479.94	26	18.45	
Total	41272.00	29		
Corrected Total	1051.31	28		

* Significant at 0.05 level

It is clear from table 65 that the obtained F -ratio is 7.53, is greater than the tabled value at 0.05 level of significance. The table value of F ratio for df (1, 26) is 4.23 at 0.05 level of significance. The significant F- ratio shows that the means of posttest scores of female students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Amotivation of the experimental group is 39.16 is significantly greater than control group which is 34.52.Therefore collaborative problem based learning has significant effect in enhancing Amotivation of female students.

Details of ANCOVA of posttest score on Academic Motivation of female students by groups with first terminal exam mark as covariate is presented in table 67.

Table 67

Summary of ANCOVA of Posttest Score on Academic Motivation of Female Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	6963.14	2	3481.57	12.08
Intercept	162583.92	1	162583.92	564.37
First terminal exam mark	2669.43	1	2669.43	9.26
Group	2282.23	1	2282.23	7.92**
Error	7490.09	26	288.08	
Total	1044700.00	29		
Corrected Total	14453.24	28		

** Significant at 0.01 level

It is clear from the table 67 that the obtained F -ratio is 7.92, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 26) is 7.72 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of female students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam

marks. Further, the adjusted mean score of Academic Motivation of experimental group is 196.27 is significantly greater than control group which is 177.45.Therefore collaborative problem based learning has significant effect in enhancing Academic Motivation among female students.

Effect Size of the Treatment on Scores of Academic Motivation and its Components viz., Intrinsic Motivation, Extrinsic Motivation and Amotivation

The effect size of the collaborative problem based learning on Academic Motivation and its components viz., Intrinsic Motivation, Extrinsic Motivation and Amotivation in posttest of both experimental and control group was calculated for total sample, male and female. The data and results of the total sample are presented in table 68.

Table 68

Data and Result on the Effect Size of the Collaborative Problem Based Learning on Academic Motivation and its Components

Variable	Group	N	Mean	SD	Hedges g	r-value
Intrinsic Motivation	Experimental group	43	89.42	6.59	1.19	0.52
	Control group	46	79.20	9.92		
Extrinsic Motivation	Experimental group	43	72.02	8.06	1.03	0.46
	Control group	46	62.41	10.12		
Amotivation	Experimental group	43	39.65	4.48	1.24	0.53
	Control group	46	32.61	6.51		
Academic Motivation	Experimental group	43	201.09	16.27	1.31	0.55
	Control group	46	174.22	23.44		

The Hedges g obtained on the mean posttest scores of Intrinsic Motivation between experimental and control groups is 1.19 with an effect size .52 which is greater than the value needed for large effect ($r \geq .5$) indicates a large effect of the collaborative problem based learning on Intrinsic Motivation. Therefore

collaborative problem based learning has large effect in enhancing Intrinsic Motivation among secondary school students.

The Hedges g obtained on the mean posttest scores of Extrinsic Motivation between experimental and control groups is 1.03 with an effect size .46 which is greater than the value needed for medium effect ($r \geq .3$) indicates a medium effect of collaborative problem based learning on Extrinsic Motivation. Thus collaborative problem based learning has medium effect in enhancing Extrinsic Motivation among secondary school students.

The Hedges g obtained on the mean posttest scores of Amotivation between experimental and control groups is 1.24 with an effect size .53 which is greater than the value needed for large effect ($r \geq .5$) indicates a large effect of collaborative problem based learning on Amotivation. Therefore collaborative problem based learning has large effect in enhancing Amotivation among secondary school students.

The Hedges g obtained on the mean posttest scores of Academic Motivation between experimental and control groups is 1.31 with an effect size .55 which is greater than the value needed for large effect ($r \geq .5$) indicates a large effect of the collaborative problem based learning on academic motivation. Therefore collaborative problem based learning has large effect in enhancing Academic Motivation among secondary school students.

The data and result on the effect Size of the problem based learning on academic motivation and its components for male sample is presented in table 69

Table 69

Data and Result on the Effect Size of the Collaborative Problem based Learning on Academic Motivation and its Components for Male Sample

Variable	Group	N	Mean	SD	Hedges g	r-value
Intrinsic Motivation	Experimental group	26	89.81	6.23	1.16	0.52
	Control group	34	79.44	10.30		
Extrinsic Motivation	Experimental group	26	73.38	7.95	1.14	0.51
	Control group	34	62.53	10.35		
Amotivation	Experimental group	26	39.46	4.44	1.20	0.53
	Control group	34	32.32	6.73		
Academic Motivation	Experimental group	26	202.65	16.10	1.33	0.57
	Control group	34	174.29	24.02		

The Hedges g obtained for mean posttest scores of Intrinsic Motivation between experimental and control groups is 1.16 with an effect size .52 which is greater than the value needed for large effect ($r \geq .5$) indicates a large effect of collaborative problem based learning on Intrinsic Motivation. Therefore collaborative problem based learning has large effect in enhancing intrinsic motivation among secondary school male students.

The Hedges g obtained on the mean posttest scores of Extrinsic Motivation between experimental and control groups is 1.14 with an effect size .51 which is greater than the value needed for large effect ($r \geq .5$) indicates a large effect of the collaborative problem based learning on Extrinsic Motivation. Thus collaborative problem based learning has large effect in enhancing Extrinsic Motivation among secondary school male students.

The Hedges g obtained on the mean posttest scores of amotivation between experimental and control groups is 1.20 with an effect size .53 which is greater than

the value needed for large effect (r ≥ .5) indicates a large effect of the collaborative problem based learning on amotivation. Therefore collaborative problem based learning has large effect in enhancing Amotivation among secondary school male students.

The Hedges g obtained on the mean posttest scores of Academic Motivation between experimental and control groups is 1.33 with an effect size .57 which is greater than the value needed for large effect (r ≥ .5) indicates a large effect of the collaborative problem based learning on Academic Motivation. Therefore collaborative problem based learning has large effect in enhancing Academic Motivation among secondary school male students.

The data and result on the effect Size of the Collaborative Problem Based Learning on Academic Motivation and its components for female sample is presented in table 70.

Table 70

Data and Result on the Effect Size of the Collaborative Problem Based Learning on Academic Motivation and its Components for Female Sample

Variable	Group	N	Mean	SD	Hedges g	r-value
Intrinsic Motivation	Experimental group	17	88.82	7.26	1.24	0.53
	Control group	12	78.50	9.16		
Amotivation	Experimental group	17	39.94	4.66	1.2	0.52
	Control group	12	33.42	6.07		
Academic Motivation	Experimental group	17	198.71	16.72	1.24	0.53
	Control group	12	174.00	22.73		

The Hedges g obtained on the mean posttest scores of Intrinsic Motivation between experimental and control groups is 1.24 with an effect size .53 which is greater than the value needed for large effect (r ≥ .5) indicates a large effect of the collaborative problem based learning on Intrinsic Motivation. Therefore

collaborative problem based learning has large effect in enhancing Intrinsic Motivation among secondary school female students.

The Hedges g obtained on the mean posttest scores of Amotivation between experimental and control groups is 1.20 with an effect size .52 which is greater than the value needed for large effect ($r \geq .5$) indicates a large effect of the collaborative problem based learning on Amotivation. Consequently collaborative problem based learning has large effect in enhancing Amotivation among secondary school female students.

The Hedges g obtained on the mean posttest scores of Academic Motivation between experimental and control groups is 1.24 with an effect size .53 which is greater than the value needed for large effect ($r \geq .5$) indicates a large effect of the collaborative problem based learning on Academic Motivation. Therefore collaborative problem based learning has large effect in enhancing Academic Motivation among secondary school female students. The findings of the study in lined with Alfaro and Taylor (2010), in which result of the study revealed that there was a positive correlation among students on Academic Motivation, Perception of classroom climate and Academic achievement.

Effectiveness of Collaborative Problem based Learning on Emotion Regulation

Preliminary Analysis

As first stage of interpretation, preliminary analysis was conducted to find the distribution of scores of Emotion Regulation and its components. Important descriptive statistics like mean, median, mode, SD, kurtosis, SE of kurtosis, skewness and SE of skewness of the total sample were calculated.

Statistical indices of distribution the pretest scores and posttest scores of Emotion Regulation and its components obtained for the experimental group are indicated in table 71.

Table 71

Statistical Indices of Distribution of the Pretest Scores and Posttest Scores of Emotion Regulation and its Components Obtained for Experimental Group

Group	Variable	Mean	Median	Mode	Std. Deviation	Skewness	Kurtosis
Pretest	Identifying	21.53	22.00	21.00	3.10	0.04	-0.35
	Processing	59.72	60.00	63.00	5.43	-0.62	0.61
	Expressing	66.67	66.00	66.00	4.25	-0.03	0.40
	Emotion Regulation	147.93	147.00	146.00	8.44	-0.94	1.68
Posttest	Identifying	25.42	25.00	27.00	3.49	0.37	-0.44
	Processing	66.60	66.00	62.00	6.86	0.70	1.26
	Expressing	74.37	73.00	71.00	7.76	1.02	1.45
	Emotion Regulation	166.40	163.00	160.00	15.23	1.04	2.65

SE of Skewness-0.361 , SE of Kurtosis- 0.709

Table 71 shows that mean (21.53), median (22), and mode (21) of pretest scores for component Identifying are almost equal. The indices of skewness (0.04) and kurtosis (-0.35) indicate the distribution is positively skewed and platykurtic. Mean (59.72), median (60) and mode (63) of pretest scores of component Processing are almost equal. The indices of skewness (-0.62) and kurtosis (0.61) indicate the distribution is negatively skewed and leptokurtic. Mean (66.67), median (66) and mode (66) of pretest scores of component Expressing are almost equal. The indices of skewness (-0.03) and kurtosis (0.40) indicate the distribution is negatively skewed and leptokurtic. Mean (147.93), median (147) and mode (146) of pretest scores of Emotion Regulation are almost equal. The indices of skewness (-0.94) and kurtosis (1.68) indicate the distribution is negatively skewed and leptokurtic.

Table 71 shows that mean (25.42), median (25), and mode (27) of posttest scores of dimension Identifying are almost equal. The indices of skewness (0.37) and kurtosis (-0.44) indicate the distribution is positively skewed and platykurtic. Mean (66.60), median (66) and mode (62) of posttest scores of dimension

processing are almost equal. The indices of skewness (0.70) and kurtosis (1.20) indicate the distribution is positively skewed and leptokurtic. Mean (74.37), median (73) and mode (71) of posttest scores of dimension Expressing are almost equal. The indices of skewness (1.02) and kurtosis (1.45) indicate the distribution is positively skewed and leptokurtic. Mean (166.40), median (163) and mode (160) of posttest scores of Emotion regulation are almost equal. The indices of skewness (1.04) and kurtosis (2.65) indicate the distribution is posititively skewed and leptokurtic.

The graphical representations of the pretest and posttest scores of the variable E Emotion Regulation and its components of experimental group are presented in figure 34 and figure 35 respectively.

Figure 34

Smoothed Frequency Curves of Pretest Scores of Emotion Regulation and its Components in Experimental Group

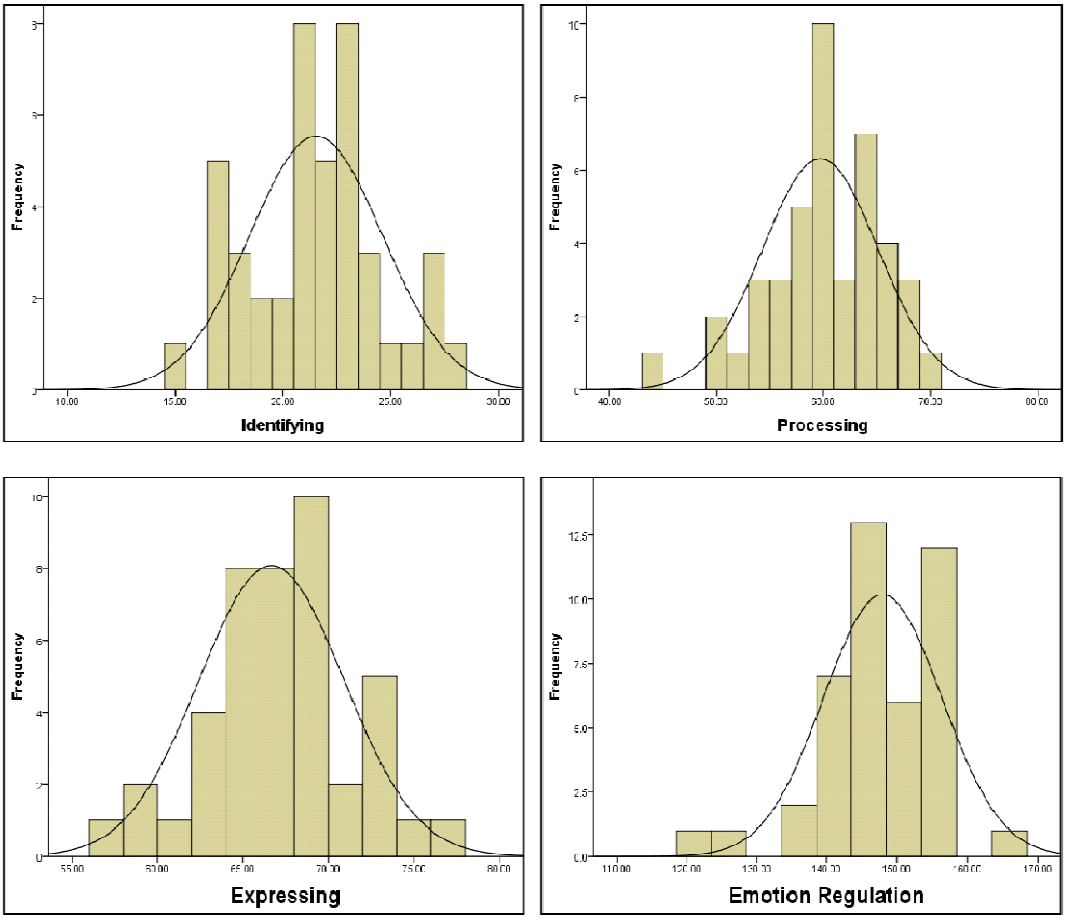
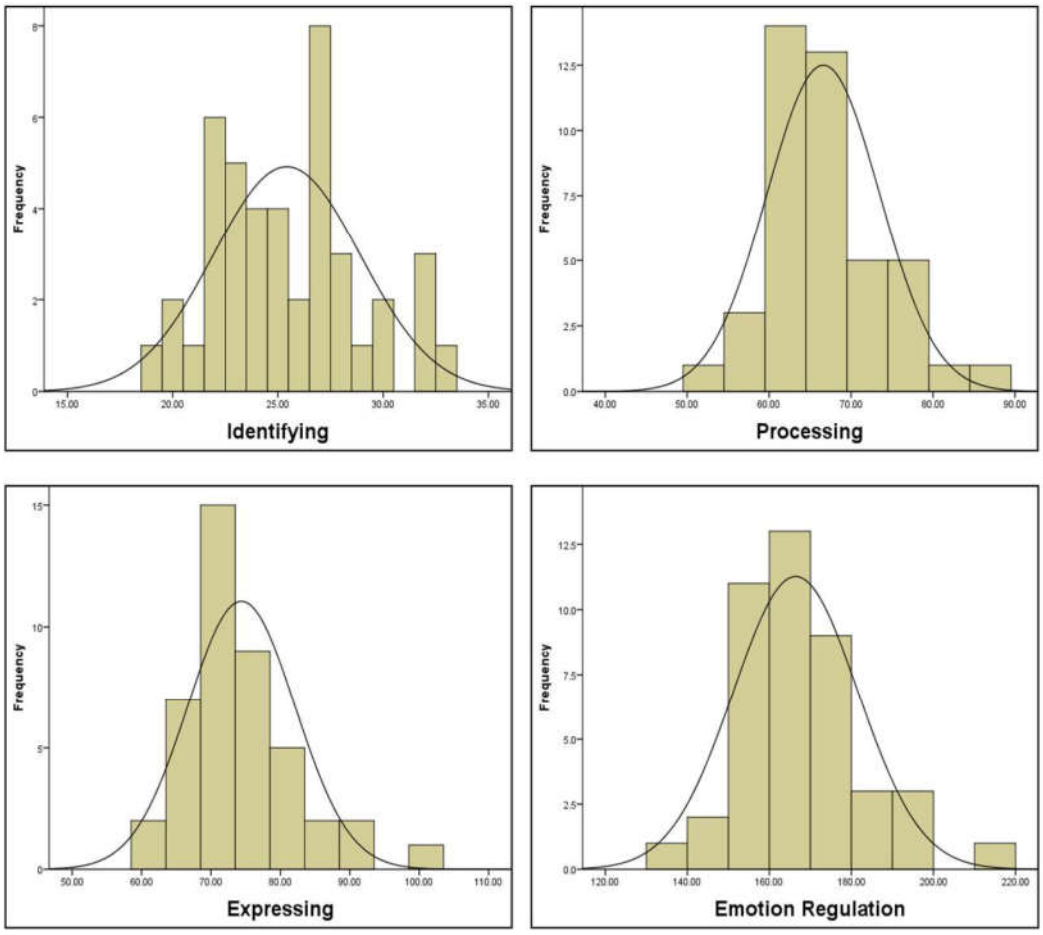


Figure 35

Smoothed Frequency Curves of Posttest Scores of Emotion Regulation and its Components in Experimental Group



Both the statistical constants and graphical representations of the pretest and posttest score of Emotion Regulation and its components of experimental group reveal that the distributions are approximately normal.

Statistical indices of distribution of pretest scores and posttest scores of Emotion Regulation and its components obtained for the control group are indicated in table 72.

Table 72

Statistical Indices of Distribution of Pretest Scores and Posttest Scores of Emotion Regulation and its Components Obtained for the Control Group

Group	Variable	Mean	Median	Mode	Std. Deviation	Skewness	Kurtosis
Pretest	Identifying	22.50	23.00	23.00	2.90	-0.22	-0.24
	Processing	60.11	59.00	53.00	6.31	0.02	-0.69
	Expressing	68.91	70.00	70.00	4.84	-0.47	-0.23
	Emotion Regulation	151.52	153.00	142.00	9.95	-0.35	-0.21
Posttest	Identifying	23.41	23.00	24.00	3.70	0.28	-0.32
	Processing	60.76	61.00	61.00	5.97	-0.26	0.46
	Expressing	69.87	70.00	70.00	4.11	-0.25	-0.32
	Emotion Regulation	154.04	155.00	159.00	10.99	-0.16	-0.28

SE of Skewness-0.35, SE of Kurtosis- 0.69

Table 72 shows that mean (22.5), median (23), and mode (23) of pretest scores of dimension Identifying are almost equal. The indices of skewness (-0.22) and kurtosis (-0.24) indicate the distribution is negatively skewed and platykurtic. Mean (60.11), median (59) mode (53) of pretest scores of dimension Processing are almost equal. The indices of skewness (0.02) and kurtosis (-0.69) indicate the distribution is positively skewed and platykurtic. Mean (68.91), median (70) and mode (70) of pretest scores of dimension Expressing are almost equal. The indices of skewness (-0.47) and kurtosis (-0.23) indicate the distribution is negatively skewed and platykurtic. Mean (151.52), median (153) and mode (142) of pretest scores of Emotion Regulation are almost equal. The indices of skewness (-0.35) and kurtosis (-0.21) indicate the distribution is positively skewed and platykurtic.

Table 72 shows that mean (23.41), median (23), and mode (24) of posttest scores of dimension Identifying are almost equal. The indices of skewness (0.28) and kurtosis (-0.32) indicate the distribution is positively skewed and platykurtic. Mean

(60.76), median (61) and mode (61) of posttest scores of dimension Processing are almost equal. The indices of skewness (-0.26) and kurtosis (0.46) indicate the distribution is negatively skewed and leptokurtic. Mean (69.87), median (70) and mode (70) of posttest scores of dimension - Expressing are almost equal. The indices of skewness (-0.25) and kurtosis (-0.32) indicate the distribution is negatively skewed and platykurtic. Mean (154.04), median (155) and mode (159) of posttest scores of Emotion Regulation are almost equal. The indices of skewness (-0.16) and kurtosis (-0.28) indicate the distribution is negatively skewed and platykurtic.

The graphical representations of the pretest and posttest scores of the variable Emotion Regulation and its components of control group are presented in figure 36 and figure 37 respectively.

Figure 36

Smoothed Frequency Curves of Pretest Scores of Emotion Regulation and its Components in Control Group

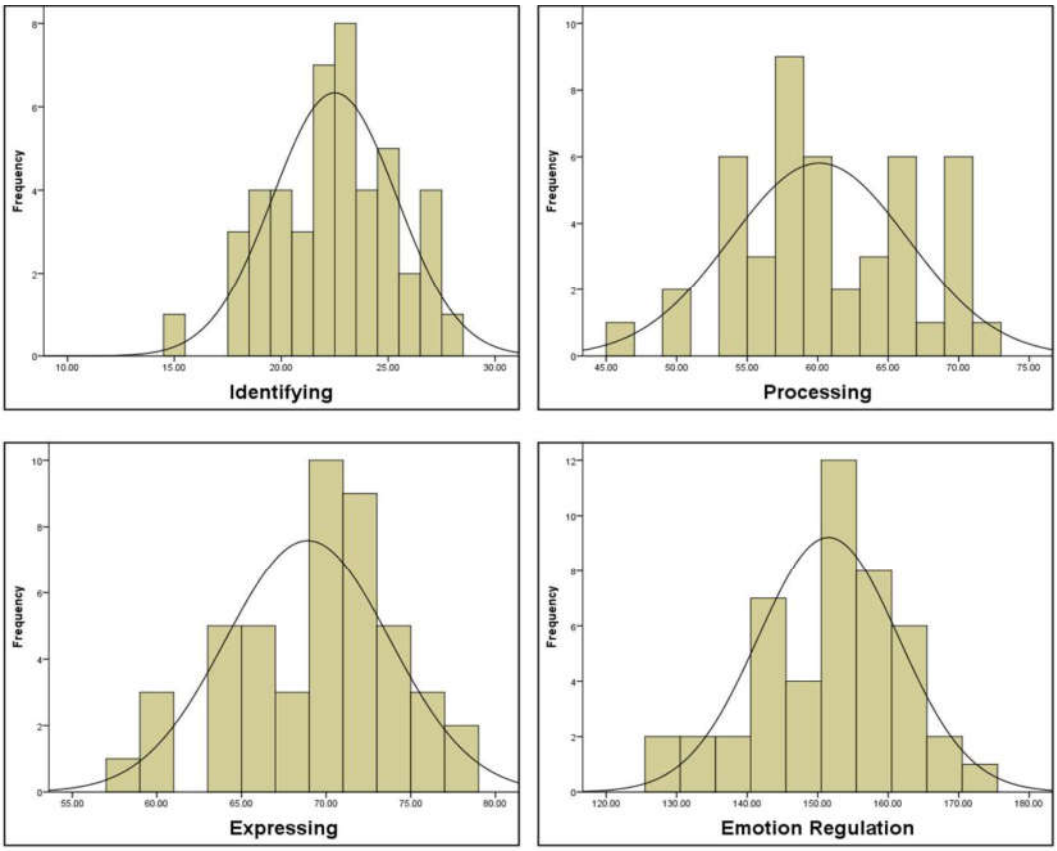
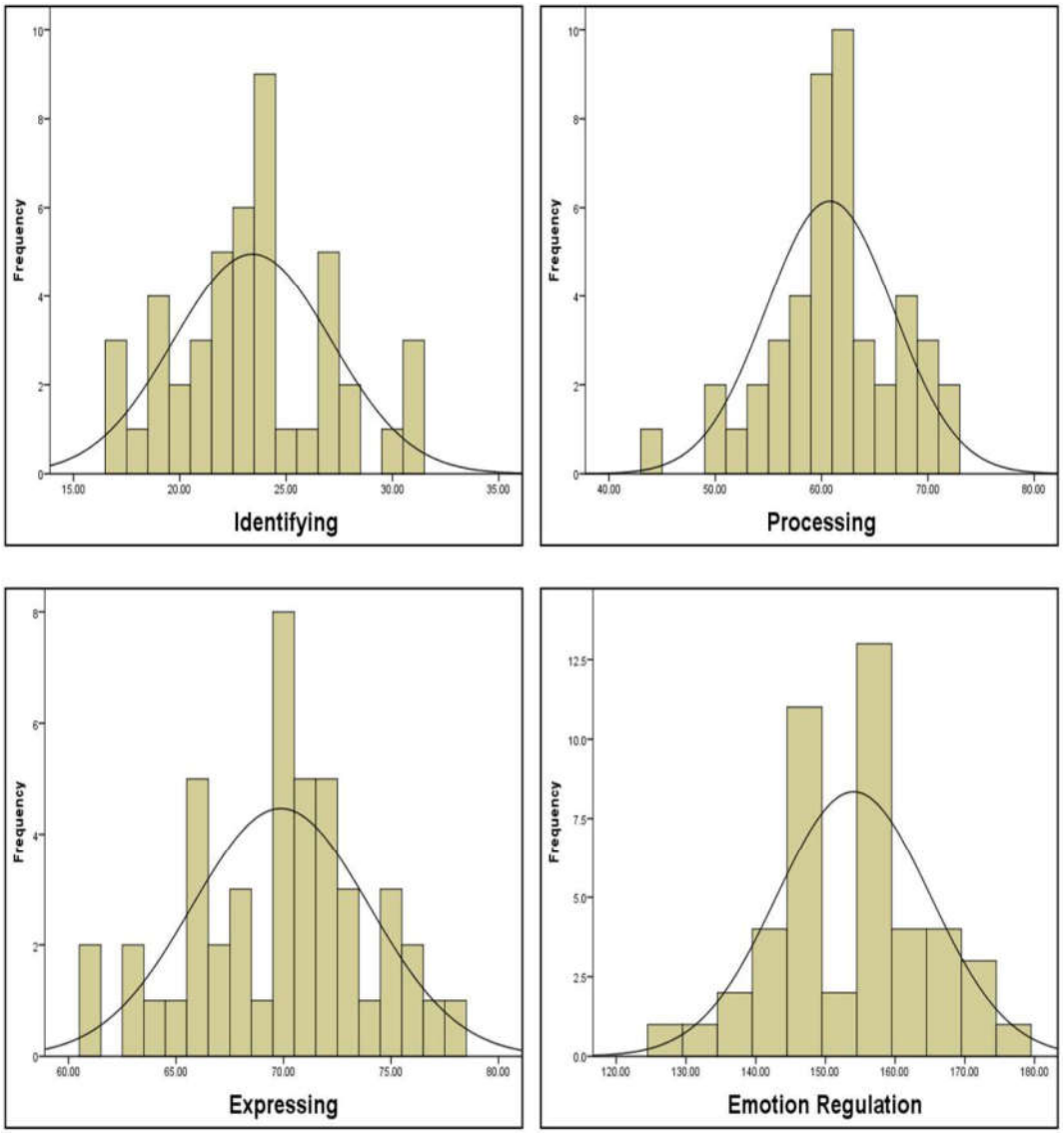


Figure 37

Smoothed Frequency Curves of Posttest Scores of Emotion Regulation and its Components in Control Group



Comparison of Mean Scores of Pretest of Emotion Regulation and its Components in Experimental and Control Groups

The mean scores of the initial level of Emotion Regulation and its components (pretest) of experimental and control groups were compared using two-tailed test of significance of difference between means for large independent groups. The details of the data and results are presented in table 73.

Table 73

Details of Comparison of Mean Pretest Scores of Emotion Regulation and its Components in Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Identifying	Experimental group	43	21.53	3.10	1.52
	Control group	46	22.50	2.90	
Processing	Experimental group	43	59.72	5.43	0.31
	Control group	46	60.11	6.31	
Expressing	Experimental group	43	66.67	4.25	2.31*
	Control group	46	68.91	4.84	
Emotion Regulation	Experimental group	43	147.93	8.44	1.83
	Control group	46	151.52	9.95	

* Significant at 0.05 level

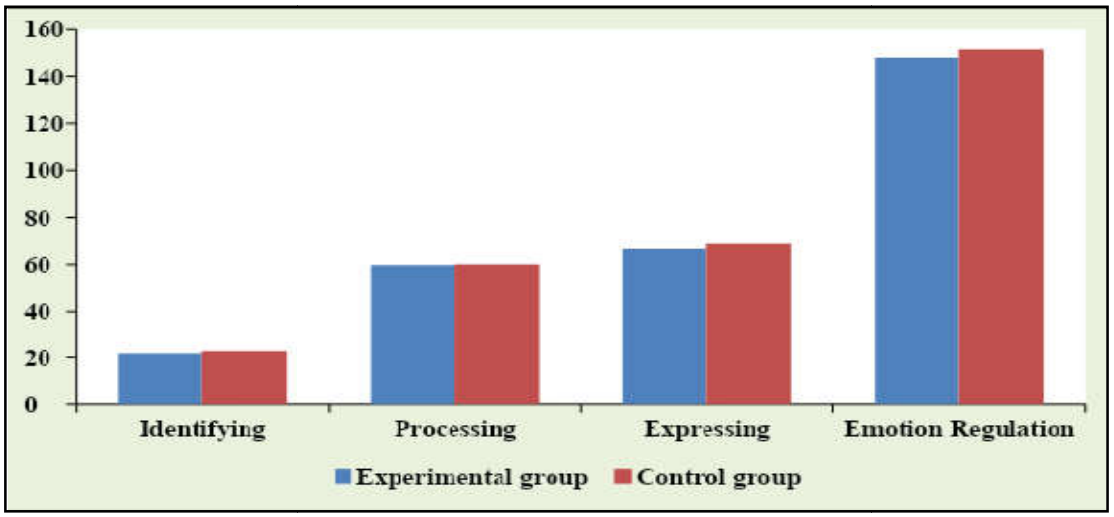
Table 73 shows that experimental and control group do not differ significantly in their mean pretest scores on Emotion Regulation (t= 1.83, p > 0.05) and its components Identifying (t= 1.52, p > 0.05) and Processing (t= .31, p > 0.05). It is evident that the initial level mean scores of Emotion Regulation and its component Identifying and Processing in experimental group and control group are almost equal.

Table 73 also reveals that experimental and control groups differ significantly in their mean pretest scores of dimension Expressing (t= 2.31, p < 0.05). It reflects that two groups differ significantly in the initial level mean scores of dimension Expressing. Further mean scores of dimension Expressing, shows that higher mean scores lies in control group. It means control group scored higher than experimental group.

Table 73 also reveals that experimental and control groups differ significantly in their mean pretest scores on Expressing (t= 2.31, p < 0.05). It shows that, two groups differ significantly in the initial level mean scores of component Expressing. Further mean scores on Expressing shows that higher mean score found in control group. It means that, control group excel in mean scores of component Expressing than the experimental group.

Figure 38

Mean Pretest Scores of Emotion Regulation and its Components in Experimental and Control Groups



Comparison of Mean Posttest Scores of Emotion Regulation and its Components in Experimental and Control Groups

The mean posttest scores of Emotion regulation and its components viz., Identifying, Processing and Expressing of experimental and control groups were compared using the two-tailed test of significance of difference between means for large independent samples. Data and results of the analysis are presented in table 74.

Table 74

Details of Comparison of Mean Posttest Scores of Emotion Regulation and its Components in Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Identifying	Experimental group	43	25.42	3.49	2.63**
	Control group	46	23.41	3.70	
Processing	Experimental group	43	66.60	6.86	4.29**
	Control group	46	60.76	5.97	
Expressing	Experimental group	43	74.37	7.76	3.45**
	Control group	46	69.87	4.11	
Emotion Regulation	Experimental group	43	166.40	15.23	4.10**
	Control group	46	154.04	10.99	

** Significant at 0.01 level

From table 74, it is clear that the critical ratio for the posttest mean score of dimension Identifying is 2.63 for experimental and control groups. This value is higher than the tabled value (2.58) for significance at .01 level**.** Thus posttest mean scores of dimension Identifying of the experimental group (25.42) is higher than that of control group (23.41). It is understood that in the posttest, students taught with collaborative problem based learning have higher score in dimension Identifying compared to that of students who taught with existing method of teaching.

Table 74 shows that the critical ratio for the posttest mean score of dimension Processing is 4.29 for experimental and control groups. This value is higher than the tabled value (2.58) for significance at .01 level. So posttest mean scores of dimension Processing of the experimental group (66.60) is higher than that of control group (60.76). It revealed that in the posttest, students who gone through Collaborative Problem based Learning have higher score for the component Processing compared to that of students who taught with existing method of teaching.

From table 74, it is clear that the obtained critical ratio for the posttest mean score of dimension Expressing is 3.45 for experimental and control groups. This value is higher than the tabled value (2.58) for significance at .01 level. Thus posttest mean scores of dimension Expressing of the experimental group (74.37) is higher than that of control group (69.87). It is evident that in the posttest, students taught with Collaborative Problem based Learning have higher score in component Expressing compared to that of students who got instruction with existing method of teaching.

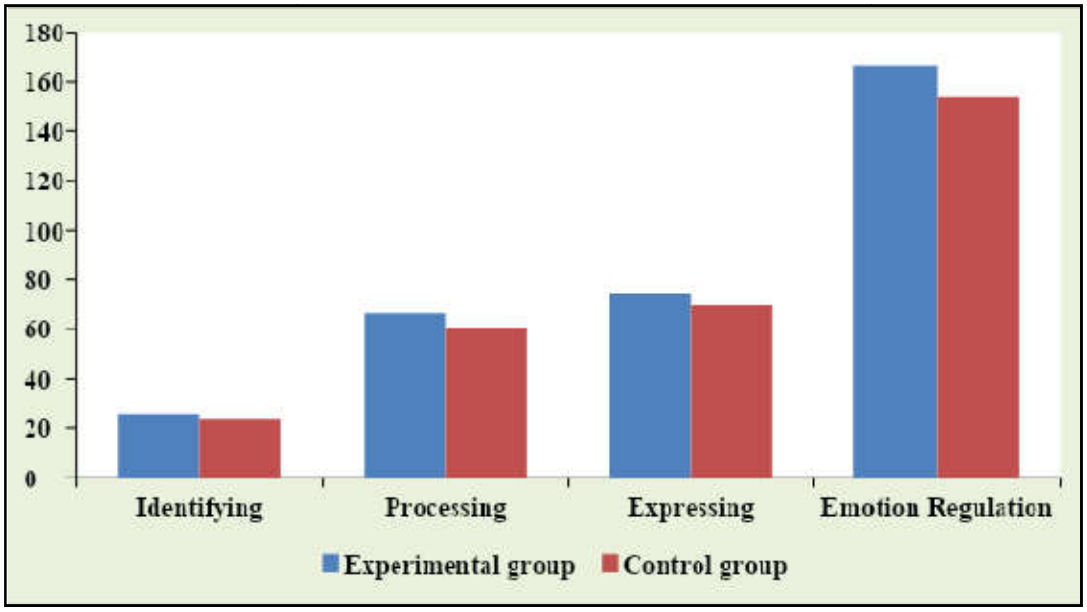
Table 74 shows that the critical ratio for the posttest mean score on Emotion Regulation is 4.10 for experimental and control groups. This value is higher than the tabled value (2.58) for significance at .01 levels. As posttest mean scores on Emotion Regulation of the experimental group (166.40) is higher than that of control group (154.04). It reflects that in the posttest, students taught with Collaborative

Problem based Learning have higher score in Emotion Regulation compared to that of students who got instructions on existing method of teaching.

The graphical representation of the comparison of posttest mean scores of Emotion Regulation and its components viz., Identifying, Processing and Expressing of the experimental group and control group is shown in figure 39.

Figure 39

Mean Posttest Scores of Emotion Regulation and its Components in Experimental and Control Groups



Comparison of Mean Pretest and Posttest Scores of Emotion Regulation and its Components between Male Students in Experimental and Control Groups

Data and results of the comparison of mean pretest scores of Emotion Regulation and its components between male students in experimental and Control groups are presented in table 75.

Table 75

Details of Comparison of Mean Pretest Scores of Emotion Regulation and its Components between Male Students in Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Identifying	Experimental group	26	21.69	3.28	1.90
	Control group	34	23.12	2.52	
Processing	Experimental group	26	59.19	3.93	.469
	Control group	34	59.85	6.30	
Expressing	Experimental group	26	67.46	4.56	1.05
	Control group	34	68.82	5.27	
Emotion Regulation	Experimental group	26	148.35	6.97	1.52
	Control group	34	151.79	9.78	

Table 75 shows that experimental and control group of male students do not differ significantly in their mean pretest scores on Emotion Regulation (t= 1.52, p > 0.05) and its component Identifying (t= 1.90, p > 0.05), component Processing (t = .469, p > 0.05) and component Expressing (t= 1.05, p > 0.05) (table value of t (58) = 2.00 at 0.05 level of significance). It shows that initial level mean scores of Emotion Regulation and its components Identifying, Processing and Expressing of the male students in experimental group and control group are almost equal.

Data and results of the comparison of mean posttest scores of Emotion regulation and its components between male students in experimental and Control groups are presented in table 76.

Table 76

Details of Comparison of Mean Posttest Scores of Emotion Regulation and its Components between Male Students in Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Identifying	Experimental group	26	25.42	3.05	1.68
	Control group	34	23.88	3.83	
Processing	Experimental group	26	65.92	5.89	3.32**
	Control group	34	61.00	5.53	
Expressing	Experimental group	26	74.19	6.44	3.12**
	Control group	34	69.94	4.09	
Emotion Regulation	Experimental group	26	165.54	12.04	3.63**
	Control group	34	154.82	10.73	

** Significant at 0.01 level

Table 76 shows that the critical ratio for the posttest mean score of dimension Identifying is 1.68 for experimental and control groups. This value is lower than the tabled value for significance at .05 level (table value of t (58) = 2.00). It is evident that in posttest, male students who taught with Collaborative Problem based Learning is not significantly differ in the score from male students taught with conventional method on component Identifying.

From Table 76, it is clear that the critical ratio for the posttest mean score of dimension Processing is 3.32 for male students in experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (58) = 2.66). As posttest mean scores on Processing of male students in experimental group (65.92) is higher than that of control group (61). It is clear that in posttest, male students taught with collaborative problem based learning have higher score in component Processing compared to that of male students taught with conventional method.

From table 76, it is clear that the obtained critical ratio for the posttest mean score of dimension Expressing is 3.12 for male students in experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (58) = 2.66). Thus posttest mean scores of dimension Expressing in experimental group (74.19) is higher than that of control group (69.94).It reflects that in posttest, male students taught with Collaborative Problem based Learning have higher score in dimension Expressing compared to that of male students taught with conventional method.

Table 76 shows that the critical ratio for the posttest mean score of Emotion Regulation is 3.63 for male students in experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (58) = 2.66).Therefore the posttest mean scores of Emotion regulation in experimental group (165.54) is higher than that of control group (154.82). It reflects that in posttest, male students taught with Collaborative Problem based Learning have higher score in Emotion Regulation compared to that of male students taught with conventional method.

Comparison of Mean Pretest and Posttest Scores of Emotion Regulation and its Components between Female Students in Experimental and Control Groups

Data and results of the comparison of mean pretest scores of Emotion Regulation and its components between female students in experimental and Control groups are presented in table 77.

Table 77

Details of Comparison of Mean Pretest Scores of Emotion Regulation and its Components between Female Students in Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Identifying	Experimental group	17	21.29	2.87	.474
	Control group	12	20.75	3.28	
Processing	Experimental group	17	60.53	7.21	.116
	Control group	12	60.83	6.58	
Expressing	Experimental group	17	65.47	3.50	2.79*
	Control group	12	69.17	3.51	
Emotion Regulation	Experimental group	17	147.29	10.50	.861
	Control group	12	150.75	10.86	

** Significant at 0.01 level

Table 77 shows that experimental and control group of female students do not differ significantly in their mean pretest scores of Emotion Regulation (t= 0.861, p > 0.05) and its components Identifying (t= .474, p > 0.05) and Processing (t= .116, p > 0.05) (table value of t (27) = 2.05 at 0.05 level of significance). It shows that the initial level mean scores of Emotion regulation and its components Identifying and Processing of the female students in experimental group and control group are almost equal.

From table 77, it is clear that the obtained critical ratio for the pretest mean score of dimension Expressing is 2.79 for female students in experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (27) = 2.77).Thus the pretest mean scores on Expressing in experimental group (65.47) is less than that of control group (69.17). It means that initial level of Expressing is significantly differ among female students in experimental and control group.

Comparison of Mean Posttest Scores of Emotion Regulation and its Components between Female Students in Experimental and Control Groups

Data and results of the comparison of mean posttest scores of Emotion Regulation and its components between female students of experimental and control groups are presented in table 78.

Table 78

Details of Comparison of Mean Posttest Scores of Emotion Regulation and its Components between Female Students in Experimental and Control Groups

Variable	Group	N	Mean	SD	t value
Identifying	Experimental group	17	25.41	4.17	2.34*
	Control group	12	22.08	3.09	
Processing	Experimental group	17	67.65	8.22	2.55*
	Control group	12	60.08	7.32	
Expressing	Experimental group	17	74.65	9.65	1.66
	Control group	12	69.67	4.33	
Emotion Regulation	Experimental group	17	167.71	19.47	2.50*
	Control group	12	151.83	11.90	

* Significant at 0.05 level

Table 78 shows that the critical ratio for the posttest mean score of dimension Identifying is 2.34 for female students in experimental and control groups. This value is higher than the tabled value for significance at .05 level (table value of t (27) = 2.05). Thus posttest mean scores of dimension Identifying of the female students in experimental group (25.41) is higher than that of control group (22.08). It is evident that in posttest, female students taught with Collaborative Problem based Learning have higher score in component Identifying compared to that of female students taught with conventional method.

From Table 78, it is clear that the critical ratio for the posttest mean score of dimension Processing is 2.55 for female students in experimental and control

groups. This value is higher than the tabled value for significance at .05 level (table value of t (27) = 2.05). As posttest mean scores on Processing of the female students in experimental group (67.65) is higher than that of control group (60.08). It is evident that in posttest, female students taught with Collaborative Problem based Learning have higher score of component Processing compared to that of female students taught with conventional method.

From table 78, it is clear that the obtained critical ratio for the posttest mean score of dimension expressing is 1.66 for female students in experimental and control groups. This value is less than the tabled value for significance at .05 level (table value of t (27) = 2.05). It is clear that in posttest, female students taught with Collaborative Problem based Learning had no difference in the score on dimension, Expressing compared to that of female students who got instruction on conventional method.

Table 78 shows that the critical ratio for the posttest mean score of Emotion Regulation is 2.50 for female students in experimental and control groups. This value is higher than the tabled value for significance at .01 level (table value of t (27) = 2.05). Therefore the posttest mean scores on emotion regulation in experimental group (167.71) is higher than that of control group (151.83).It is clear that in posttest, female students taught with Collaborative Problem based Learning have higher score in Emotion Regulation compared to that of female students taught with conventional method.

Comparison of Mean Scores of Pretest and Posttest of Emotion Regulation and its Components in Experimental Group

The mean scores of Emotion Regulation and its components viz., Identifying, Processing and Expressing in both pre- test and posttest for the experimental group was compared using paired sample t test. Data and results of the analysis are presented in table 79.

Table 79

Details of Comparison of Mean Scores of Emotion Regulation and its Components in Pretest and Posttest of Experimental Group (N= 43)

Variable	Group	Mean	SD	r	t value
Identifying	Posttest	25.42	3.49	.559	8.19**
	Pretest	21.53	3.10		
Processing	Posttest	66.60	6.86	.514	7.29**
	Pretest	59.72	5.43		
Expressing	Posttest	74.37	7.76	.327	6.70**
	Pretest	66.67	4.25		
Emotion Regulation	Posttest	166.40	15.23	.554	9.55**
	Pretest	147.93	8.44		

** Significant at 0.01 level

Table 79 shows that the critical ratio for mean score on Identifying is 8.19 and coefficient of correlation is .559. The t-value is greater than the tabled value at .01 level of significance. Obtained values of mean scores indicate that the mean score of dimension Identifying in posttest is higher than that in pretest among the students who taught with Collaborative Problem based Learning.

Table 79 shows that the critical ratio for mean score of dimension Processing is 7.29 and coefficient of correlation is .514. The t-value is greater than the tabled value at .01 level of significance. Obtained values of mean scores indicate that the mean score of Processing in posttest is higher than that in pretest among the students taught with Collaborative Problem based Learning.

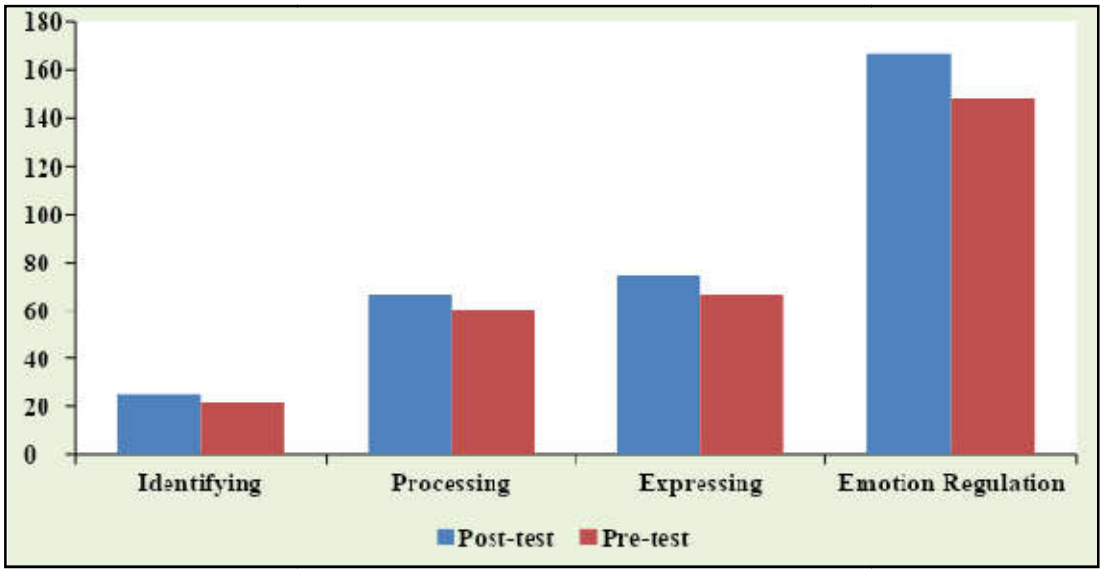
From table 79 it is clear that the critical ratio for mean score of dimension Expressing is 6.70 and coefficient of correlation is .327. The t-value is greater than the tabled value at .01 level of significance. Obtained values of mean scores indicate that the mean score of dimension Expressing in posttest is higher than that in pretest among the students taught with Collaborative Problem based Learning.

Table 79 shows that the critical ratio for mean score of Emotion Regulation is 9.55 and coefficient of correlation is .554. The t-value is greater than the tabled value at .01 level of significance. Obtained values of mean scores indicate that the mean score of Emotion Regulation in posttest is higher than that in pretest among the students who taught with collaborative problem based learning.

Graphical representation of comparison of mean scores of Emotion Regulation and its components viz., Identifying, Processing and Expressing in pretest and posttest for the experimental group is presented in figure 40.

Figure 40

Graphical Representation of Comparison of Mean Scores of Emotion Regulation and its Components in Pretest and Posttest for the Experimental Group



Comparison of Mean Scores of Pretest and Posttest of Emotion Regulation and its Components for Male Students in Experimental Group

Data and results of the analysis of comparison of mean scores of pretest and posttest on Emotion Regulation and its components for the male students in experimental group is presented in table 80.

Table 80

Details of Comparison of Mean Scores of Emotion Regulation and its Components in Pretest and Posttest for the Male Students in Experimental Group (N= 26)

Variable	Group	Mean	SD	r	t value
Identifying	Posttest	25.42	3.05	.517	6.10**
	Pretest	21.69	3.28		
Processing	Posttest	65.92	5.89	.423	6.21**
	Pretest	59.19	3.93		
Expressing	Posttest	74.19	6.44	.385	5.45**
	Pretest	67.46	4.56		
Emotion Regulation	Posttest	165.54	12.04	.532	8.59**
	Pretest	148.35	6.97		

** Significant at 0.01 level

Table 80 shows that the critical ratio for mean score of dimension Identifying is 6.10 and coefficient of correlation is .517. The t-value is greater than the tabled value at .01 level of significance (table value of t (25) = 2.79). Obtained values of mean scores indicate that the mean score of Identifying in posttest is higher than in pretest among male students taught with collaborative problem based learning.

Table 80 shows that the critical ratio for mean score of dimension Processing is 6.21 and coefficient of correlation is .423. The t-value is greater than the tabled value at .01 level of significance (table value of t (25) = 2.79). Obtained values of mean scores indicate that the mean score of dimension Processing in posttest is higher than that in pretest among male students taught with collaborative problem based learning.

From table 80, it is clear that the critical ratio for mean score of dimension Expressing is 5.45 and coefficient of correlation is .385. The t-value is greater than the tabled value at .01 level of significance (table value of t (25) = 2.79). Obtained values of mean scores indicate that the mean score of Expressing in posttest is

higher than that in pretest among male students taught with Collaborative Problem based Learning.

Table 80 shows that the critical ratio for mean score on Emotion Regulation is 8.59 and coefficient of correlation is .532. The t-value is greater than the tabled value at .01 level of significance (table value of t (25) = 2.79). Obtained values of mean scores indicate that the mean score of Emotion Regulation in posttest is higher than that in pretest among male students taught with Collaborative Problem based Learning.

Comparison of Mean Scores of Pretest and Posttest of Emotion Regulation and its Components for Female Students in Experimental Group

Data and results of the analysis of comparison of mean scores of pretest and posttest on Emotion Regulation and its components for the female students in experimental group is presented in table 81.

Table 81

Details of Comparison of Mean Scores of Emotion Regulation and its Components in Pretest and Posttest for the Female Students in Experimental Group (N= 17)

Variable	Group	Mean	SD	r	t value
Identifying	Posttest	25.41	4.17	.648	5.34**
	Pretest	21.29	2.87		
Processing	Posttest	67.65	8.22	.565	4.05**
	Pretest	60.53	7.21		
Expressing	Posttest	74.65	9.65	.331	4.15**
	Pretest	65.47	3.50		
Emotion Regulation	Posttest	167.71	19.47	.580	5.29**
	Pretest	147.29	10.50		

** Significant at 0.01 level

Table 81 shows that the critical ratio for mean score of dimension Identifying is 5.34 and coefficient of correlation is .648. The t-value is greater than the tabled value at .01 level of significance (table value of t (16) = 2.92). Obtained values of mean scores indicate that mean score of Identifying in posttest is higher than that in pretest among female students taught with Collaborative Problem based Learning.

Table 81 shows that the critical ratio for mean score of dimension Processing is 4.05 and coefficient of correlation is .565. The t-value is greater than the tabled value at .01 level of significance (table value of t (16) = 2.92). Obtained values of mean scores indicate that the mean score of Processing in posttest is higher than that in pretest among female students taught with Collaborative Problem based Learning.

From table 81, it is clear that the critical ratio for mean score of dimension Expressing is 4.15 and coefficient of correlation is .331. The t-value is greater than the tabled value at .01 level of significance (table value of t (16) = 2.92). Obtained values of mean scores indicate that the mean score of Expressing in posttest is higher than that in pretest among the female students taught with Collaborative Problem based Learning.

Table 81 shows that the critical ratio for mean score on Emotion Regulation is 5.29 and coefficient of correlation is .580. The t-value is greater than the tabled value at .01 level of significance (table value of t (16) = 2.92). Obtained values of mean scores indicate that the mean score of Emotion Regulation in posttest is higher than that in pretest among female students taught with Collaborative Problem based Learning.

Comparison of Mean Scores of Pretest and Posttest on Emotion Regulation and its Components in Control Group

The mean scores of Emotion Regulation and its components viz., Identifying, Processing and Expressing in both pre- test and posttest for the control

group was compared using paired sample t test. Data and results of the analysis are presented in table 82.

Table 82

Details of Comparison of Mean Scores of Emotion Regulation and its Components in Pretest and Posttest in Control Group (N= 46)

Variable	Group	Mean	SD	r	t value
Identifying	Posttest	23.41	3.70	.426	1.72
	Pretest	22.50	2.90		
Processing	Posttest	60.76	5.97	.703	.932
	Pretest	60.11	6.31		
Expressing	Posttest	69.87	4.11	.794	2.19*
	Pretest	68.91	4.84		
Emotion Regulation	Posttest	154.04	10.99	.788	2.48*
	Pretest	151.52	9.95		

* Significant at 0.05 level

Table 82 shows that pretest and posttest scores of control group do not differ significantly in their mean scores of dimension Identifying ($t = 1.72$, $p > 0.05$, $r = .426$) and Processing ($t = .932$, $p > 0.05$, $r = .703$). It is clear that there is no significant difference in the mean pretest and posttest scores of Identifying and Processing for students taught with conventional method.

From table 82, it is clear that the critical ratio for mean score of dimension Expressing is 2.19 and coefficient of correlation is .794. The t-value is greater than the tabled value at .05 level of significance. Obtained values of mean scores indicate that the mean score of Expressing in posttest is higher than in pretest among the students taught with conventional method.

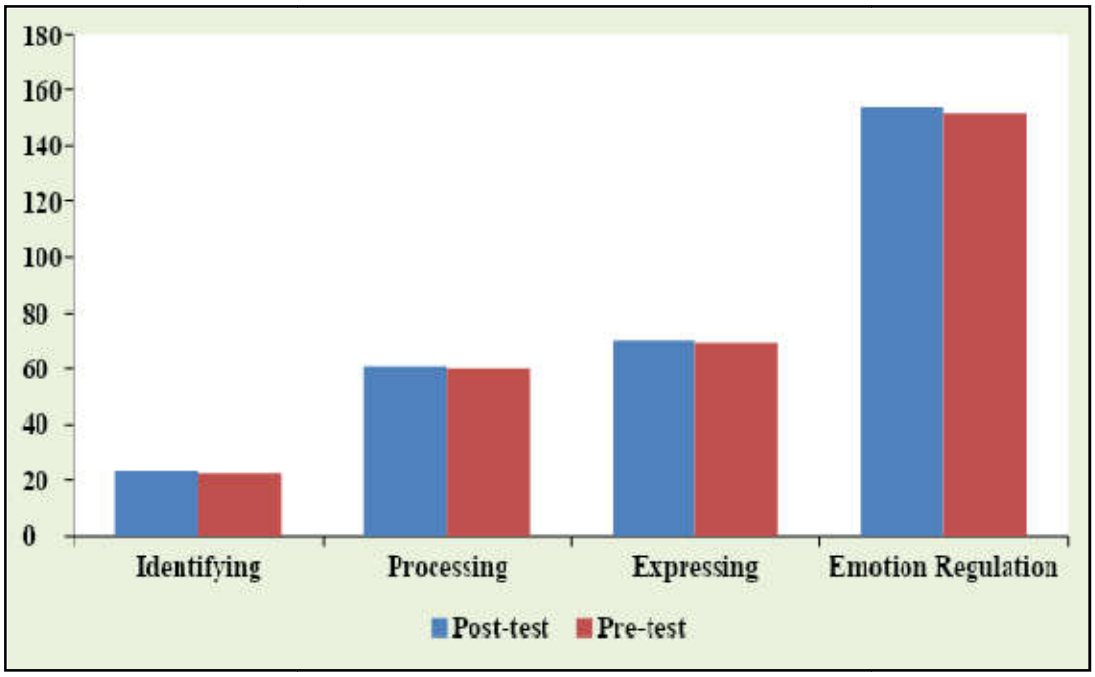
Table 82 shows that the critical ratio for mean score of Emotion Regulation is 2.48 and coefficient of correlation is .788. The t-value is greater than the tabled

value at.05 level of significance. Obtained values of mean scores indicate that the mean score of Emotion Regulation in posttest is higher than that in pretest among the students taught with conventional method.

Graphical representation of comparison of mean scores of Emotion Regulation and its components viz., Identifying, Processing and Expressing in pretest and posttest for the control group is presented in figure 41.

Figure 41

Graphical Representation of Comparison of Mean Scores of Emotion Regulation and its Components in Pretest and Posttest in Control Group



Comparison of Mean Scores of Pretest and Posttest of Emotion Regulation and its Components for Male Students in Control Group

Data and results of the analysis of comparison of mean scores of pretest and posttest on Emotion Regulation and its components for the male students in control group is presented in table 83.

Table 83

Details of Comparison of Mean Scores of Emotion Regulation and its Components in Pretest and Posttest for the Male Students in Control Group (N= 34)

Variable	Group	Mean	SD	r	t value
Identifying	Posttest	23.88	3.83	.507	1.33
	Pretest	23.12	2.52		
Processing	Posttest	61.00	5.53	.670	1.38
	Pretest	59.85	6.30		
Expressing	Posttest	69.94	4.09	.850	2.32*
	Pretest	68.82	5.27		
Emotion Regulation	Posttest	154.82	10.73	.875	3.39**
	Pretest	151.79	9.78		

* Significant at 0.05 level, ** Significant at 0.01 level

Table 83 shows that pretest and posttest scores of control group do not differ significantly in their mean scores of dimension Identifying (t= 1.33, p > 0.05, r= .507) and Processing (t= 1.38, p > 0.05, r= .67). It is evident that there is no significant difference in the mean pretest and posttest scores of Identifying and Processing for male students taught with conventional method.

From table 83, it is clear that the critical ratio for mean score of dimension Expressing is 2.32 and coefficient of correlation is .850. The t-value is greater than the tabled value at .05 level of significance. Obtained values of mean scores indicate that the mean score of Expressing in posttest is higher than that in pretest among male students taught with conventional method.

Table 83, shows that the critical ratio for mean score of Emotion Regulation is 3.39 and coefficient of correlation is .875. The t-value is greater than the tabled value at .01 level of significance. Obtained values of mean scores indicate that the mean score of Emotion Regulation in posttest is higher than that in pretest among male students taught with conventional method.

Comparison of Mean Scores of Pretest and Posttest of Emotion Regulation and its Components for Female Students in Control Group

Data and results of the analysis of comparison of mean scores of pretest and posttest on Emotion Regulation and its components for female students in control group is presented in table 84.

Table 84

Details of Comparison of Mean Scores of Emotion Regulation and its Components in Pretest and Posttest for Female Students in Control Group (N= 12)

Variable	Group	Mean	SD	r	t value
Identifying	Posttest	22.08	3.09	.056	1.05
	Pretest	20.75	3.28		
Processing	Posttest	60.08	7.32	.813	.603
	Pretest	60.83	6.58		
Expressing	Posttest	69.67	4.33	.637	.506
	Pretest	69.17	3.51		
Emotion Regulation	Posttest	151.83	11.90	.580	.359
	Pretest	150.75	10.86		

Table 84, shows that pretest and posttest scores of female students of control group do not differ significantly in their mean scores of Emotion Regulation (t= .359, p > 0.05, r= .580) and its components Identifying (t= .105, p > 0.05, r= .056) , Processing (t= .603, p > 0.05, r= .813) and Expressing (t= .506, p > 0.05, r= .637) (table value of t (11) = 2.20 at 0.05 level of significance). It shows that there is no significant difference in the mean pretest and posttest scores of Emotion Regulation and its components for female students taught with conventional method.

Comparison of Mean Posttest Scores of Emotion Regulation and its Components in Experimental and Control Group with First Terminal Exam Mark as Covariates

To find the effectiveness of collaborative problem based learning on enhancing emotion regulation and its components, ANCOVA applied with first terminal exam mark as covariate.

ANCOVA of Posttest Score on Identifying by Groups with First Terminal Exam Mark as Covariate

Details of ANCOVA of posttest score on identifying by groups with first terminal exam mark as covariate is presented in table 85.

Table 85

Summary of ANCOVA of Posttest Score on Identifying by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	101.97	2	50.98	3.93
Intercept	15035.31	1	15035.31	1159.63
First terminal exam mark	12.57	1	12.57	.97
Group	101.26	1	101.26	7.81**
Error	1115.04	86	12.96	
Total	54126.00	89		
Corrected Total	1217.01	88		

** Significant at 0.01 level

It is clear from the table 85, that the obtained F -ratio is 7.81, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 86) is 6.9 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of identifying in experimental group is 25.60 is significantly greater than control group which is 23.24. Therefore Collaborative Problem based Learning has significant effect in enhancing dimension Identifying

ANCOVA of Posttest Score on Processing by Groups with First Terminal Exam Mark as Covariate

Details of ANCOVA of posttest score on Processing by groups with first terminal exam mark as covariate is presented in table 86.

Table 86

Summary of ANCOVA of Posttest Score on Processing by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	784.04	2	392.02	9.47
Intercept	99979.40	1	99979.40	2416.88
First terminal exam mark	25.07	1	25.07	.606
Group	731.35	1	731.35	17.68**
Error	3557.57	86	41.36	
Total	364165.00	89		
Corrected Total	4341.61	88		

** Significant at 0.01 level

It is clear from the table 86 that the obtained F -ratio is 17.68, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 86) is 6.9 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Processing of experimental group is 66.86 is significantly greater than control group which is 60.52. It is clear that Collaborative Problem based Learning has significant effect in enhancing component Processing.

ANCOVA of Posttest Score on Expressing by Groups with First Terminal Exam Mark as Covariate

Details of ANCOVA of posttest score on Expressing by groups with first terminal exam mark as covariate is presented in table 87.

Table 87

Summary of ANCOVA of Posttest Score on Expressing by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	495.67	2	247.83	6.57
Intercept	128870.25	1	128870.25	3418.36
First terminal exam mark	45.11	1	45.11	1.19
Group	486.61	1	486.61	12.90**
Error	3242.15	86	37.69	
Total	465690.00	89		
Corrected Total	3737.82	88		

** Significant at 0.01 level

It is clear from the table 87, that the obtained F -ratio is 12.90, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 86) is 6.9 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Expressing of experimental group is 74.72 is significantly greater than control group which is 69.54. Therefore Collaborative Problem based Learning has significant effect in enhancing dimension Expressing.

ANCOVA of Posttest Score on Emotion Regulation by Groups with First Terminal Exam Mark as Covariate

Details of ANCOVA of posttest score on Emotion Regulation by groups with first terminal exam mark as covariate is presented in table 88.

Table 87

Summary of ANCOVA of Posttest Score on Emotion Regulation by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	3623.99	2	1812.00	10.42
Intercept	636482.97	1	636482.96	3663.09
First terminal exam mark	233.20	1	233.20	1.34
Group	3500.63	1	3500.63	20.15**
Error	14942.99	86	173.76	
Total	2297287.00	89		
Corrected Total	18566.99	88		

** Significant at 0.01 level

It is clear from the table 88, that the obtained F -ratio is 20.15, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 86) is 6.9 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Emotion Regulation of experimental group is 167.19 is significantly greater than control group which is 153.30. Hence Collaborative Problem based Learning has significant effect in enhancing Emotion Regulation.

Details of ANCOVA of posttest score of component identifying for male students by groups with first terminal exam mark as covariate is presented in table 89.

Table 89

Summary of ANCOVA of Posttest Score on Identifying of Male Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	35.91	2	17.96	1.43
Intercept	9835.31	1	9835.31	784.14
First terminal exam mark	.94	1	.944	.075
Group	22.62	1	22.63	1.80
Error	714.93	57	12.54	
Total	36913.00	60		
Corrected Total	750.85	59		

It is clear from the table 89 that the obtained F -ratio is 1.80, is less than the tabled value at 0.05 level of significance. The table value of F ratio for df (1, 57) is 4.01 at 0.05 level of significance. This means that there is no significant difference in the posttest scores of male students in the experimental and control groups after they have been adjusted for difference in the first terminal exam marks. Consequently Collaborative Problem based Learning has no effect on enhancing dimension Identifying for male students.

Details of ANCOVA of posttest score of component Processing for male students by groups with first terminal exam mark as covariate is presented in table 90.

Table 90

Summary of ANCOVA of Posttest Score of Component Processing of Male Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	357.155	2	178.577	5.432
Intercept	66376.946	1	66376.946	2019.174
First terminal mark	.067	1	.067	.002
Group	281.758	1	281.758	8.57**
Error	1873.779	57	32.873	
Total	241380.000	60		
Corrected Total	2230.933	59		

** Significant at 0.01 level

It is clear from the table 90, that the obtained F -ratio is 8.57, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 57) is 7.1 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of male students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of dimension Processing for male students

in experimental group is 65.94 is significantly greater than control group which is 60.98. Thus Collaborative Problem based Learning has significant effect in enhancing component Processing among male students.

Details of ANCOVA of posttest score of component Expressing of male students by groups with first terminal exam mark as covariate is presented in table 91.

Table 91

Summary of ANCOVA of Posttest Score of Component Expressing of Male Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	273.17	2	136.58	4.92
Intercept	84151.63	1	84151.63	3033.92
First terminal exam mark	6.91	1	6.91	.249
Group	172.88	1	172.88	6.23*
Error	1581.00	57	27.73	
Total	311025.00	60		
Corrected Total	1854.18	59		

* Significant at 0.05 level

It is clear from the table 91 that the obtained F -ratio is 6.23, is greater than the tabled value at 0.05 level of significance. The table value of F ratio for df (1, 57) is 4.01 at 0.05 level of significance. The significant F- ratio shows that the means of posttest scores of male students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of component Expressing of male students in experimental group is 73.98 is significantly greater than control group which is 70.1. Therefore the Collaborative Problem based Learning has significant effect in enhancing component Expressing among male students.

Details of ANCOVA of posttest score of Emotion Regulation for male students by groups with first terminal exam mark as covariate is presented in table 92.

Table 92

Summary of ANCOVA of Posttest Score of Emotion Regulation for Male Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	1702.69	2	851.34	6.54
Intercept	418478.84	1	418478.83	3218.09
First terminal exam mark	11.16	1	11.16	.086
Group	1203.46	1	1203.46	9.25**
Error	7412.23	57	130.04	
Total	1534892.000	60		
Corrected Total	9114.933	59		

** Significant at 0.01 level

It is clear from the table 92 that the obtained F -ratio is 9.25, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 57) is 7.1 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of male students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Emotion Regulation of male students in experimental group is 165.28 is significantly greater than control group which is 155.03. Thus Collaborative Problem based Learning has significant effect in enhancing Emotion Regulation among male students.

Details of ANCOVA of posttest score of component Identifying of female students by groups with first terminal exam mark as covariate is presented in table 93.

Table 93

Summary of ANCOVA of Posttest Score of Component Identifying of Female Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	99.18	2	49.59	3.56
Intercept	3764.43	1	3764.43	270.54
First terminal exam mark	21.25	1	21.25	1.52
Group	95.73	1	95.73	6.88*
Error	361.77	26	13.91	
Total	17213.00	29		
Corrected Total	460.96	28		

* Significant at 0.05 level

It is clear from the table 93 that the obtained F -ratio is 6.88, is greater than the tabled value at 0.05 level of significance. The table value of F ratio for df (1, 26) is 4.23 at 0.05 level of significance. The significant F- ratio shows that the means of posttest scores of female students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of component identifying of female students in experimental group is 25.63 is significantly greater than control group which is 21.77. Therefore Collaborative Problem based Learning has significant effect in enhancing component Identifying among female students.

Details of ANCOVA of posttest score of component Processing for female students by groups with first terminal exam mark as covariate is presented in table 94.

Table 94

Summary of ANCOVA of Posttest Score of Component Processing of Female Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	473.17	2	236.58	3.84
Intercept	26066.46	1	26066.46	423.56
First terminal exam mark	70.73	1	70.73	1.14
Group	468.13	1	468.13	7.61*
Error	1600.06	26	61.54	
Total	122785.00	29		
Corrected Total	2073.24	28		

* Significant at 0.05 level

It is clear from the table 94 that the obtained F -ratio is 7.61, is greater than the tabled value at 0.05 level of significance. The table value of F ratio for df (1, 26) is 4.23 at 0.05 level of significance. The significant F- ratio shows that the means of posttest scores of female students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of component Processing of female students in experimental group is 68.04 is significantly greater than control group which is 59.52. Thus Collaborative Problem based Learning has significant effect in enhancing component Processing among female students.

Details of ANCOVA of posttest score of component Expressing for female students by groups with first terminal exam mark as covariate is presented in table 95.

Table 95

Summary of ANCOVA of Posttest Score of Component Expressing of Female Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	376.78	2	188.39	3.27
Intercept	34826.15	1	34826.15	605.97
First terminal exam mark	202.30	1	202.30	3.52
Group	280.89	1	280.89	4.88*
Error	1494.24	26	57.47	
Total	154665.00	29		
Corrected Total	1871.03	28		

* Significant at 0.05 level

It is clear from the table 95, that the obtained F -ratio is 4.88, which is greater than the tabled value at 0.05 level of significance. The table value of F ratio for df (1, 26) is 4.23 at 0.05 level of significance. The significant F- ratio shows that the means of posttest scores of female students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of component Expressing of female students in experimental group is 75.32 is significantly greater than control group which is 68.72. Thus Collaborative Problem based Learning has significant effect in enhancing component Expressing among female students.

Details of ANCOVA of posttest score of Emotion Regulation for female students by groups with first terminal exam mark as covariate is presented in table 96.

Table 96

Summary of ANCOVA of Posttest Score on Emotion Regulation of Female Students by Groups with First Terminal Exam Mark as Covariate

Source	Sum of Squares	df	Mean Square	F
Corrected Model	2514.49	2	1257.25	4.75
Intercept	167627.86	1	167627.86	633.21
First terminal exam mark	742.25	1	742.24	2.80
Group	2321.37	1	2321.37	8.76**
Error	6882.95	26	264.72	
Total	762395.00	29		
Corrected Total	9397.45	28		

** Significant at 0.01 level

It is clear from the table 96 that the obtained F –ratio which is 8.76, is greater than the tabled value at 0.01 level of significance. The table value of F ratio for df (1, 26) is 7.72 at 0.01 level of significance. The significant F- ratio shows that the means of posttest scores of female students in the experimental and control groups differ significantly after they have been adjusted for difference in the first terminal exam marks. Further, the adjusted mean score of Emotion Regulation of female students in experimental group is 168.99 is significantly greater than control group which is 150.01. Thus Collaborative Problem based Learning has significant effect in enhancing Emotion Regulation among female students.

Effect Size of the Treatment on Scores of Emotion Regulation and its Components viz., Identifying, Processing and Expressing

The effect size of the Collaborative Problem based Learning on Emotion Regulations and its components viz., Identifying, Processing and Expressing in posttest of both experimental and control group was calculated for total sample, male and female. The data and results of the total sample are presented in table 97.

Table 97

Data and Result on the Effect Size of the Collaborative Problem based Learning on Emotion Regulation and its Components

Variable	Group	N	Mean	SD	Hedges g	r- value
Identifying	Experimental group	43	25.42	3.49	.55	.27
	Control group	46	23.41	3.70		
Processing	Experimental group	43	66.60	6.86	.90	.41
	Control group	46	60.76	5.97		
Expressing	Experimental group	43	74.37	7.76	.72	.34
	Control group	46	69.87	4.11		
Emotion Regulation	Experimental group	43	166.40	15.23	.93	.42
	Control group	46	154.04	10.99		

The Hedges g obtained on the mean posttest scores of component Identifying between experimental and control groups is 0.55 with an effect size .27 which is greater than the value needed for small effect ($r \geq .1$) that indicates a small effect of the collaborative problem based learning on component Identifying. It is clear that Collaborative Problem based Learning has small effect on enhancing component Identifying among secondary school students.

The Hedges g obtained on the mean posttest scores of component Processing between experimental and control groups is 0.90 with an effect size .41 which is greater than the value needed for medium effect ($r \geq .3$) that indicates a medium effect of the Collaborative Problem based Learning of component Processing. As Collaborative Problem based Learning has medium effect on enhancing component Processing among secondary school students.

The Hedges g obtained on the mean posttest scores of component Expressing between experimental and control groups is 0.72 with an effect size .34 which is greater than the value needed for medium effect ($r \geq .3$) that indicates a medium effect of the collaborative problem based learning on component Expressing. It is evident that the Collaborative Problem based Learning has medium effect on enhancing component Expressing among secondary school students.

The Hedges g obtained on the mean posttest scores of Emotion regulation between experimental and control groups is 0.93 with an effect size .42 which is

greater than the value needed for medium effect ($r \geq .3$) that indicates a medium effect of the Collaborative Problem based Learning on Emotion regulation. It is evident that the collaborative problem based learning has medium effect on enhancing Emotion Regulation among secondary school students.

The data and result on the effect size of the Collaborative Problem based Learning on Emotion Regulation and its components for male students is presented in table 98.

Table 98

Data and Result on the Effect Size of the Collaborative Problem Based Learning on Emotion Regulation and its Components for Male Students

Variable	Group	N	Mean	SD	Hedges g	r- value
Processing	Experimental group	26	65.92	5.89	.85	.39
	Control group	34	61.00	5.53		
Expressing	Experimental group	26	74.19	6.44	.80	.37
	Control group	34	69.94	4.09		
Emotion Regulation	Experimental group	26	165.54	12.04	.93	.42
	Control group	34	154.82	10.73		

The Hedges g obtained on the mean posttest scores of component Processing between experimental and control groups is 0.85 with an effect size .39 which is greater than the value needed for medium effect ($r \geq .3$) that indicates a medium effect of Collaborative Problem based Learning on component Processing. Thus collaborative problem based learning has medium effect on enhancing component Processing among secondary school male students.

The Hedges g obtained on the mean posttest scores of component Expressing between experimental and control groups is 0.80 with an effect size .37 which is greater than the value needed for medium effect ($r \geq .3$) that indicates a medium effect of the collaborative problem based learning on component expressing. It is evident that Collaborative Problem based Learning has medium effect on enhancing the component Expressing among secondary school male students.

The Hedges g obtained on the mean posttest scores of Emotion Regulation between experimental and control groups is 0.93 with an effect size .42 which is

greater than the value needed for medium effect (r ≥ .5) that indicates medium effect of the collaborative problem based learning on Emotion Regulation. It reflect that Collaborative Problem based Learning has medium effect on enhancing Emotion Regulation among secondary school male students.

The data and result on the effect size of the Collaborative Problem based Learning on Emotion Regulation and its components for female students is presented in table 99.

Table 99

Data and Result on the Effect Size of the Collaborative Problem based Learning on Emotion Regulation and its Components for Female Students

Variable	Group	N	Mean	SD	Hedges g	r- value
Identifying	Experimental group	17	25.41	4.17	.86	.41
	Control group	12	22.08	3.09		
Processing	Experimental group	17	67.65	8.22	.93	.44
	Control group	12	60.08	7.32		
Expressing	Experimental group	17	74.65	9.65	.61	.31
	Control group	12	69.67	4.33		
Emotion Regulation	Experimental group	17	167.71	19.47	.92	.44
	Control group	12	151.83	11.90		

The Hedges g obtained on the mean posttest scores of component Identifying between experimental and control groups is 0.86 with an effect size .41 which is greater than the value needed for medium effect (r ≥ .3) that indicates a medium effect of the collaborative problem based learning on the component Identifying. It is clear that Collaborative Problem based Learning has medium effect on enhancing component Identifying among secondary school female students.

The Hedges g obtained on the mean posttest scores of the component Processing between experimental and control groups is 0.93 with an effect size .44 which is greater than the value needed for medium effect (r ≥ .3) that indicates medium effect of Collaborative Problem based Learning on the component Processing. Thus collaborative problem based learning has medium effect on enhancing component Processing among secondary school female students.

The Hedges g obtained on the mean posttest scores of component Expressing between experimental and control groups is 0.61 with an effect size .31 which is greater than the value needed for medium effect ($r \geq .3$) that indicates a medium effect of Collaborative Problem based Learning on component Expressing. It is evident that Collaborative Problem based Learning has medium effect on enhancing component Expressing among secondary school female students.

The Hedges g obtained on the mean posttest scores of Emotion Regulation between experimental and control groups is 0.92 with an effect size .44 which is greater than the value needed for medium effect ($r \geq .3$) that indicates medium effect of Collaborative Problem based Learning on Emotion regulation. It reflects that Collaborative Problem based Learning has medium effect on enhancing Emotion Regulation among secondary school female students. Hanin and Nieuwenhoven (2020) also reported same opinion. Problem solving involves three main aspects cognitive, emotional and regulatory processes.

Discussion of the Result

Comparison of Pretest Scores of Experimental and Control Group

The analysis procedure demanded the comparison of two selected groups such as Experimental and Control group, in order to find whether the two groups differ significantly regarding the three variable viz, Critical Thinking, Academic Motivation and Emotion Regulation. Pre treatment levels of each depended variables were compared with Critical Thinking Test (Francis &Mustafa 2011), Academic Motivation Scale and Emotion Regulation Scale. Experimental and Control group do not differ significantly in their mean pretest scores of Critical Thinking. It indicated that, initial level mean scores of Critical Thinking and its components Inference, Recognition of Assumption, Deduction, Interpretation and Evaluation of Arguments of the experimental and control group are almost equal, t value obtained after comparison of mean pre test scores of Critical Thinking and it's components in experimental and control group is (t=.093).The mean pre test scores of Academic Motivation and it's components in experimental and control group are

almost equal. That means the initial level mean scores of Academic Motivation and it's components Intrinsic motivation and extrinsic motivation of experimental and control group are almost equal (t=1.93).But experimental and control groups differ significantly in their mean pretest scores of Amotivation. Comparison of mean pre test scores of Emotion Regulation and it's components of experimental and control group (t=1.83). This indicated that, initial level mean scores of Emotion Regulation and it's components Identifying and Processing in experimental and control group are almost equal. But experimental and control group differ significantly their mean pre test scores on Expressing, that means control group excel in the scores on component- Expressing than the experimental group.

Comparison of Posttest Scores of Experimental and Control Group

Post treatment levels of three variables were measured with the same instruments used for measuring the pre treatment level. Post test scores of Critical Thinking and it's components Inference, Recognition of Assumption, Deduction, Interpretation and Evaluation of Arguments are higher than that of control group. Hence critical ratio for the post test mean scores on Critical Thinking is (9.51) for experimental and control group. It indicated that post test mean scores on Critical Thinking in experimental group is higher than that of control group. In post test students who taught with CPBL has a higher scores on Critical Thinking compared to that of students taught with existing method of teaching. Comparison of post test scores of Academic Motivation and it's components Intrinsic motivation, Extrinsic motivation and Amotivation in experimental group (201.09) is higher than that of control group. Hence critical ratio for the post test mean scores on Academic motivation is higher than that of control group. Which indicate that in the post test, students taught with CPBL has higher scores on Academic motivation compared to that of existing method of teaching. Comparison of mean post test scores on Emotion Regulation and its components Identifying and Processing. Component Expressing in experimental group is higher than that of control group. The critical ration for post test mean scores on Emotion Regulation is (4.10) for experimental

and control group. There for post test mean scores on Emotion Regulation of the experimental group (166.40) is higher than that of control group. This indicated that in posttest students who taught with CPBL has a higher scores on Emotion Regulation compared to that of students taught with conventional method.

Effect of CPBL on Critical Thinking, Academic Motivation and Emotion Regulation among Subsamples

CPBL has significant and very large effect on male students. CPBL has very large effect on the components Inference, Recognition of Assumption, Deduction and Evaluation of Argument. But CPBL has significant and medium effect on the component Interpretation. In case of female students, CPBL has significant and very large effect on component Interpretation. CPBL has significant and medium effect on the component Recognition of Assumption .But there was no significant effect of CPBL on the component Inference, Deduction and Evaluation of arguments of female students. CPBL has significant and large effect on Academic Motivation and it's components Intrinsic motivation and Amotivation. CPBL has significant and medium effect on component Extrinsic motivation among secondary school students. In case of male students, CPBL has significant and large effect on Academic Motivation and it's components Intrinsic motivation, Extrinsic motivation and Amotivation. In female students, CPBL has significant and large effect on Acadmic Motivation and it's components Intrinsic motivation and Amotivation. But there is no significant effect of CPBL on component Extrinsic motivation among female students. CPBL has significant and medium effect on Emotion Regulation and its components Processing and Expressing. CPBL has significant and small effect on Emotion Regulation and it's component Identifying among secondary school students. In female students, CPBL has significant and medium effect on Emotion Regulation and it's components Identifying, Processing and Expressing. Based on the analysis and interpretation of the data CPBL has significant effect on Critical Thinking, Academic Motivation and Emotion Regulation among secondary school students.

Chapter 5

SUMMARY, FINDINGS & CONCLUSION

- Study in Retrospect
- Major Findings of the Study
- Tenability of Hypotheses
- Conclusion

This chapter deals with an overview of work done, significant findings of the research, major implications of the study.

Study in Retrospect

The study was investigated to find the effectiveness of an instructional strategy on Critical Thinking, Academic Motivation and Emotion Regulation using 3C3R modules of 8th standard Biology content. Then the study was entitled "Effectiveness of Collaborative Problems Based Learning on Critical Thinking, Academic Motivation and Emotion Regulation of Secondary School Students in Kerala.

Restatement of the Problem

The study was intended to find the Effectiveness of Collaborative Problem Based Learning on Critical Thinking, Academic Motivation and Emotion Regulation of Secondary school Students in Kerala.

Variables in the Study

Independent Variable

The independent variable of the study is Collaborative Problem Based Learning.

The Dependent Variables

The study's dependent variables are Critical Thinking, Academic Motivation and Emotion Regulation.

Control Variables

Academic achievement is the control variable of the study. The first terminal examination mark of 8th standard students has taken as the score of academic achievement.

Categorical Variable

The gender of the student was taken as the categorical variable of the study. The total participants of the study were compared based on gender.

Major Objectives of the Study

1. To develop Collaborative Problem Based Learning modules of 3C3R framework for Secondary School Students.
2. To determine the Effectiveness of the Collaborative Problem-based Learning module on enhancing Critical Thinking, Academic Motivation and Emotion Regulation of secondary school students.

Minor Objectives of the Study

1. To assess the Effectiveness of Collaborative Problem Based Learning modules of 3C3R framework on enhancing Critical Thinking and its components, viz.,
    a) Inference
    b) Recognition of Assumption
    c) Deduction
    d) Interpretation
    e) Evaluation of Arguments
2. To assess the Effectiveness of Collaborative Problem Based Learning modules of 3C3R framework on enhancing Academic Motivation and its components, viz.,
    a) Intrinsic Motivation
    b) Extrinsic Motivation
    c) Amotivation
3. To assess the Effectiveness of Collaborative Problem Based Learning modules of 3C3R framework on enhancing Emotion Regulation and its components, viz.,
    a) Identifying
    b) Processing
    c) Expressing

Hypotheses of the Study

1. There is no significant difference in the pre-test scores of Critical Thinking and its components between the experimental and control groups for total sample.
2. The mean post-test scores of Critical Thinking and its components for the experimental group are significantly higher than that of the control group for total sample.
3. There is a significant difference in the mean pre-test and post-test scores of Critical Thinking and its components between the experimental and control groups for the total sample and subsample based on gender.
4. Collaborative Problem Based Learning modules of 3C3R framework have significant effect on Critical Thinking and its components for total sample and subsample based on gender.
5. There is no significant difference in the mean pre-test scores of Academic Motivation and its components between experimental and control groups for total sample.
6. The mean post-test scores of Academic Motivation and its components for the experimental group are significantly higher than that ofthe control group for total sample.
7. There exist a significant difference in the mean pre-test and post-test scores of Academic Motivation and its components between experimental and control group for total sample and subsample based on gender
8. Collaborative Problem Based Learning modules of 3C3R framework have significant effect on Academic Motivation and its components for total sample and subsample based on gender.

9. No significant difference exists in the mean pre-test scores of Emotion Regulation and its components between the experimental and control groups for total sample.
10. The mean post-test scores of Emotion Regulation and its components for the experimental group are significantly higher than that of the control group for the total sample.
11. There are significant differences in the mean pretest-posttest scores of Emotion Regulation and its components between experimental and control groups for total sample and subsample based on gender.
12. Collaborative Problem Based Learning modules of 3C3R framework have significant effect on Emotion Regulation and its components for total sample and subsample based on gender.

Methodology

The methodology used for the study is to test the effectiveness of CPBL in the development of Critical Thinking, Academic Motivation and Emotion Regulation is summarized briefly.

Design of Experimentation

Pre-test- post-test non-equivalent group design from the Quasi-Experimental family was used for the study.

$$\begin{array}{c} O_1 \; X \; O_2 \\ \hline O_3 \; C \; O_4 \end{array}$$

O_1 and O_3 represent the Pre-tests

O_2 and O_4 represent the Post-tests

X represents the treatment given for experimental group

C represents the treatment given for control group

In this notation, " 'O' represents the process of observation or measurement. O_1 and O_2 denote the pre-tests and O_3 and O_4 designate the post-tests.'X' indicates the exposure of a group to an experimental treatment, the effects of which are to be measured (Campbell & Stanley, 1963)". 'C' denotes exposure of a group to a different treatment or no treatment.The dashed line indicates the experimental and control groups, which are not equal. The design is often used in class room experiments when experimental and control groups are such naturally resembled groups as intact classes which may be similar (Best & Khan, 2008).

There are mainly three phases in the study, they are given below

1. Exploratory Phase
2. Developmental Phase
3. Experimental Phase

Exploratory Phase. Exploratory phase is the first stage of the methodology. Researcher identified and reviewed various theories related to Problem Based Learning, Critical Thinking, Academic Motivation and Emotion Regulation. Qualitative content analysis of 5^{th}, 6^{th} 7^{th} and 8^{th} standard Basic science textbooks and social science textbooks helped to identify interdisciplinary contents for module preparation.

Developmental Phase. This is the second level of experimental procedure**.** This phase consisted of tool preparation and standardization. Collaborative Problem Based Learning modules, Academic Motivation scale, Emotion Regulation Scale were prepared and standardized.

Experimental Phase. This is the major phase of experimentation**.** In experimental phase standardized tools are employed to control and experimental group. For the present study pretest – posttest non equivalent group design was used

for VIII std students. Participants of 43 students from one school as experimental group and 45 students from another school as control group are taken for experimentation.

Sample Selected for the Study

The researcher selected two intact class groups from two different Government schools in Calicut district for the study. The investigator selected total of 89 students for experiment. Govt. Higher secondary school Puthur and Govt. Vocational Higher secondary school Madappally were selected for the study. Forty-three students were in the experimental group, and 46 were in the control group.To avoid experiment's practical difficulty, researcher selected one 8^{th} std. class from one school for experimental group and one class for control group from another school.

Tools used for the Study

1 3C3R Model for Collaborative Problem Based Learning modules (Linisha & Jaseena, 2019).

2 Critical Thinking Test (Francis & Mustafa, 2011).

3 Academic Motivation Scale (Linisha & Jaseena, 2019.)

4 Emotion Regulation Scale (Linisha & Jaseena, 2019

5 Rating scale on Collaborative Problem Based Learning (CPBL) module (Linisha & Jaseena, 2019)

6 Lesson Transcript on existing method of teaching (Linisha & Jaseena, 2019)

Statistical Techniques used for the Study

1. Test of significance of difference between means
2. Analysis of covariance (ANCOVA)
3. Estimation of Effect size, Hedges g

Major Findings of the Study

The findings of the study can be summerised as follows.

Effect of CPBL

- The study reveals that CPBL has significant role on enhancing Critical Thinking, Academic Motivation and Emotion Regulation among secondary school students.

Role of CPBL on Critical Thinking

1. Experimental and control group do not differ significantly in their mean pre-test scores on Critical Thinking ($t= .093$, $p>0.05$) and its components Inference ($t = .906$, $p > 0.05$), Recognition of assumptions ($t = .163$, $p > 0.05$), Deduction ($t = .407$, $p > 0.05$), Interpretation ($t= .033$, $p > 0.05$) and Evaluation of arguments ($t= .322$, $p > 0.05$).
2. There exist a significant difference in mean post-test scores on Critical Thinking ($t= 9.51$, $p < 0.01$) and its components Inference ($t= 6.05$, $p < 0.01$), Recognition of assumptions ($t= 6.24$, $p < 0.01$), Deduction ($t= 5.31$, $p < 0.01$), Interpretation ($t= 5.23$, $p < 0.01$) and Evaluation of arguments ($t= 5.35$, $p < 0.01$) of experimental and control group.
3. Male students of experimental and control group of do not differ significantly in their mean pre-test scores on Critical Thinking ($t= 1.05$, $p > 0.05$) and its components Inference ($t= 1.71$, $p >0.05$), Recognition of assumptions ($t= .143$, $p > 0.05$), Deduction ($t= .077$, $p > 0.05$), Interpretation ($t= .013$, $p > 0.05$) and Evaluation of arguments ($t= 1.36$, $p > 0.05$).
4. There exists significant difference in mean post-test scores on Critical Thinking ($t= 9.94$, $p < 0.01$) and its components Inference ($t= 6.33$, $p < 0.01$), Recognition of assumptions ($t= 5.56$, $p < 0.01$), Deduction ($t= 5.69$, $p < 0.01$), Interpretation ($t= 3.72$, $p < 0.01$) and Evaluation of arguments ($t= 5.55$, $p < 0.01$) in male students of experimental and control group.

5. Female students of experimental and control group of do not differ significantly in their mean pre-test scores on Critical Thinking (t= 1.51, p > 0.05) and its components Inference (t= .905, p > 0.05), Recognition of assumptions (t= .066, p > 0.05), Deduction (t= 1.33, p > 0.05) and interpretation (t= .348, p > 0.05). There exists significant difference in mean pre-test scores of evaluation of arguments between female students in experimental and control groups (t= 2.98, p< 0.05).

6. Female students in Experimental and control group do not differ significantly in their mean post-test scores on Inference (t= 1.78, p > 0.05), Deduction (t= 1.07, p > 0.05) and Evaluation of arguments (t= 1.08, p > 0.05). There exists significant difference in mean post-test scores on Critical Thinking (t= 3.23, p < 0.01) and its components Recognition of assumptions (t= 2.84, p < 0.01), Interpretation (t= 3.49, p < 0.01) of female students.

7. There exist a significant difference in mean pre test and post test score on Critical thinking (t= 17.9, p < 0.01) and its components Inference (t= 7.02, p < 0.01), Recognition of assumptions (t= 7.78, p < 0.01), Deduction (t= 6.65, p < 0.01), Interpretation (t= 6.35, p < 0.01) and Evaluation of arguments (t= 9.13, p < 0.01) of experimental group.

8. There exist a significant difference in mean pre test and post test score on Critical Thinking (t= 15.8, p < 0.01) and its components Inference (t= 6.34, p < 0.01), Recognition of assumptions (t= 7.35, p < 0.01), Deduction (t= 5.51, p < 0.01), Interpretation (t= 5.20, p < 0.01) and Evaluation of arguments (t= 6.37, p < 0.01) of male students in experimental group.

9. There exist a significant difference in mean pre test and post test score on Critical Thinking (t= 10.05, p < 0.01) and its components Inference (t= 3.57, p < 0.01), Recognition of assumptions (t= 4.09, p < 0.01), Deduction (t= 3.79, p < 0.01), Interpretation (t= 4.15, p < 0.01) and Evaluation of arguments (t= 6.67, p < 0.01) of female students in experimental group.

10. Pre-test and post-test scores of control group do not differ significantly in their mean scores on Inference (t= 1.07, p > 0.05), Recognition of assumptions (t= 1.12, p > 0.05), Deduction (t= 1.27, p > 0.05), Interpretation (t= 1.18, p > 0.05) and Evaluation of arguments (t= 1.22, p > 0.05). There is a significant difference in the control group's mean pre-test and post-test scores on Critical Thinking (t = 2.32, p < 0.05).

11. Pre-test and post-test scores of male students in control group do not differ significantly in their mean scores on Critical Thinking (t = 1.94, p > 0.05) and its components Inference (t = 1.14, p > 0.05), Recognition of assumptions (t = 0.73, p > 0.05), Deduction (t = 1.04, p > 0.05), Interpretation (t = .85, p > 0.05) and Evaluation of arguments (t = 1.54, p > 0.05).

12. Pre-test and post-test scores of female students of control group do not differ significantly in their mean scores on Critical Thinking (t= 1.27, p > 0.05) and its components Inference (t= 0.25, p > 0.05), Recognition of assumptions (t= 1.00, p > 0.05), Deduction (t= 0.69, p > 0.05), Interpretation (t= 1.00, p > 0.05) and Evaluation of arguments (t= 0.01, p > 0.05).

13. Collaborative Problem Based Learning has large effect on Critical Thinking (r = .71) and its components Inference (r = 0.54) and Recognition of assumptions (r = 0.55). Collaborative Problem-based Learning has a medium effect on Deduction(r = .49), Interpretation(r = .48) and Evaluation of arguments (r = .49).

Role of CPBL on Academic Motivation

14. Experimental and control group do not differ significantly in their mean pre-test scores on Academic Motivation (t= 1.73, p > 0.05) and its components Intrinsic Motivation (t= 1.63, p > 0.05) and Extrinsic Motivation (t= .981, p > 0.05). Experimental and control groups differ significantly in their mean pre-test scores on Amotivation (t= 1.99, p < 0.05).

15. There exists a significant difference in mean post-test scores on Academic Motivation (t= 6.32, p < 0.01) and its components Intrinsic Motivation (t= 5.76,

$p < 0.01$), Extrinsic Motivation ($t= 4.93$, $p < 0.01$) and Amotivation ($t= 5.98$, $p < 0.01$) of experimental and control group.

16. Experimental and control group of male students do not differ significantly in their mean pre-test scores on Academic Motivation ($t= 1.35$, $p > 0.05$) and its components Intrinsic Motivation ($t= 1.41$, $p > 0.05$), Extrinsic Motivation ($t= .853$, $p > 0.05$) and Amotivation ($t= 1.21$, $p > 0.05$).

17. There exist a significant difference in mean post-test scores on Academic Motivation ($t= 5.19$, $p < 0.01$) and its components Intrinsic Motivation ($t= 4.53$, $p < 0.01$), Extrinsic Motivation ($t= 4.44$, $p < 0.01$) and Amotivation ($t= 4.94$, $p < 0.01$) of experimental and control group of male students.

18. Experimental and control group of female students do not differ significantly in their mean pre-test scores on Academic Motivation ($t= 1.02$, $p > 0.05$) and its components Intrinsic Motivation ($t= .682$, $p > 0.05$), Extrinsic Motivation ($t= .627$, $p > 0.05$) and Amotivation ($t= 1.48$, $p > 0.05$).

19. There exist a significant difference in mean post-test scores on Academic Motivation ($t= 3.38$, $p < 0.01$) and its components Intrinsic Motivation ($t= 3.39$, $p < 0.01$), Extrinsic Motivation ($t= 2.36$, $p < 0.05$) and Amotivation ($t= 3.28$, $p < 0.01$) of experimental and control group of female students.

20. There exist a significant difference in mean pre-test and post-test score of Academic Motivation ($t= 7.93$, $p < 0.01$) and its components Intrinsic Motivation ($t= 7.94$, $p < 0.01$), Extrinsic Motivation ($t= 6.82$, $p < 0.01$) and Amotivation ($t= 6.21$, $p < 0.01$) of experimental group.

21. There exists a significant difference in mean pre test and post test score of Academic Motivation ($t= 6.06$, $p < 0.01$) and its components Intrinsic Motivation ($t= 6.33$, $p < 0.01$), Extrinsic Motivation ($t= 5.11$, $p < 0.01$) and Amotivation ($t= 5.24$, $p < 0.01$) in male students in experimental group.

22. There exists a significant difference in mean pre test and post test score of Academic Motivation (t= 5.20, p < 0.01) and its components Intrinsic Motivation (t= 4.66, p < 0.01), Extrinsic Motivation (t= 4.92, p < 0.01) and Amotivation (t= 3.33, p < 0.01) in female students of experimental.
23. Pre-test and post-test scores of control group do not differ significantly in their mean scores on Academic Motivation (t = .672, p > 0.05, r = .40) and its components Intrinsic Motivation (t= 1.2, p > 0.05, r= .286), Extrinsic Motivation (t = .063, p > 0.05, r = .279) and Amotivation (t = .129, p > 0.05, r = .409).
24. Pre-test and post-test scores of male students in control group do not differ significantly in their mean scores on Academic Motivation (t= .66, p > 0.05, r= .540) and its components Intrinsic Motivation (t= 1.39, p > 0.05, r= .427), Extrinsic Motivation (t= .044, p > 0.05, r= .371) and Amotivation (t= .179, p > 0.05, r= .591).
25. Pre-test and post-test scores of female students in control group do not differ significantly in their mean scores on Academic Motivation (t= .236, p > 0.05, r= -.229) and its components Intrinsic Motivation (t= .101, p > 0.05, r= -.316), Extrinsic Motivation (t= .19, p > 0.05, r= -.316) and Amotivation (t= .361, p > 0.05, r= -.096).
26. Collaborative Problem Based Learning has large effect on Academic Motivation (r = .57) and its components Intrinsic Motivation (r = 0.52), Extrinsic Motivation (r = 0.51) and Amotivation (r = .53) among secondary school students.

Role of CPBL on Emotion Regulation

27. Experimental and control group do not differ significantly in their mean pre-test scores on Emotion Regulation (t=1.83, p > 0.05) and its components Identifying (t= 1.52, p> 0.05) and Processing (t = .31, p > 0.05). Experimental and control groups differ significantly in their mean pre-test scores on Expressing (t= 2.31, p< 0.05).

28. There exist a significant difference in mean post-test scores on Emotion Regulation (t= 4.1, $p < 0.01$) and its components Identifying (t= 2.63, $p < 0.01$), Processing (t= 4.29, $p < 0.01$) and Expressing (t= 3.45, $p < 0.01$) of experimental and control group.
29. Experimental and control group of male students do not differ significantly in their mean pre-test scores on Emotion Regulation (t= 1.52, $p > 0.05$) and its components Identifying (t= 1.90, $p > 0.05$), Processing (t= .469, $p > 0.05$) and Expressing (t= 1.05, $p > 0.05$).
30. There exist a significant difference in mean post-test scores on Emotion Regulation (t= 3.63, $p < 0.01$) and its components Processing (t= 3.32, $p < 0.01$) and Expressing (t= 3.12, $p < 0.01$) of experimental and control group of male students. There is no significant difference in mean post-test scores on Identifying ($t = 1.68$, $p > 0.05$) of experimental and control group of male students.
31. Experimental and control group of female students do not differ significantly in their mean pre-test scores on Emotion Regulation (t= 0.861, $p > 0.05$) and its components Identifying (t= .474, $p > 0.05$) and Processing (t= .116, $p > 0.05$). There exist a significant difference in mean pre-test scores on Expressing ($t = 2.79$, $p<0.01$).
32. There exist a significant difference in mean post-test scores on Emotion Regulation (t= 2.50, $p < 0.05$) and its components Identifying (t= 2.34, $p < 0.05$) and Processing (t= 2.55, $p < 0.05$) of experimental and control group of female students. There is no significant difference in mean post-test scores on Expressing ($t = 1.66$, $p > 0.05$) of the experimental and control group of female students.
33. There exist a significant difference in mean pre test and post test score on Emotion Regulation (t= 9.55, $p < 0.01$) and its components Identifying (t= 8.19,

$p < 0.01$), Processing ($t= 7.29$, $p < 0.01$) and Expressing ($t= 6.70$, $p < 0.01$) of experimental group.

34. There exist a significant difference in mean pre test and post test score on Emotion Regulation ($t= 8.59$, $p < 0.01$) and its components Identifying ($t= 6.10$, $p < 0.01$), Processing ($t= 6.21$, $p < 0.01$) and Expressing ($t= 5.45$, $p < 0.01$) of experimental group of male students.

35. There exist a significant difference in mean pre-test and post-test score on Emotion Regulation ($t= 5.29$, $p < 0.01$) and its components Identifying ($t= 5.34$, $p < 0.01$), Processing ($t= 4.05$, $p < 0.01$) and Expressing ($t= 4.15$, $p < 0.01$) of experimental group of female students.

36. Pre-test and post-test scores of control group do not differ significantly in their mean scores on Identifying ($t= 1.72$, $p > 0.05$, $r= .426$) and Processing ($t= .932$, $p > 0.05$, $r= .703$). Pre-test and post-test scores of control group significantly differ in their mean scores on Emotion Regulation ($t= 2.48$, $p < 0.05$, $r= .788$) and Expressing ($t= 2.19$, $p < 0.05$, $r= .794$).

37. Pre-test and post-test scores of male control group do not differ significantly in their mean scores on Identifying ($t = 1.33$, $p > 0.05$, $r = .507$) and Processing ($t= 1.38$, $p > 0.05$, $r = .670$). Pre-test and post-test scores of control group significantly differ in their mean scores on Emotion Regulation ($t=3.39$, $p< 0.01$, $r = .875$) and Expressing ($t= 2.32$, $p < 0.05$, $r= .850$).

38. Pre-test and post-test scores of female students of control group do not differ significantly in their mean scores on Emotion Regulation ($t= .359$, $p > 0.05$, $r = .580$) and its components Identifying ($t= .105$, $p > 0.05$, $r= .056$), Processing ($t = .603$, $p > 0.05$, $r= .813$) and Expressing ($t= .506$, $p > 0.05$, $r= .637$).

39. Collaborative Problem Based Learning has medium effect on Emotion Regulation ($r = .42$) and its components Processing ($r = 0.41$) and Expressing ($r = .34$). Collaborative Problem Based Learning has small effect on Identifying ($r = 0.27$)

Tenability of Hypotheses

Based on the study's findings, the tenability of the hypotheses was examined.

1. Hypothesis 1 states that "**There is no significant difference in the pre-test scores of Critical Thinking and its components between the experimental and control groups for the total sample."**

   The findings revealed that there was no significant difference found between pre-test scores of Critical Thinking and its components among experimental and control group for the total sample. **Hence the first hypothesis is not rejected**.

2. Hypothesis 2 states that "**The mean post-test scores of Critical Thinking and its components for the experimental group are significantly higher than that of the control group for the total sample**."

   The conclusion was there is significant difference found in mean post-test scores of Critical Thinking and its components beween the experimental group and control group for the total sample.**Hence the hypothesis is not rejected**.

3. Hypothesis 3 states that "**There is a significant difference in the mean pre-test and post-test scores of Critical Thinking and its components between experimental and control groups for total sample and subsample based on gender**."

   The result indicate that there exists a significant difference in the mean pre-test and post-test scores of Critical Thinking and its components between the experimental and control group for the total sample. But in the subsample, the difference is found only in one component, (Evaluation of Arguments). **Thus, the hypothesis is partially accepted**.

4. Hypothesis 4 states that "**Collaborative Problem Based Learning modules of 3C3R framework have significant effect on Critical Thinking and its components for total sample and subsample based on gender**."

   The findings revealed that Collaborative Problem based Learning modules of 3C3R framework has significant and positive effect on Critical Thinking and

its components, such as Inference, Recognition of assumption, Deduction, Interpretation and Evaluation of arguments for the total sample.Among male students they have significant and substancial effect for the components Inference, Recognition of assumption, Deduction and Evaluation of arguments, but they have medium effect in Interpretation. In female students, CPBL has significant but substancial effect on component Interpretation, however there is no effect of CPBL on component Inference, Deduction and Evaluation of arguments. **Hence the hypothesis is partially substantiated**.

5. Hypothesis 5 states that **"There is no significant difference in the pre-test scores of Academic Motivation and its component between experimental and control groups for the total sample**."

   The result indicate that there is no significant difference in the mean pre-test scores of Academic Motivation and its components, Intrinsic and Extrinsic motivation, between experimental and control group for total sample. But experimental and control groups differ significantly in the mean pre-test scores on component Amotivation.Mean pre-test scores in Amotivation scored higher in experimental group. In such a manner, **the hypothesis is partially substantiated**.

6. Hypothesis 6 states that "**The mean post-test scores of Academic Motivation and its components for the experimental group are significantly higher than that of the control group for the total sample."**

   It was found that the mean post-test scores of Academic Motivation and its components for the experimental group are significantly higher than that of the control group for the total sample.**Thus the hypothesis is not rejected**.

7. Hypothesis 7 states that "**There is a significant difference in the mean pre-test and post-test scores of Academic Motivation and its components between the experimental and control groups for total sample and subsample based on gender.**"

   The findings revealed that there exists a significant difference in the mean pre-test and post-test scores of Academic Motivation and its components

between the experimental and control group for total sample and subsample based on gender.**Hence the hypothesis is not rejected**.

8. Hypothesis 8 states that "**Collaborative Problem Based Learning modules of 3C3R framework have significant effect on Academic Motivation, and its components for total sample and subsample based on gender.**"

   The result of the study revealed that CPBL module of 3C3R framework have significant and large effect on Academic Motivation and its components, Intrinsic Motivation and Amotivation, further there found significant and medium effect on Extrinsic Motivation for the total sample. In subsample based on gender, male students shows significant and large effect on Academic Motivation and its components Intrinsic Motivation, Extrinsic Motivation and Amotivation.In female students, CPBL has a significant effect on Academic motivation and its components, Intrinsic Motivation and Amotivation, but there was no effect found on component Extrinsic Motivation.To this extent, **this hypothesis is partially substantiated**.

9. Hypothesis 9 states that "**There exist no significant difference in the pre-test scores of Emotion Regulation and its component between the experimental and control group for the total sample.**"

   The result indicate that there is no significant difference in the mean pre-test scores of Emotion Regulation and its components Identifying and Processing.The experimental and control group differ significantly in Expressing of Emotion Regulation. **Hence the hypothesis is partially accepted.**

10. Hypothesis 10 states that "**The mean post-test scores of Emotion Regulation and its components for the experimental group is significantly higher than that of the control group for the total sample."**

    The findings revealed that the mean post-test scores of Emotion Regulation and its components for the experimental group are considerably higher than that of the control group for total sample. **Thus, the hypothesis is not rejected**.

11. Hypothesis 11 states that "**There are a significant differences in the mean pretest and posttest scores of Emotion Regulation and its components between the experimental and control groups for total sample and subsample based on gender.**"

    The findings shows that there exists significant difference in the mean pre-test and post-test scores of Emotion Regulation and its components between the experimental and control group for total sample and subsample based on gender. **Thus the hypothesis is accepted.**

12. Hypothesis 12 states that "**Collaborative Problem Based Learning modules of 3C3R framework have significant effect on Emotion Regulation and its components for total sample and subsample based on gender.**"

    The conclusion derived that CPBL module of 3C3R framework has significant and positive effect on Emotion Regulation for the total sample. Based on gender, male students exhibited a significant and medium effect on the Processing and Expressing components of Emotion Regulation. Also found, there was no effect of CPBL on component Identifying.In female students, CPBL framework have a significant and medium effect on Emotion Regulation and its components Identifying, Processing and Expressing.**Thus the hypothesis is partially substantiated.**

Conclusion

The major objective of the proposed study was to find the Effectiveness of Collaborative Problem Based Learning on Critical Thinking, Academic Motivation and Emotion Regulation of Secondary School Students in Kerala.

The first section of the analysis deals with the interpretation of effectiveness of Collaborative Problem Based Learning on Critical Thinking and its components for total sample and sub-sample based on gender. The analysis revealed that Collaborative Problem Based Learning significantly and substantially effects Critical Thinking among secondary school students. (Saputra et al., 2019) confirmed with the

conclusion as effect of jigsaw Collaboration and Problem-Based Learning to enhance the Critical Thinking of students. Also supported by Jigsaw collaboration and PBL were very effective for developing Critical Thinking in students (Khairani et al., 2020). The result of the study revealed that students who were taught with Collaborative Problem Based Learning obtained higher score in Critical Thinking. The high score in post test of Critical Thinking can be result of active participation of students in learning process and developing thinking skills.Collaborative Problem Based Learning has a significant and large effect on the components as Inference and Recognition of Assumptions among secondary school students. However Collaborative Problem Based Learning has a significant but medium effect on component Deduction, Interpretation and Evaluation of Arguments component. Gender-wise analysis showed that Collaborative Problem Based Learning significantly influence Critical Thinking among secondary school Male students. This may be due to the ability of male students to solve different problems encountere in daily life and problems particularly in academic areas. Effect of Collaborative Problem Based Learning on component Interpretation among Male students is significant but, medium effect only. In the case of Female students, Collaborative Problem Based Learning has a significant and large effect on Critical Thinking and components Interpretation. This findings also inlined with the findings of (Ahamad & Duskri, 2018) on gender differences among secondary school students in mathematical Critical Thinking skills. Female students showed better Critical Thinking skills than males.Collaborative Problem Based Learning has a significant but medium effect on the component Recognition of assumption. However there is no significant effect of Collaborative Problem Based Learning on component Inference, Deduction and Evaluation of Arguments among female secondary school students.

Next phase deals with effectiveness of Collaborative Problem Based Learning on Academic Motivation and its components for total sample and sub-sample based on gender. Findings revealed that Collaborative Problem Based Learning has a significant but large effect found on Academic Motivation and its components, Intrinsic

Motivation and Amotivation.The result also supported by (Wijnen et al., 2017), which examined the association between the student-centred PBL method and motivation. The study revealed that students taught through PBL experienced more relatedness and an autonomous form of motivation. The result of the study also supported by (Kumari & Chamundeswari, 2013), that highly motivated students performed very well learning. The high score in Academic Motivation was due to the role of CPBL in promoting active learning and enhancing motivation among secondary school students. Likewise Collaborative Problem Based Learning has a significant and medium effect on Extrinsic Motivation among secondary school students. The gender-wise analysis reported that Collaborative Problem Based Learning has a significant and large effect on Academic Motivation and its components, Intrinsic Motivation, Extrinsic Motivation and Amotivation among secondary school Male students. Also indicate that Collaborative Problem Based Learning has a significant and large effect on Academic Motivation, components Intrinsic Motivation and Amotivation among secondary school Female students. But there is no significant effect of Collaborative Problem Based Learning on component Extrinsic Motivation among Female secondary school students.

Following phase deals with the effectiveness of Collaborative Problem based Learning on Emotion Regulation and its components for total sample and sub-sample based on gender. The conclusion of the analysis revealed that Collaborative Problem Based Learning has a significant and medium effect on Emotion Regulation, its components Processing and Expressing among secondary school students. The result of the study inlined with (Liu et al., 2022) explorated the Processing characteristics of Automatic Emotion Regulation in children, social anxiety was significantly and positively correlated with Emotion regulation. Collaborative Problem Based Learning has a significant but negligible effect on component Identifying among secondary school students. Gender-wise analysis showed that Collaborative Problem Based Learning has a significant but medium effect on Emotion Regulation and its

component Processing and Expressing among secondary school Male students. (Hanin & Nieuwenhoven, 2020) supported that Problem-solving involves three main aspects: cognitive, emotional and regulatory processes of emotion. Also found that there is no significant effect of Collaborative Problem Based Learning on component Identifying among Male secondary school students.The analysis also revealed that Collaborative Problem Based Learning has a significant but medium effect on Emotion Regulation and its components Identifying, Processing and Expressing among secondary school Female students.

The study's outcomes revealed that Collaborative Problem Based Learning significantly influence Critical Thinking, Academic Motivation and Emotion Regulation of Secondary School Students.

Chapter 6

RECOMMENDATIONS

- Educational Implications of the Study
- Suggestions for Further Research

Based on the findings and discussions, some recommendations are put forward for Policy makers, Curriculum planners, Educational practitioners and teachers. This chapter describes major recommendations of the study. Findings of the study have its own implications and recommendations

The study intended to find the “Effectiveness of Collaborative Problems Based Learning on Critical Thinking, Academic Motivation and Emotion Regulation of Secondary School Students in Kerala”.

Educational Implications of the Study

The present study goes a long way in the area of Collaborative Problem Based Learning. The findings of the study established that Effectiveness of Collaborative Problem Based Learning has outcome for enhancing Critical Thinking, Academic Motivation and Emotion Regulation of Secondary School Students in Kerala which can directly applied in school education, and the developed 3C3R model has major contribution in the area to reduce the research gap identified in the review of related literature.

The development of science and technology produced many transformational changes in the teaching-learning process. Innovative instructional approaches also made a drastic change in the system of education. Collaborative problem-based learning is a learner-centred approach that enhances some of the children's cognitive and affective aspects. The role of Collaborative Problem Based Learning (CPBL) in enhancing Critical Thinking, Academic Motivation and Emotion Regulation has become evident from the study and the theories undertaken. Inferences and suggestions for stakeholders such as policymakers, teachers and students regarding Collaborative Problem Based Learning (CPBL) are pointing out here.

The present research reveals that shifting from the traditional approach to an innovative one will significantly improve dependent variables.The educational

implications of the study can improve the existing practice of instructional strategy in the present classroom situation.

Implication for Policymakers

It is important to append effective learning technique as part of curriculum plan and the space of Collaborative Problem Based Learning(CPBL) to yield maximum benefits for learners and instructors.Incorporating into the prospectus will give ample space for positive interdependence, individual accountability, face to face interaction, appropriate interpersonal skills and regular group assessment.The learning activities throughout the Collaborative Problem Based Learning cycles are aligned to ensure the fulfillment of these five principles of Collaborarive Learning and they are important in ensuring collaboration and functional abilities of the students to learn together.

Diverse viewpoints may offer diverse insights and solution to an issue by leveraging collective group intelligence. It encourages active learning and the retention and development of skills for lifetime learning. It promotes self-regulated learning by posing issues to pupils and facilitates the development of deep learning, in addition, to promote Critical Thinking and facilitating Academic Motivation.By emphasizing the meaning, applicability and relevance of learning materials, students will have a more profound knowledge of the subjects studied.Students become proficient when they are given increasingly demanding and significant challenges. While content preparation backbenchers must make sure of those qualities during curriculum design.

Implication for School Education

Teachers are an integral part of the students' learning lives, where they manage classrooms and impart knowledge and instructions to the students. It is vital that those ideas should be efficient and comprehensive and of wide applicability for learners.Traditional methods are no more comprehensive and do not meet every

need by aspirations of learning process and personal and academic requirements of students. Collaborative Problem Based Learning (CPBL) is an effective method that teachers can adopt into their teaching process.CPBLis a type of learning strategy that is based on cognitive and social constructivist learning theories. Learner's social engagement can foster teamwork, which has a considerable favourable impact on learning.Learners will have the opportunity to discuss, defend, reflect and criticize ideas or information through teamwork.Teachers must insert problem based learning, it can make the students self motivated, plan good teamwork skills and prepare self reflected learners.It is manifested that CPBL can nurture more, bring substantial curriculum, and is good for students cognitive development. The findings of the study showed that CPBL helps the students to develop critical thinking skill by practicing problems solving skill.CPBL was found to be effective in enhancing problem solving ability among young adult learners in comparison with traditional methods of teaching. Here students work in collaborative learning groups, they can work in creative and healthy environment, thereby experiencing comfort in the learning process. By practicing the learner centered approach of collaborative problem based learning students, they will be able to apply all the gathered knowledge in solving real life problems later.

The idea of social constructivism emphasis an equilibrium in classroom between students and teachers. Not only the transfer of knowledge but also by the interpretation of that knowledge through learning community. The process of learning is made possible only through duel factors of social interaction and simultaneous exposure to cognition. The findings of the study made an insight to science education as CPBL enhance Critical Thinking skill which is an essential skill for 21st century. Thus CPBL can be used as an alternative instructional strategy in science education to develop critical thinking skill in children.Here students take charge of their learning or development which makes them equipped to take charge

of themselves, help to achieve success in life. Finding of the study showed that CPBL found to be effective in enhancing Academic Motivation of students.Thus it can successfully help for teachers to enhance intrinsic and extrinsic motivation among the learner.A constructive classroom is intellectually, mentally and physically safe, where diverse instructional and assessment strategies are used to ensure a healthy teacher student relationship.

Emotion Regulation is imperative in personal development and has been found that Collaborative Problem Based Learning (CPBL) positively contributes towards emotion regulation.Findings of the study showed that CPBL enhances emotion regulation among children. Emotion regulation is very essential in managing problems in adolescents, such as depression, obsessive compulsive disorder and anxiety disorder. CPBL environment provides a comfortable and positive environment to channelize their emotions in calmful manner.Also it is worthy to note that CPBL is fruitful in improving academic motivation and critical thinking among learners. Undoubtedly it can be argued that CPBL will be a constructive asset for a student not only in their learning time but also in their future life such as in job, stress coping skills and trauma managing competencies.Therefore the need of employing this technique is rationalized. In CPBL situation students can outperform learned concept from beginning to end by their learning competencies, problem solving, self assessment procedures, datagathering, behavioural changes and other factors, It's because they are better at activating prior knowledge and learning in a situation that is similar to their future context, allowing them to expound more on the material offered which resulting in a greater grasp and retention of knowledge.

It is high time for policy makers and teachers to get adapt comprehensive and creative teaching techniques which will provide long term benefits for scholars.Taking the above mentioned advantages for adapting collaborative problem based learning

into classroom goal orientation can be attained for great extent.The ability of this technique is positively affect the cognitive, emotional and academic facets and have a great benefit for students. Hence school experts and policymakers need to make a note of it.

Supplementary Implications

1. Failure in Emotion Regulation are associated with multiple psychopathologies, low Emotion Regulation predicted behavioural problems in children such as Attention Deficit Hyper activity Disorder(ADHD), Major Depressive Disorder (MDD), Obsessive Compulsive Disorder(OCD), and Oppsitional Defiant Disorder (ODD). CPBL is an effective method which can contribute the development of Emotion Regulation constructively there by contributing to the betterment of the learner's career and life.
2. Teachers and Faculties may be trained for Collaborative Problem Based Learning strategy so as to improve the quality of teaching and learning process.
3. Collaborative Problem Based Learning theories, Critical Thinking skills and Emotion Regulation strategies should include in the curriculum as a part of mental wellbeing and for developing Critical Thinking skills which is highlighted in National Education Policy 2020.
4. It is helpful to develop collaboration skill among students because learning take place through active collaboration between the students.
5. Science and Technology helps to modify teaching learning material with the advancement of modern inventions. Teachers must update, expertise in technopedagogical skills, multicultural teaching and interpersonal communication. This will enable the teachers to accomplish different types of teaching methodologies.

Recommendations of the Study

Major Recommendations of the study are explained hereunder

In the light of the study result, the researcher provides following recommendations to Curriculum Designers, Decision makers and School administrators which may assist in improving the existing practice of school education.

Some of the revealed advocacy are as follows

CPBL Facilitate Supportive and Democratic Learning Environment

Collaborative Problem Based Learning (CPBL) provides a positive and enjoyable learning environment that will reduce anxiety, fear in children. Teacher acts as co-learner,provide equal opportunity for the learners. CPBL environment provides attention, support and allow children to express their emotions, needs and problem solving ability. In the light of findings of the study, recommended to implement CPBL in school education as a new strategy for learning. It may be applied in various training program and Pre service teachers training program.

CPBL Enhances Cognitive and Affective Development of the Learner

The findings of the study revealed that CPBL has a positive and significant effect on Critical thinking in children. Critical thinking skill is the major skill mentioned in NEP 2020.By adapting this learner centered instructional strategy, cognitive, affective aspects of children can be improved. Hence CPBL can be implemented in curricular program and Pre primary education for Enhancing Professional Competency (EPC).

In the light of findings of the study, it is also evident that CPBL has a significant and positive effect on enhancing Academic motivation among secondary school students. CPBL can be implemented in pedagogic aspects of young learners.

The findings of the study also showed that CPBL has a significant and positive effect on enhancing Emotion regulation among secondary school students. Thus CPBL has greater implication in instructional practices.

Promote Child Centered and Interdisciplinary Curriculum

CPBL modules were prepared based on 3C3R framework. Interdisciplinary topics were selected for module preparation. In the light of conclusion this study strongly recommended to modify the school curriculum into interdisciplinary nature**,** so as the learners will have the opportunity to learn the subjects in collaborating with other discipline.

Lowering Curriculum Load

CPBL provides a possibility of self regulated learning in classroom environment,that will reduce the stress and anxiety related to examination, homework and learning burden.NCF (2000) has also remind the problem of curriculum load which is emphasized on learning without burden. By implementing CPBL, the school education can reshape in a better way.

For Policy Makers and Teachers

1 CPBL is a comprehensive and creative learning strategy which will provide long term benefits for the learners. It will be an asset not only in learning environment but also for future classrooms. Thus it can be implemented in school education.

2 Across the findings of the study, CPBL helps to enhance Emotion regulation and it is imperative in personal development of the child. CPBL is effective for regulating emotions in adolescence. It is a method which will cater individual learners and collaborative learning situation.

3 Based on the findings of the study, it is evident that CPBL is an effective learning strategy for inclusive education too. One girl student in the experimental group with learning disability actively participated in learning process. So CPBL can be implemented as a part of inclusive education.

CPBL learning strategy is based on social constructivism; experiential learning and contextualized learning. As students will be able to apply all gathered knowledge to solve real life problems, so it can be used in life skill education.

Suggestions for Further Research

In the light of the result of the study, it offers the following suggestions that could be taken by future investigators. The study evidenced that the impact of Collaborative Problem Based Learning can bring changes in the learning environment of future generation**.**

- Further studies can be conducted with modifications by incorporating other subjects or lesson to test effectiveness of CPBL in general.
- More investigation can be done as the role of CPBL on adjusting abilities of Emotions, enhancing Academic motivation among students at different levels.
- Reverse study, as influence of critical thinking, Academic motivation and Emotion regulation on collaborative learning environment among students at secondary level may be studied.
- Can be replicated to explore how CPBL affect cognitive abilities, personality traits among adolescence.
- The study is limited to some topic of Science text book.Further research is needed on other areas of different subjects in school curriculum.
- A case study on the role of CPBL on study habits and goal orientation among adolescence.
- Effect of meta cognitive strategy on various components of CPBL can be investigated.

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APPENDICES

Appendix I

FAROOK TRAINING COLLEGE

Affiliated to University of Calicut

DETAILS OF CONTENT ANALYSIS

Basic Science 5th Std.	Basic Science 6th Std.	Basic Science Text Book 7th Std.	Basic Science Text Book 8th Std.
Chapter 1 **To know the plant world closely**	**Chapter 1** **Caskets of Life**	**Chapter 1** **Reaping gold from soil**	**Chapter 1** **Life's Mysteries in Little Chambers**
Concepts: • Photosynthesis • Stomata • Chlorophyll • Different plant pigments • Photosynthesis and respiration • Parasitic plants • Saprophytes • Climbers • Creepers • Prop root and stilt roots • Mangroves • Storage roots and underground stem • Diversity in the world of plants	***Concepts:*** • Microscope • Basis of life • Tiny units of the body • Method of collecting cheek cells • Different types of cells • Inside the cell • Diversity in plant cell • Method of construction of OHP sheet	***Concepts:*** • Seed quality • Sowing and sprouting • Stem cutting • Layering • Grafting • Budding • Combining qualities • Hybridisation • Hybrid varieties of coconut plant • Agricultural Research Institute • Tissue culture • Plant diversity • Leguminous plant • Biopesticides • Biofertilizers • Integrated farming • Agriculture and cattle rearing	***Concepts:*** • Compound microscope • Observation materials • Discovering the cell • Mile stone in the history of cell biology • Cell structure • Cell stage.
Chapter 2 **Life –Giving water**	**Chapter 2** **The essence of change**	**Chapter 2** **Wonders of visible light**	**Chapter 2** **Cell Clusters**
Concepts: • Properties of	***Concepts:*** • Different forms	***Concepts:*** • The surface	***Concepts:*** • Diversity among

Basic Science 5th Std.	Basic Science 6th Std.	Basic Science Text Book 7th Std.	Basic Science Text Book 8th Std.
water • Soluble and insoluble substance • Solute, Solvent, Solution • Substance that sink and those which float • Preparation of liter vessel • The earth abundant in water • Water pollution • How is rain formed • Evaporation and condensation • Water conservation methods • Natural disasters	of energy • Mechanical energy • Chemical energy • Change of state • Make an ice doll • Physical change • Permanent change • Chemical change • Different types of chemical change	matters • Light and sight • Plane mirror • When looking in a mirror • Images of different types • Spherical mirrors • Formation of images • Wonder world of mirrors • Kaleidoscope • Periscope • The Uses of lenses • Beauty of the rainbow • World of lenses • Let us make a colour disc	tissues • Tissues • Stem cells • Animal tissues • Plant tissues • Vascular tissues • Organ system
Chapter 3 **Celestial Shadow Sights**	**Chapter 3** **Flower to Flower**	**Chapter 3** **Acids and Alkalis**	**Chapter 3** **Let's Regain Our Field**
Concepts: • Substance which allow light to pass through and those which do not • Transparent object • Opaque object • Translucent object • Shadows • Solar eclipse • Lunar eclipse	***Concepts:*** • Spectacles of flower • Functions of flower • Inside the flower • Male and female flower • Seed formation • Pollination • Artificial Pollination • Journey of	***Concepts:*** • Acids • Acids and metals • General properties of acids • To identify alkali • Indicators • When acid and alkali mix together • Neutralisation • PH value • PH of soil • Preparation of Soap	***Concepts:*** • Crises in agriculture • Microbial fertilizers • Pest control • Integrated Pest management • Waste management • Sustainable agriculture • Reaping diversity • Poly house

Basic Science 5th Std.	Basic Science 6th Std.	Basic Science Text Book 7th Std.	Basic Science Text Book 8th Std.
• Observing Eclipse	Pollen grains • Withering petals • Only one fruit • One flower many fruits • Look one though not • The disguised • Fruit and flower		farming • Precision farming • Cultivation without soil • Indigenous varieties • Scientific method • Different types of farming
Chapter 4 **Essential Requirement for the Germination of Seed**	**Chapter 4** **Along with Motion**	**Chapter 4** **Through the Alimentary Canal**	**Chapter 4: Properties of Matter**
Concepts: • Germination of seed • Vegetative propagation • Seed dispersal • Adaptations for seed dispersal • Guest from across sea	***Concepts:*** • Motion • Minor concepts • Motion with in the body • Motion around us • Force and motion • Different types of motion • Oscillation • Vibrations • Motion in application • Gears	***Concepts:*** • Nutrition • For food • Parasites • Saprophytes • Predators of the plant world • Food in human • Tooth • Tooth decay • Chew and grind • The journey of food • Digestive system • Nutrition in Amoeba • Stages in the process of nutrition • Expelling waste • Filters in the body • Excretion through skin and kidney	***Concepts:*** • Different states of matter • Change of state • Diffusion of substances in different states • Pure substance and mixtures • Distillation • Fractional distillation • Separation • Sublimation • Centrifugation • Chromatography

Basic Science 5th Std.	Basic Science 6th Std.	Basic Science Text Book 7th Std.	Basic Science Text Book 8th Std.
		• Excretion in plants • Food and hygiene	
Chapter 5 **Sources of energy**	**Chapter 5** **Food for Health**	**Chapter 5** **When current flows**	**Chapter 5** **Basic Constituent of Matter**
Concepts: • Energy sources • Minor concepts • Fuels • Food • Conventional energy source • Non-conventional energy source • Solar energy • Wind energy • Towards the future with care • Wastage of fuels	• Healthy food • Minor concept • Food • Detecting starch • Behind growth • Kwashiorker • Detect fat • Fat and cholesterol • Vitamines • Health • Minerals • Nutrient Deficiency Diseases • Non nutrient factor • Balanced Diet	• How torch bulb glow • For current to flow • Symbols • Different types of wires • Magnet and electricity • Let us make electromagnet • Domestic electricity • Hydroelectric power station • Electric shock	• Elements and compounds • Origin of the names of elements • Symbols • Atoms and molecules • Method of representing atoms and molecules • Compounds • Chemical equation
Chapter 6 **A Little Effort Lot of Work**	**Chapter 6** **Living in Harmony**	**Chapter 6** **For Pollution Free Nature**	**Chapter 6** **Chemical Changes**
Concepts: • Work • Minor concepts • Small machines • Levers • Falcrum, Effort, Resistance • Wheel and Axle • Inclined plane	***Concepts:*** • Biotic and abiotic factors • Ecosystem • For food • Food relations • Producers • Consumer • Decomposers • When we	***Concepts:*** • Minor concepts • Soil observation • Moisture in soil • Water absorption capacity of soil • Organic content f soil • Soil erosion • Conserving water	***Concepts:*** • Physical change • Chemical change • Reactants and Products • Thermo chemical reactions • Photochemical reactions • Electrochemical reactions

Basic Science 5th Std.	Basic Science 6th Std.	Basic Science Text Book 7th Std.	Basic Science Text Book 8th Std.
	intervene in nature	resources • Water quality • Water purification • Water treatment plant • Air pollution	• Electroplating • Different types of cells
Chapter 7 **Windows of Knowledge**	**Chapter 7** **Attraction and Repulsion**	**Chapter 7** **Pressure in Liquid and Gases**	**Chapter 7** **Metals**
Concepts: • Sense organs • Information through eye • How do we see • Why two eyes • World of the blind • Eye donation • Protection of eyes • Knowing with closed eye • Protection of ear • Sensing by smell • World of taste • Identifying taste • Sense organs • Sense organs – Cleanliness and protection	***Concepts:*** • Magnets • Nonmagnetic substances • Different types of magnets • Uses of magnets • When magnet attracts • When magnet is suspended • When magnetic poles come nearer • Let's make a magnet • The range of attraction • Let's make actions	***Concepts:*** • Pressure of gas • The balloon in the bottle • Pressure of gas in daily life • Siphon making • Liquid pressure • Depth and Pressure • Pressure gauge	***Concepts:*** • General characteristics of metals • Metals reactions with water • Metals reactions with air • Reactions of metals with acids • Corrosion of metals
Chapter 8 **Keeping diseases at Bay**	**Chapter 8** **Moon and Stars**	**Chapter 8** **Breath and blood of life**	**Chapter 8** **Measurements and Units**
Concepts: • Microorganisms • Carriers of diseases • Dry day observance	***Concepts:*** • Day and night • Sunrise and sunset • One moon path in the sky	***Concepts:*** • Breathing • Movement of ribs • Respiratory system in humans	***Concepts:*** • Length • Smaller unit of length • Length of a curved line

Basic Science 5th Std.	Basic Science 6th Std.	Basic Science Text Book 7th Std.	Basic Science Text Book 8th Std.
• Preventing transmission of diseases • Super bug • Artificial immunity • Vaccination Hygienic habits • Social Hygiene	• Let's observe the moon • Mystery of moon crescent • Peculiarity of Lunar rotation • Celestial friends • Shape of stars • Size of stars • The picture book in the sky • Constellations • Star map • Observing planets	• During respiration • Constructing a model of lung • When the windpipe is blocked • Diversity in respiration • Respiration in plants • Inhaled air in to blood • In human blood • Blood cells • Blood circulation • Human heart • Heart beat • Let us make a stethoscope • When wounded	• Mass • Time • Fundamental units • Derived units • Area of leaf • Volume and Density • The rules to be followed while writing units
Chapter 9 **Space – A World of wonder**	**Chapter 9** **Mix and Separate**	**Chapter 9** **Paths of Heat flow**	**Chapter 9** **Motion**
Concepts: • Space • Minor concepts • Space around the earth • The first human space journey • Artificial satellite • Launching Vehicles • Indian Astranauts • Space a world of wonders	***Concepts:*** • Molecules • Pure substance • Mixture • Different types of mixtures • Different types of solutions • Separation of iron powder • Sand as a good sieve	***Concepts:*** • Heat transmission • Conduction • Transmission of Heat in metals • Transmission of heat in liquid • Convection • Path of smoke • Radiation • Wit out losting Heat • Thermal Expansion in solids	***Concepts:*** • Speed and Velocity • Uniform speed and Non uniform speed • Uniform Velocity and non uniform Velocity • Acceleration • Retardation

Basic Science 5th Std.	Basic Science 6th Std.	Basic Science Text Book 7th Std.	Basic Science Text Book 8th Std.
		• Thermal expansion in Liquids • Measuring temperature • Thermometers • Thermal expansion in gases • Thermal expansion in daily life • Wind • Sea breeze • Land breeze • Direction of wind • Wind and rain	
Chapter 10 **Animal Lore**	**Chapter 10** **For shape and strength**	**Chapter 10** **Safety in food too**	**Chapter 10** **Force**
Concepts: • Different types of organisms • Bird watching • Oviparous organism • Story of Salmon fish • Metamorphosis • Sea turtles • Viviparous organisms • Oviparous creatures among mammals	***Concepts:*** • Skeleton Exoskeleton • Endoskeleton • Human skeleton • Bones of many kinds • Movement and locomotion • Protection of bones • Bone fracture • Splint • Hardness of bones	***Concepts:*** • Preservation of food • Food decaying • Pasteurisation • Sea food • Preservation of food • Tinned food • Food Adulteration • Knowing by sight and smell • The quality of milk • Lactometer • Iodine test • Enticing colours • Quality of food substances	***Concepts:*** • Contact force and non contact force • Frictional force • Different types of friction • Thrust and Pressure • Liquid pressure • Atmospheric pressure

Basic Science 5th Std.	Basic Science 6th Std.	Basic Science Text Book 7th Std.	Basic Science Text Book 8th Std.
		• Information provided on the packet	
			Chapter 11 Magnetism
			Concepts: • Natural magnets and artificial magnets • Magnetic compass • Earth as magnet • Magnetic field • Magnetic flux density • Magnetic Induction • Magnetic induction in soft iron and steel • Permeability • Electromagnet
			Chapter 12 Why Classification
			• Keys for identification • Taxonomy • Taxonomic hierarchy proposed by Linnaeus • Taxonomic hierarchy of plants • Diversity in names • Binomial nomenclature • Towards more precision • Modern trends in taxonomy

Basic Science 5th Std.	Basic Science 6th Std.	Basic Science Text Book 7th Std.	Basic Science Text Book 8th Std.
			Chapter 13 Diversity for Sustenance
			• Biosphere • Ecology • Food chain • Food web • Trophic level • Ecological interactions • Diverse ecosystems • Biodiversity • Biodiversity depletion • Red data book • Biodiversity conservation • In situ conservation • Ex situ conservation • National and international level organizations
			Chapter 14 For the Continuity of Generations
			• Different modes of reproduction • Pollination and floral diversity • Fertilization • Reproduction in human beings • Male reproductive system • Female reproductive

Basic Science 5th Std.	Basic Science 6th Std.	Basic Science Text Book 7th Std.	Basic Science Text Book 8th Std.
			system • Menstruation • Parturition • Adolescence a special phase in life • Adolescence and food • Adolescence a period of challenges • Adolescence – addictive habits • Need to assertiveness • Adolescence a period of possibilities
			Chapter 15 Solutions
			• Concentration of solution • Saturated solution • Supersaturated solution • Classification of mixtures • True solution, Colloid, suspension • Soft drinks
			Chapter 16 Water
			• Boiling point of water • Heat capacity of water • Anomalous expansion of

Basic Science 5th Std.	Basic Science 6th Std.	Basic Science Text Book 7th Std.	Basic Science Text Book 8th Std.
			water • Freezing of water • Surface tension of water • Components of water • Reaction of water with metals • Water the universal solvent • Soft water and hard water • Water and gases • Water pollution
			Chapter 17 **Major Concepts: Fibres and Plastics**
			• Polymers • Man made or synthetic fibres • Plastics • Thermoplastics and Thermo setting plastics • Pollution due to plastic • Plastic and micron • Recycling symbols
			Chapter 18 **Reflection of Light in Spherical Mirrors**
			• Spherical mirrors • Centre of curvature • Radious of curvature • Reflection from a

Basic Science 5th Std.	Basic Science 6th Std.	Basic Science Text Book 7th Std.	Basic Science Text Book 8th Std.
			spherical mirror • Focus and focus length of a spherical mirror • Principal focus of a concave mirror • Focal length • Magnification
			Chapter 19 **Source of Sound**
			• Natural frequency • Pitch and loudness • Male and female voices • Propagation of sound • Hearing • Limits of audibility • Hearing aid • Use of electronic waves • Noise pollution • Reducing noise pollution
			Chapter 20 **Static Electricity**
			• Properties of electric charges • Electrostatic induction • Capacitor • Distribution of electric charges • Thunder and lightning • Lightning conductor

Social Science Text Books 5th std	Social Science Text Books 6th std	Social Science Text Book 7th Std
Chapter 1 **A Road to History**	**Chapter 1** **Medieval India: The Centres of Power**	**Chapter 1** **Europe in Transition**
Concepts: • Discover a record-History of my school • Pre Historic period • Historic period • Funeral practices in Kerala • History museum in schools • Reckoning time • Centuries	***Concepts:*** • Medieval India • Across the topography of Delhi • Delhi as a seat of power • The expansion of Sultanate • Delhi under Mughal rule • Centres of power in Southern and Western India • Chola kingdom • Vijayanagara Kingdom • Bahmani kingdom • Maratha Kingdom	***Concepts:*** • Europe in Transition • Hagia Sophia • The Renaissance • Renaissance in Literature • Renaissance in Arts • Renaissance in Science • The Reformation • In search of Sea Routes • Industrial Revolution
Chapter 2 **From stone to metal**	**Chapter 2** **Medieval India, Society, Resourse and Trade**	**Chapter 2** **From Trade to Power**
Concepts: • Palaeolithic Age • Neolithic Age • Bronze Age • The Mesopotamian Civilization • The Egyptian civilization • The Chinese civilization • The Harappan civilization	***Concepts:*** • Agriculture and Artisanship • Towns and trades • Social life • India the abode of knowledge	***Concepts:*** • From Trade to Power • From Portugal to Calicut • The Dutch • The advent of English • French Trade Relations • The competition for the monopoly of the world • The company gains the Power • The Reign expands
Chapter 3 **Our family**	**Chapter 2** **Kerala: The land, the Rain and the Crop**	**Chapter 3** **Resistance and the first war of Independence**
Concepts:	***Concepts:***	***Concepts:***

Social Science Text Books 5th std	Social Science Text Books 6th std	Social Science Text Book 7th Std
• Family –the basic unit of society • Formation of a family • Different types of families • Characteristics of a Family • Functions of a family	• Kerala ,the land ,the rain and the crop • Comparison with other neighbouring states • The physiographic diversity and agriculture in Kerala • Kerala –Highland • Kerala –Midland • Kerala lowland • The land that embraced agriculture • Changing land use and changing land style • Changing lifestyle • Let us find alternatives • Alternatives and possibilities • Government incentives • Green Kerala	• First war of independence • Minor concepts • Thumb of the Nagodas • Against the Farmers • Against the Tribals • Against the Weavers • Up risings • The Santhal Rebellion • Rebellions in Kerala • The first war of Independence 1857 • The Reign of the Queen
Chapter 4 **Spend carefully**	**Chapter 3** **Production Process**	**Chapter 4** **India Towards a New Era**
Concepts: • Different sources of family income • Diverse expenses • Economic security • Habit thrift • Family income and expenditure • Activity budget	***Concepts:*** • Minor concepts • What is production • Factors of production • Land • Labour • Capital • Features of Capital • Organization • Circular flow of economic activities	***Concepts:*** • Social reformers • Minor concepts • The changing People • Emergence of Nationalism • Formation of Indian National Congress • Partition of Bangal • All India Muslim League • Surat split • Home rule movements • Lucknow Pact
Chapter 5 **Universe : A Great Wonder**	**Chapter 4** **The Earth: Myth and Reality**	**Chapter 5** **Economic Sources**
Concepts:	***Concepts:***	***Concepts:***

Social Science Text Books 5th std	Social Science Text Books 6th std	Social Science Text Book 7th Std
• Solar System • Guests in the solar system Meteoroids • Earth • The world of stars • Universe	• Earth • Shape of the Earth: Beliefs to Reality • How big the Earth is • Lines on the Earth • Latitudes • Longitudes • Day and Night • Sunrise and sunset • Changing seasons	• Economic sources • Minor concepts • Sectors and Related employment Opportunities • Poverty Alleviation Programmes • Kerala and Public distribution system • Challenges to food production
Chapter 6 **Continents and Oceans**	**Chapter 6** **World of Diversities**	**Chapter 6** **Major concept: Maps**
Concepts: • Different continents • Different Oceans • The coral Reefs	***Concepts:*** • Diversity • Minor concepts • Hot and Rainy lands • Dry sandy stretches • Land of eternal snow	***Concepts:*** • Understanding of Maps • Importance of Maps • History of Maps • Sketch and Plan • Essential elements of maps
Chapter 7 **The changes Wrought by Iron**	**Chapter 7** **Medieval India Art and Literature**	**Chapter 7** **Earth and Biosphere**
Concepts: • Cattle the measure of wealth • Towards the Gangetic plain • Stones do have a story to tell • Through the Pazhamthamizhpattu	***Concepts:*** • Art and Literature of Medieval India • Minor concept: • Music and Painting • Literature	***Concepts:*** • Earth and Biosphere • Minor concepts • Lithosphere • Knowing the soil • Disappearing paddy field • Sand mining in Rivers • Destruction of hills • Hydrosphere • Scientific modes of water management • Atmosphere • Biosphere • Natural Disasters
Chapter 8 **Non violence, Wisdom, Power**	**Chapter 8** **Medieval World**	**Chapter 8** **Towards a New Kerala Society**

Social Science Text Books 5th std	Social Science Text Books 6th std	Social Science Text Book 7th Std
Concepts: • Mahajanapada • Ahimsa • Jain Principle • Buddhist Principles • Expansion of Powers • Duty of King • Society, Economy, Art • Transition of Ages • The blooming of Wisdom	***Concepts:*** • Medieval World • Minor concepts • Cities, Trades and Trade Guilds • Knowledge and Art in Medieval Europe • Medieval China and Arab World	***Concepts:*** • New Kerala Society • Minor concepts • Enrichment through Education • Education-A social investment • Transformation through writings • Against superstitions • Towards gender equality • The Missionary Activities
Chapter 9 **For the people**	**Chapter 9** **Medieval Kerala**	**Chapter 9** **Gandhiji and the Freedom**
Concepts: • Democracy • Election • Stages of Election • Factors sustaining Democracy • Social and economic justice • Mass media • Opposition • Democracy a way of Life	***Concepts:*** • Medieval Kerala • Minor concepts • Perumals • Naduvazhi swaroopam • Trade • Markets • Language, Art and Literature • Knowledge	***Concepts:*** • Struggle • Gandhiji and the Freedom struggle • Gandhiji's Entry in to the National movement • National movements • Non corporation movements • Malbar Rebellion • Wagon Tragedy • Chauri Chaura incident • Vaikom Satyagraha • A pinch of salt challenges an empire • Guruvayur Satyagraha • Quit India movements • Indian National Army • INA and Keralites • Muhammed Ali Jinnah and Pakistan Demand • Dawn of Freedom
Chapter 10 **Major concept: Kerala**	**Chapter 10** **Democracy and Rights**	**Chapter 10** **Our Constitution**
Concepts:	***Concepts:***	***Concepts:***

Social Science Text Books 5th std	Social Science Text Books 6th std	Social Science Text Book 7th Std
• Kerala –Physiography • Kerala –Highland • In the lap of Sahya • Midland • Lowland • Climate • Rivers • Backwaters • Lakes • Agriculture and Human Life • The vanishing crop diversity • Courtyard farm • Transport • Gods own country	• National Human Rights Commission • National Human Rights Commission functions • State Human Rights Commission • Child Rights • Rights of Women • Rights and Duties	• Indian Constitution • Minor concept • Framing the Indian constitution • Preample of Indian constitution • Main features of Indian constitution • Constitutional Amendment
Chapter 11 **Our India**	**Chapter 11** **Diversity in Social Life**	**Chapter 11** **Individual and Society**
Concepts: • India • India location and neighboring countries • India states • India Physiograhy • Plains in India • Deserts in India • Plateaus in India • Coastal regions in India • Islands in India • India Rivers • India Climate • India natural vegetation and animal life • We, the Indians	***Concepts:*** • Diversity in social life • Tribal Community • Features of Tribal community • Rural Community • Urban community • Problems in Cities • Chapter 12 • Gifts of Nature • Major concept: Resources • Minor concepts • Natural Resources • Conservation of Resources • Sustainable Development • Renewable Resources • Non Renewable Resources	Concept • Individual and Society • Minor concepts • Community and association • Socialization • Agencies of Socialization

Social Science Text Books 5th std	Social Science Text Books 6th std	Social Science Text Book 7th Std
	• Major concepts: Democracy, Rights • Minor concepts • Merits of Democratic Government • Human rights	
		Chapter 12 **Insolation and Atmospheric Condition** **Major Concept: Insolation and Atmosphere**
		Minor concept Sun –The energy provider Temperature and movement of air Temperature and water in the atmosphere Weather and climate **Chapter 13** **A Glimpse of India**
		Minor concept: A Glimpse of India Minor concepts In the lap of Himalayas Importance of the Northern Mountain Region The Plains of North India Plateau To the coastal plains Green spots in Ocean Rivers in India Soil types of India Climate The summer season The winter season The Rainy Season Natural vegetation and animal diversity

Appendix II

പ്രശ്നാധിഷ്ഠിത പഠന സമീപനമാർഗ്ഗം

സെക്കണ്ടറി വിദ്യാർത്ഥികൾക്കുള്ള മോഡ്യൂളുകൾ

തയ്യാറാക്കിയത്

ലിനിഷ സി കെ

ഗവേഷക

&

ഡോ. ഫാത്തിമ ജസീന എം.പി.എം.

വിദ്യാഭ്യാസ വിഭാഗം അസിസ്റ്റന്റ് പ്രൊഫസറും

റിസർച്ച് സൂപ്പർവൈസറും

വിദ്യാഭ്യാസ ഗവേഷണ വിഭാഗം

ഫാറൂഖ് ട്രെയ്നിംഗ് കോളേജ്

കോഴിക്കോട്

2019

ഉള്ളടക്കം...

പ്രശ്നാധിഷ്ഠിത പഠന സമീപനമാർഗ്ഗ മോഡ്യൂളുകൾ

ഒരു പ്രത്യേക ഉള്ളടക്കവുമായി ബന്ധപ്പെട്ട് നിർദ്ദിഷ്ട ലക്ഷ്യങ്ങൾ നേടുന്നതിന് ഒരു പഠിതാവിനെ സഹായിക്കുന്ന സ്വയംപഠന സാമഗ്രികളാണ് മൊഡ്യൂളുകൾ. ഇതിൽ ഉള്ളടക്കവുമായി ബന്ധപ്പെട്ട ആമുഖം, ലക്ഷ്യങ്ങൾ, അടിസ്ഥാന ആശയങ്ങൾ, ഉപാശയങ്ങൾ, പിന്തുണാ സാമഗ്രികൾ, വിലയിരുത്തലുകൾ, ക്രോഡീകരണം, തുടർപ്രവർത്തനങ്ങൾ, റഫറൻസ് എന്നിവ ഉൾപ്പെടുന്നു.

സെക്കണ്ടറി വിദ്യാർത്ഥികളിൽ പ്രശ്നാധിഷ്ഠിത പഠന സമീപനമാർഗ്ഗം ഉപയോഗിച്ച് 3C3R മാതൃകയിൽ ഒരു പഠന വിഷയത്തെ മറ്റ് വിഷയങ്ങളുമായി കോർത്തിണക്കി പഠിപ്പിക്കുന്നതിന് സഹായിക്കുന്ന ഒരു രീതി ആണ് ഈ മൊഡ്യൂളുകൾ വിശദീകരിക്കുന്നത്. ഈ മൊഡ്യൂളിലൂടെ ഓരോ പഠന വിഷയവും എങ്ങനെ മറ്റ് വിഷയങ്ങളുമായി ബന്ധപ്പെട്ടിരിക്കുന്നു എന്ന് മനസ്സിലാക്കാൻ കഴിയുന്നു. അതിലൂടെ കുട്ടികളിൽ വിമർശനാത്മക ചിന്ത, പ്രശ്ന പരിഹാരത്തിനുള്ള കഴിവ്, ആശയ വിനിമയത്തിനുള്ള നൈപുണി എന്നിവ നേടിയെടുക്കാൻ കഴിയുന്നു.

ക്ലാസ് 8: അടിസ്ഥാന ശാസ്ത്രം. പാഠം 3
വീണ്ടെടുക്കാം വിളനിലങ്ങൾ

മോഡ്യൂൾ 1
ഭക്ഷ്യസുരക്ഷ

പഠന നേട്ടങ്ങൾ

- ഭക്ഷ്യദൗർലഭ്യം, ഭക്ഷ്യ സുരക്ഷ എന്നീ ആശയങ്ങൾ വിശദീകരിക്കാൻ കഴിയുന്നു.
- ഭക്ഷ്യോൽപാദന രംഗത്ത് ഉണ്ടായിക്കൊണ്ടിരിക്കുന്ന മാറ്റങ്ങൾ വിശദീകരിക്കാൻ കഴിയുന്നു.
- ഭക്ഷ്യ സുരക്ഷാ നിയമത്തിന്റെ പ്രാധാന്യം തിരിച്ചറിഞ്ഞ് പ്രചരിപ്പിക്കുന്നു.
- പൊതുവിതരണ സമ്പ്രദായത്തിന്റെ ആവശ്യകത തിരിച്ചറിയുന്നു.

ക്ലാസ് 1

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

Chicken a la carte subtitulado en español - YouTube
https://www.youtube.com/watch?v=XldZMuLCFCY

- ഇതിൽ നിന്നും കുട്ടികൾക്ക് എന്ത് മനസ്സിലായി?
- കുട്ടികൾക്ക് ഭക്ഷ്യദൗർലഭ്യത്തെക്കുറിച്ചും ഭക്ഷണസാധനങ്ങൾ പാഴാക്കുന്നതിനെക്കുറിച്ചും കുട്ടികൾ ചിന്തിക്കുന്നു.

Step 2

Identification of Facts

A) ഭക്ഷ്യദൗർലഭ്യം- എല്ലാവർക്കും ആരോഗ്യകരമായ ജീവിതം നയിക്കുന്നതിന് വേണ്ട ഭക്ഷണം ആവശ്യാനുസരണം ലഭ്യമാകാത്ത സാഹചര്യമാണ് ഭക്ഷ്യദൗർലഭ്യം.

B) ഭക്ഷ്യസുരക്ഷ - എല്ലാവർക്കും ആരോഗ്യകരമായ ജീവിതം നയിക്കുന്നതിന് വേണ്ട ഭക്ഷണം ആവശ്യാനുസരണം ലഭ്യമാകുന്ന സാഹചര്യമാണ് ഭക്ഷ്യസുരക്ഷ. ദാരിദ്ര്യഭീതിയോ, പോഷകക്കുറവുകൊണ്ടുള്ള പ്രശ്നങ്ങളോ ഇല്ലാത്ത ഒരു സമൂഹസൃഷ്ടിക്ക് ഭക്ഷ്യസുരക്ഷ ഉറപ്പാക്കേണ്ടത് അനിവാര്യമാണ്.

C) പൊതുവിതരണ സമ്പ്രദായം - ഭക്ഷ്യ സുരക്ഷ സാധ്യമാക്കുന്നതിന് പൊതുവിതരണ സമ്പ്രദായം സഹായകരമാണ്.

D) ന്യായമായ വിലക്ക് സമൂഹത്തിൽ ആവശ്യക്കാരായവർക്ക് ഭക്ഷ്യ വസ്തുക്കളും മറ്റു നിത്യോപയോഗ വസ്തുക്കളും നൽകുവാൻ ചുമതലപ്പെട്ടതും സർക്കാർ നിയന്ത്രണത്തിലുള്ളതുമായ സ്ഥാപനങ്ങളുടെ ശൃംഖലയാണ് പൊതുവിതരണ സംവിധാനം.

E) 2013ൽ ഭക്ഷ്യസുരക്ഷാനിയമം പാർലമെന്റ് അംഗീകരിച്ചു. ഭക്ഷ്യവസ്തുക്കളുടെ ലഭ്യത പൗരന്റെ നിയമപരമായ അവകാശമാണ്.

ഭക്ഷ്യസുരക്ഷാനിയമം (Food Security Act)

2013-ൽ പാർലമെന്റ് അംഗീകരിച്ചു.

പ്രത്യേകതകൾ

- ഭക്ഷ്യസുരക്ഷ സർക്കാരിന്റെ നിയമപരമായ കടമയാണ്.
- ആവശ്യമുള്ളത്രയും പോഷകപ്രദവും ഗുണമേന്മയുള്ളതുമായ ഭക്ഷ്യവസ്തുക്കൾ മിതമായ വിലയ്ക്ക് എല്ലാവർക്കും ഉറപ്പാക്കുക.
- ഭക്ഷ്യവസ്തുക്കളുടെ ലഭ്യത പൗരന്റെ നിയമപരമായ അവകാശമാണ്.

F) ഹരിതവിപ്ലവം - 1940 മുതൽ 1970 വരെ കാർഷിക മേഖലയലിൽ ഉൽപാദനം വർദ്ധിപ്പിക്കാനായി ആഗോളതലത്തിൽ വ്യാപകമായി നടപ്പാക്കിയ ഗവേഷണ, വികസന സാങ്കേതികവിദ്യാ കൈമാറ്റമാണ് ഹരിത വിപ്ലവം.

Step 3

Generation of Ideas

1) ഭക്ഷ്യദൗർലഭ്യത്തിന്റെ കാരണങ്ങൾ മനസ്സിലാക്കുന്നു.
2) ഭക്ഷ്യസുരക്ഷയുടെ പ്രാധാന്യം മനസ്സിലാക്കുന്നു.
3) കേരളത്തിൽ ഹരിതവിപ്ലവത്തിന്റെ പരിണിതഫലങ്ങൾ മനസ്സിലാക്കുന്നു.
4) ഭക്ഷ്യസുരക്ഷ ഉറപ്പാക്കുന്നതിൽ പൊതുവിതരണ സമ്പ്രദായത്തിന്റെ പങ്ക് മനസ്സിലാക്കുന്നു.
5) ഭക്ഷ്യസുരക്ഷാബിൽ, ഭക്ഷ്യസുരക്ഷാ നിയമം എന്നീ ധാരണകൾ കൈവരിക്കുന്നു.
6) ജനസംഖ്യാ വർദ്ധനവ് ഭക്ഷ്യസുരക്ഷയുമായി എങ്ങനെ ബന്ധപ്പെട്ടിരിക്കുന്നു എന്ന് മനസ്സിലാക്കുന്നു.

Step 4

Developmental Phase

Activity I ഭക്ഷ്യദൗർലഭ്യം

(10 Minutes)

Collaborative Working Groups

കുട്ടികൾ ഭക്ഷ്യദൗർലഭ്യത്തെക്കുറിച്ചും ഭക്ഷ്യോൽപാദനം നേരിടുന്ന വെല്ലുവിളികൾ എന്നിവ ഗ്രൂപ്പിൽ ചർച്ചചെയ്ത് റിപ്പോർട്ട് തയ്യാറാക്കുന്നു.

സൂചന: ഭക്ഷ്യദൗർലഭ്യത്തിന്റെ കാരണങ്ങൾ (സംവാദം)

- പ്രകൃതി ക്ഷോഭം മൂലമുണ്ടാകുന്ന കൃഷിനാശം
- കൃഷിഭൂമികൾ മറ്റ് ആവശ്യങ്ങൾക്കായി ഉപയോഗിക്കുന്നത്.
- സബ്സിഡി കുറയ്ക്കുന്നത്.
- യന്ത്രസാമഗ്രികൾ വാങ്ങാൻ കഴിയാത്ത അവസ്ഥ
- കാലാവസ്ഥാ വ്യതിയാനം
- ഇൻഷൂറൻസ് പരിരക്ഷ ഉറപ്പാക്കാൻ കഴിയാത്തത്
- രാസവളങ്ങളുടെ അമിത ഉപയോഗം ഭൂമിയുടെ ഫലഭൂയിഷ്ഠി നഷ്ടപ്പെടുന്നു.

Report Writing and presentation. (6 minutes)
Reflection: Students reflect on concepts.

Activity II ഭക്ഷ്യദൗലഭ്യം പരിഹരിക്കുന്നതിൽ ശാസ്ത്രത്തിന്റെ പങ്ക്

(16 minutes)

Working Groups

Hints: എം.എസ്. സ്വാമിനാഥന്റെ ജീവിതക്കുറിപ്പ്

Flash Cards:

1. ഹരിതവിപ്ലവം കേരളത്തിൽ

എം.എസ്. സ്വാമിനാഥൻ

പ്രശസ്ത കൃഷി ശാസ്ത്രജ്ഞനായ എം.എസ്. സ്വാമിനാഥൻ എന്ന മങ്കൊമ്പ് സാംബശിവൻ സ്വാമിനാഥൻ ഇന്ത്യയിൽ ഹരിതവിപ്ലവത്തിന്റെ പിതാവ് എന്നറിയപ്പെടുന്നു. 1952ൽ കേംബ്രിഡ്ജ് സർവകലാശാലയിൽ നിന്നും ജനിതകശാസ്ത്രത്തിൽ പി.എച്ച്.ഡി നേടിയ അദ്ദേഹം ഇന്ത്യയിൽ കാർഷിക രംഗത്തിന്റെ അതികായനായി. ഇന്ത്യൻ പരിസ്ഥിതിക്കിണങ്ങുന്നതും അത്യുൽപ്പാദനശേഷിയുള്ള വിത്തുകൾ വികസിപ്പിക്കുകയും അത് കർഷകർക്കിടയിൽ പ്രചരിപ്പിക്കുകയും ചെയ്തു.

1966ൽ മെക്സിക്കൻ ഗോതമ്പിനങ്ങൾ ഇന്ത്യൻ സാഹചര്യങ്ങൾക്കനുസരണമായി മാറ്റി പഞ്ചാബിലെ പാടശേഖരങ്ങളിൽ അദ്ദേഹം നൂറുമേനി കൊയ്തു. ഇത് അദ്ദേഹത്തെ ഇന്ത്യയിലെ ഹരിതവിപ്ലവത്തിന്റെ പിതാവാക്കി. പത്മശ്രീ. പത്മഭൂഷൺ എന്നിവ അദ്ദേഹത്തിന് നൽകി രാജ്യം അദ്ദേഹത്തെ ആദരിച്ചു.

2. ഭക്ഷ്യസുരക്ഷാ ബിൽ, ഭക്ഷ്യസുരക്ഷാ നിയമം ഉറപ്പാക്കുന്നതിൽ പൊതുവിതരണ സമ്പ്രദായത്തിന്റെ പങ്ക്

July 11 is followed as World population day.

Prepare a report on

1) ഡോ. എം.എസ് സ്വാമിനാഥൻ
2) ഹരിതവിപ്ലവം-കേരളത്തിൽ
3) ഭക്ഷ്യസുരക്ഷ നിയമം (6 minutes)

Students research the topics by using ICT facilities. (5 minutes)

പൊതുവിതരണ സംവിധാനം
(Public Distribution System)

ന്യായമായ വിലയ്ക്ക് സമൂഹത്തിൽ ആവശ്യക്കാരായവർക്ക് ഭക്ഷ്യവസ്തുക്കളും മറ്റ് നിത്യോപയോഗ വസ്തുക്കളും നൽകുവാൻ ചുമതലപ്പെട്ടതും സർക്കാർ നിയന്ത്രണത്തിലുള്ളതുമായ സ്ഥാപനങ്ങളുടെ ശൃംഖലയാണ് പൊതുവിതരണ സംവിധാനം.

ക്ലാസ് II

Step 5

Reflection: students reflect on perceived ideas (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

ജനങ്ങൾക്ക് ന്യായമായ വിലയ്ക്ക് അവശ്യവസ്തുക്കൾ ലഭ്യമാക്കുക എന്ന ലക്ഷ്യത്തോടെയാണ് ഏജൻസികൾ പ്രവർത്തിക്കുന്നത്.

SRL activities (10 minutes)

കേന്ദ്രം	ലഭ്യമാകുന്ന വസ്തുക്കൾ
പൊതുവിതരണകേന്ദ്രം	അരി, ഗോതമ്പ്, പഞ്ചസാര, മണ്ണെണ്ണ
ഹോർട്ടികോർപ്	പച്ചക്കറികൾ
സപ്ലൈകോ സൂപ്പർമാർക്കറ്റ്	എല്ലാ നിത്യോപയോഗ സാധനങ്ങളും
നന്മ സ്റ്റോർ	
നീതി സ്റ്റോർ	
ലാഭം സപ്ലൈകോ മാർക്കറ്റ്	
മാവേലി സ്റ്റോർ	
ത്രിവേണി സൂപ്പർമാർക്കറ്റ്	
ത്രിവേണി ഫ്ളോട്ടിംഗ് സൂപ്പർമാർക്കറ്റ്	

Step 2

Summarizing the ideas

എം.എസ് സ്വാമിനാഥൻ, ഹരിതവിപ്ലവം

Step 3

Note-taking

ഭക്ഷ്യ സുരക്ഷാബിൽ

Step 4

Mapping

പൊതുവിതരണ സമ്പ്രദായം

Step 5

Reflection on the above topics

Ladder III

Group Discussion phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting.

Step 2

Reasoning about the topic

കേരളത്തിലെ ഹരിതവിപ്ലവനത്തിന്റെ അനന്തരഫലങ്ങൾ	ജനസംഖ്യവർദ്ധനവിന്റെ കാരണങ്ങൾ
Hints: • കാർഷിക ഉൽപാദനത്തിലെ വർദ്ധനവ് • തൊഴിൽ സാധ്യത വർദ്ധിച്ചു. • ഇറക്കുമതി കുറഞ്ഞു. • കൃഷിക്കാരുടെ നേട്ടം വർദ്ധിച്ചു	Hints: • മരണനിരക്കിലെ കുറവ് • മാതൃ, ശിശു മരണനിരക്കിലെ കുറവ് • പകർച്ചവ്യാധികളുടെ നിയന്ത്രണം. • ആയുർദൈർഘ്യത്തിലെ വർദ്ധനവ്

ഭക്ഷ്യശുചിത്വം എങ്ങനെയൊക്കെ ഉറപ്പാക്കാം

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL (10 Minutes)

Step 1

Presentation

Participants present the output of SRL

Step 2

Peer Assessment

Peer Assessment is carried out through activities such as:

- Discussion on Learning Points: ഭക്ഷ്യദൗർലഭ്യം, ഭക്ഷ്യസുരക്ഷ
- Single Presentation of the Ideas: ഹരിതവിപ്ലവം

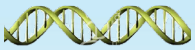
Step 3

Conclusion

Teacher concluded the learning points.

Hints: ഭക്ഷ്യദൗർലഭ്യം, ഭക്ഷ്യസുരക്ഷ
ഹരിതവിപ്ലവം, എം.എസ് സ്വാമിനാഥൻ
ഭക്ഷ്യസുരക്ഷാ നിയമം

Ladder V



Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

ഹരിതവിപ്ലവം, എം.എസ് സ്വാമിനാഥൻ, ഭക്ഷ്യസുരക്ഷാ നിയമം

Step 2

Reflection on Summary of topic

- ഭക്ഷ്യദൗർലഭ്യം
- ഭക്ഷ്യസുരക്ഷ
- ജനസംഖ്യാ വർദ്ധനവിന്റെ കാരണങ്ങൾ
- ഹരിതവിപ്ലവം
- പൊതുവിതരണ സമ്പ്രദായം

Step 3

Reflection of the learning process

(5 minutes)

- Students present the learned ideas.
- Summarizing the ideas: ഹരിതവിപ്ലവം, എം.എസ്. സ്വാമിനാഥൻ
- Mapping of the ideas: പൊതുവിതരണ സമ്പ്രദായം
- Note-taking on the topic: ഭക്ഷ്യസുരക്ഷാനിയമം
- Overall reflection of the topic: ഭക്ഷ്യദൗർലഭ്യവും ഭക്ഷ്യസുരക്ഷയും

Step 4

Review Question

(4 Minutes)

1) ഭക്ഷ്യസുരക്ഷയുടെ പ്രാധാന്യം എന്ത്?
2) ഹരിതവിപ്ലവത്തിന്റെ പ്രാധാന്യം എന്ത്?
3) ഭക്ഷ്യസുരക്ഷ ബില്ലിന്റെ പ്രാധാന്യം എന്ത്?
4) ഭക്ഷ്യദൗർലഭ്യതയുടെ കാരണങ്ങൾ എന്തെല്ലാം?

Step 5

Follow-up activities

(2 minutes)

1) ഭക്ഷ്യസുരക്ഷയുടെ പ്രാധാന്യം കാണിക്കുന്ന പോസ്റ്റർ ഉണ്ടാക്കുക.
2) റോൾപ്ലേയിലൂടെ കൃഷിയുടെ പ്രാധാന്യം കാണിക്കുക.

References

1) VIII Std. textbooks.
2) Samagra
3) Teachers handbook
4) https://www.youtube.com/watch?v=XldZMuLCFCY

മോഡ്യൂൾ 2
കാർഷിക മേഖലയിലെ പ്രതിസന്ധികൾ

പഠന നേട്ടങ്ങൾ

- കാർഷിക മേഖലയിലെ പ്രതിസന്ധികൾ തിരിച്ചറിഞ്ഞ് വിശദീകരിക്കാൻ കഴിയുന്നു.
- കൃഷിയുടെ പ്രാധാന്യം തിരിച്ചറിയുകയും കർഷകരെ ആദരിക്കുകയും ചെയ്യുന്നു.
- ദാരിദ്ര്യ നിർമാർജ്ജനത്തിനാവശ്യമായ ഗവൺമെന്റ് പദ്ധതികൾ മനസ്സിലാക്കുന്നു.

CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

വയനാട്ടിലെ കർഷകരുടെ ആത്മഹത്യകൾ കൂടിക്കൊണ്ടിരിക്കുകയാണ്. കാർഷിക മേഖലയെ മുഴുവൻ ഈ പ്രശ്നം ബാധിച്ചിരിക്കുകയാണ്.

https://www.newindianexpress.com/nation/2018/sep/12

- നമുക്ക് എങ്ങനെ ഈ പ്രശ്നങ്ങളെ മറികടക്കാം?
- എന്തായിരിക്കാം കർഷകരുടെ ആത്മഹത്യയ്ക്ക് കാരണം?
- ഈ പ്രശ്നം നമ്മളെ എങ്ങനെ ബാധിക്കും?

Step 2

Identification of Facts

1. കേരളത്തിലെ ഭൂരിഭാഗം ജനങ്ങളും കാർഷികവൃത്തിയെ ആശ്രയിച്ചാണ് ജീവിക്കുന്നത്.
2. കാർഷിക മേഖലയിൽ ധാരാളം പ്രതിസന്ധികൾ ഉണ്ട്.
3. പരിസ്ഥിതിനാശവും, കാലാവസ്ഥാവ്യതിയാനവും കൃഷിയെ ബാധിച്ചിരിക്കുന്ന പ്രധാന പ്രശ്നങ്ങളാണ്.
4. ദാരിദ്ര്യ നിർമാർജ്ജനത്തിനായി ഗവൺമെന്റ് ആസൂത്രണം ചെയ്ത വിവിധ പദ്ധതികൾ മനസ്സിലാക്കുന്നു.

Step 3

Generation of Ideas

1. കൂടുതൽ ഉൽപ്പാദനച്ചെലവ്, വിളയിലും, വിലയിലുമുള്ള നഷ്ടം, ഇടനിലക്കാരുടെ ചൂഷണം എന്നിവയെല്ലാം കാർഷിക മേഖലയെ ബാധിക്കുന്നു.
2. പരിസ്ഥിതിനാശവും, കാലാവസ്ഥാ വ്യതിയാനവും കൃഷിയെ ബാധിക്കുന്ന പ്രധാന പ്രശ്നങ്ങളാണ്.
3. ഗവൺമെന്റിന്റെ വിവിധ പദ്ധതികൾ ഉപയോഗിക്കുന്നതിലൂടെ കർഷകർക്ക് കൃഷി ഉൽപാദനം വർദ്ധിപ്പിക്കാനും, ലാഭമുണ്ടാക്കാനും സാധിക്കുന്നു.

Step 4

Developmental Phase

Activity I കാർഷിക മേഖലയിലെ പ്രതിസന്ധികൾ

(10 Minutes)

ചിത്രം 3.1

കുട്ടികൾ കാർഷിക മേഖലയിലെ പ്രതിസന്ധികളെക്കുറിച്ച് ചർച്ച ചെയ്ത് റിപ്പോർട്ട് തയ്യാറാക്കുന്നു.
Report Writing and presentation.
Reflection: Students reflect on concepts.

(6 minutes)

Hints: കാർഷിക മേഖലയിലെ പ്രശ്നങ്ങൾ

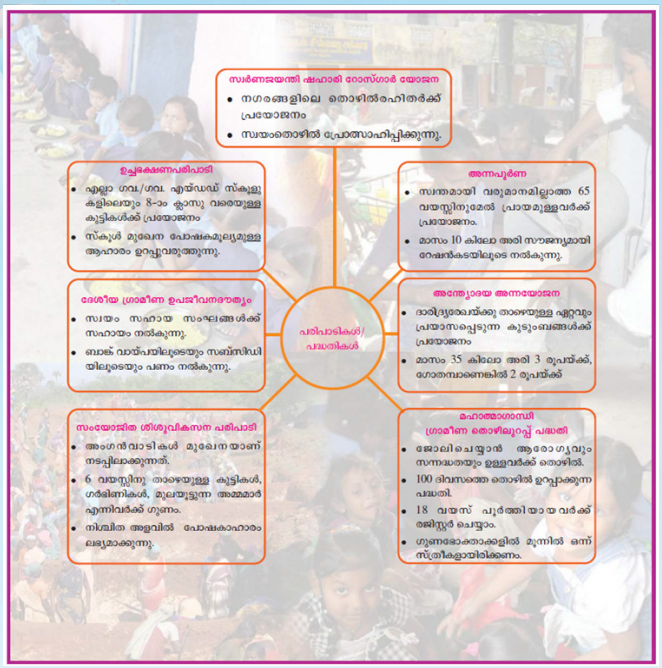
- ഉൽപ്പാദനച്ചെലവ്
- വിളനഷ്ടം, വിലനഷ്ടം
- സ്ഥലപരമിതി
- പരിസ്ഥിതി നാശവും, കാലാവസ്ഥാ വ്യതിയാനവും
- ഇടനിലക്കാരുടെ ചൂഷണം

Activity II ദാരിദ്ര്യ നിർമാർജ്ജനത്തിനാവശ്യമായ ഗവൺമെന്റിന്റെ പദ്ധതികൾ

(16 minutes)

കുട്ടികൾ ഗ്രൂപ്പിൽ ചർച്ച ചെയ്യുന്നു.

Flash Cards:



ദാരിദ്ര്യ നിർമാർജ്ജനത്തിനാവശ്യമായ ഗവൺമെന്റിന്റെ പദ്ധതികൾ

സർക്കാർ പദ്ധതികൾ	സർക്കാർ പരിപാടികൾ
• അന്നപൂർണ	സംയോജിത ശിശുവികസന പരിപാടി
• അന്ത്യോദയ അന്നയോജന	സ്കൂൾ ഉച്ചഭക്ഷണ പരിപാടി
• മഹാത്മാഗാന്ധി ഗ്രാമീണ തൊഴിലുറപ്പ് പദ്ധതി	ദേശീയ ഗ്രാമീണ ഉപജീവനദൗത്യം
• സ്വർണജയന്തി ഷഹാരി റോസ്ഗാർ യോജന	

Prepare a report on

1) അന്നപൂർണ്ണ
2) സ്കൂൾ ഉച്ചഭക്ഷ പരിപാടി
3) സംയോജിത ശിശുവികസന പരിപാടി

(6 minutes)

കുട്ടികൾ ഈ വിഷയവുമായി ബന്ധപ്പെട്ട കൂടുതൽ വിവരങ്ങൾ അന്വേഷിച്ചു കണ്ടുപിടിക്കുന്നു.

(5 minutes)

CLASS II

Step 5

Reflection: Sharing of ideas that researched (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

സർക്കാർ പദ്ധതികൾ	സർക്കാർ പരിപാടികൾ
• അന്നപൂർണ	സംയോജിത ശിശുവികസന പരിപാടി
• അന്ത്യോദയ അന്നയോജന	സ്കൂൾ ഉച്ചഭക്ഷണ പരിപാടി
• മഹാത്മാഗാന്ധി ഗ്രാമീണ തൊഴിലുറപ്പ് പദ്ധതി	ദേശീയ ഗ്രാമീണ ഉപജീവനദൗത്യം
• സ്വർണജയന്തി ഷഹാരി റോസ്ഗാർ യോജന	

ദാരിദ്ര്യ നിർമാർജ്ജനത്തിനാവശ്യമായ ഗവൺമെന്റിന്റെ പദ്ധതികൾ

SRL activities (10 minutes)

Step 2

Summarizing the ideas

കാർഷിക മേഖലയിലെ പ്രതിസന്ധികൾ

Step 3

Note-taking

ഗവൺമെന്റിന്റെ ദാരിദ്ര്യ നിർമാർജ്ജന പദ്ധതികൾ

Step 4

Mapping

ഭക്ഷ്യ സുരക്ഷ ഉറപ്പാക്കാനുള്ള ഗവൺമെന്റിന്റെ പദ്ധതികൾ

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting.

Step 2

Reasoning about the topic

കാർഷിക മേഖലയിലെ പ്രധാന പ്രശ്നങ്ങൾ ഏതാണ്?

പരിസ്ഥിതി നാശവും കാലാവസ്ഥാ മാറ്റവും എങ്ങനെ കാർഷിക മേഖലയെ ബാധിച്ചിരിക്കുന്നു?

ദാരിദ്ര്യ നിർമാർജ്ജന പദ്ധതികളുടെ ഗുണങ്ങളും ദോഷങ്ങളും വിവരിക്കുക

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL

(10 Minutes)

Step 1

Presentation

Participants present the output of SRL through activities such as:
1) Discussion of learning points. - കാർഷിക മേഖലയിലെ പ്രതിസന്ധികൾ.
2) Parallel presentation -ദാരിദ്ര്യ നിർമാർജ്ജന പദ്ധതികൾ.

Step 2

Peer Assessment

Peer Assessment is carried out through the activities.

- Discussion on Learning Point: കാർഷിക മേഖലയിലെ പ്രതിസന്ധികൾ
- Single Presentation of the Ideas: ദാരിദ്ര്യ നിർമാർജ്ജനത്തിനായുള്ള സർക്കാർ പരിപാടികൾ
- Parallel presentation: ദാരിദ്ര്യ നിർമാർജ്ജനത്തിനാവശ്യമായ ഗവൺമെന്റിന്റെ പദ്ധതികൾ

Step 3

Conclusion

Teacher concluded the learning points.

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

കാർഷിക മേഖലയിലെ പ്രതിസന്ധികളെക്കുറിച്ച് കുറിപ്പ് തയ്യാറാക്കുന്നു

Step 2

Reflection on Summary of topic

- ദാരിദ്ര്യ നിർമാർജ്ജന പദ്ധതികളുടെ കുറിപ്പ് തയ്യാറാക്കുന്നു.

Step 3

Reflection of the learning process

(5 minutes)

- Students present the learned ideas.
- Summarizing the ideas: കാർഷിക മേഖലയിലെ പ്രതിസന്ധികൾ
- Mapping of the ideas: ഭക്ഷ്യ സുരക്ഷ ഉറപ്പാക്കാനുള്ള ഗവൺമെന്റിന്റെ പദ്ധതികൾ
- Note-taking on the topic: ദാരിദ്ര്യ നിർമാർജ്ജന പരിപാടികൾ
- Overall reflection of the topic: കാർഷിക മേഖലയിലെ പ്രതിസന്ധികൾ

Step 4

Review Question

(4 Minutes)

1. കാർഷിക മേഖലയിലെ പ്രശ്നങ്ങൾ ഏതെല്ലാം?
2. പരിസ്ഥിതി നാശവും കാലാവസ്ഥാ വ്യതിയാനവും കാർഷിക മേഖലയെ എങ്ങനെ ബാധിച്ചിരിക്കുന്നു?
3. ഗവൺമെന്റിന്റെ ദാരിദ്ര്യ നിർമാർജ്ജന പദ്ധതികൾ ഏവ?

Step 5

Follow-up activities

(2 minutes)

കർഷകരെ സഹായിക്കുന്നതിനുള്ള വിവിധ പദ്ധതികൾ കണ്ടെത്തുക.

References

1) VIIIth std Basic science text books
2) VIIth std social science text book
3) Samagra
4) Teachers handbook
5) https://*www.newindianexpress.com/nation/2018/sep/12*

മോഡ്യൂൾ 3

കർഷകരുടെ ആരോഗ്യവും സുരക്ഷിതത്വവും

പഠന നേട്ടങ്ങൾ

- കൃഷിയിടങ്ങളിലെ ആരോഗ്യ പ്രശ്നങ്ങളും അപകടങ്ങളും മനസ്സിലാക്കുന്നു.
- കൃഷിയിടങ്ങളിൽ എന്തൊക്കെ മുൻകരുതലുകൾ സ്വീകരിക്കണമെന്ന് മനസ്സിലാക്കുന്നു
- കർഷകരെ പ്രഥമശുശ്രൂഷയെക്കുറിച്ച് ബോധവാന്മാരാക്കുന്നതിനും അത് പ്രചരിപ്പിക്കുന്നതിനും കഴിയുന്നു.

CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

ടീച്ചർ കഥ പറയുന്നു. കൃഷിയിടങ്ങളിലെ അപകട സാധ്യതകൾ. ചിത്രം പ്രദർശിപ്പിക്കുന്നു.

ഈ പാടത്ത് എന്തൊക്കെ അപകടങ്ങൾ സംഭവിക്കാം?
ഇങ്ങനെയുള്ള അപകടങ്ങളെക്കുറിച്ച് കർഷകർക്ക് അവബോധം ഉണ്ടാക്കാനും മുൻകരുതലുകൾ എടുക്കാനും നാം ശ്രദ്ധിക്കണം.
കാർഷിക മേഖലയെ ആശ്രയിച്ച് ജീവിക്കുന്ന നമുക്ക് കർഷകരുടെ ആരോഗ്യം വളരെ പ്രധാനപ്പെട്ടതാണ്.

Step 2

Identification of Facts

1) കർഷകർക്ക് കൃഷിയിടങ്ങളിൽ ഒരുപാട് അപകട സാധ്യത ഉണ്ട്. അവ ഏതൊക്കെയാണെന്ന് മനസ്സിലാക്കുന്നു.
2) കൃഷിയിടങ്ങളിൽ കർഷകർ കൈക്കൊള്ളേണ്ട മുൻകരുതലുകൾ മനസ്സിലാക്കുന്നു.
3) കൃഷിയിടങ്ങളിൽ പ്രഥമ ശുശ്രൂഷയുടെ പ്രാധാന്യം മനസ്സിലാക്കുന്നു.

Step 3

Generation of Ideas

കർഷകരുടെ ആരോഗ്യവും സുരക്ഷിതത്വവും

Step 4

Developmental Phase

Activity I കർഷകരുടെ ആരോഗ്യ പ്രശ്നങ്ങൾ (10 Minutes)

Collaborative Working Groups

കർഷകരുടെ പലതരം ജീവിത സാഹചര്യങ്ങളുമായി ബന്ധപ്പെട്ട ആരോഗ്യ പ്രശ്നങ്ങൾ ആസ്പദമാക്കി ഗ്രൂപ്പ് ചർച്ച നടത്തുന്നു

ഏതൊക്കെ സന്ദർഭങ്ങളുമായി ബന്ധപ്പെട്ട് കർഷകർക്ക് അപകടങ്ങൾ ഉണ്ടാകുന്നു?

കുട്ടികൾ (Think Pair Share) സംഘ ചർച്ചയിലൂടെ റിപ്പോർട്ട് തയ്യാറാക്കുന്നു.

Report Writing and presentation.
Reflection: Students reflect on concepts. (6 minutes)

Activity II കർഷകരുടെ ആരോഗ്യ പ്രശ്നങ്ങൾ

(16 minutes)
Working Groups

ടീച്ചർ ചാർട്ട് പ്രദർശിപ്പിക്കുന്നു.
ചാർട്ടിൽ വിട്ട ഭാഗം പൂരിപ്പിക്കാൻ പറയുന്നു

Chart:

പാരിസ്ഥിതിക ഘടകങ്ങൾ	ആരോഗ്യ പ്രശ്നങ്ങൾ	കൃഷി രീതികൾ
വേനൽക്കാലം		തുറസ്സായ സ്ഥലത്ത് കൃഷി ചെയ്യുന്നവർ
പാമ്പുകടി		
	അപകടകരവും ജീവനു തന്നെ ഭീഷണിയും ഉണ്ടാകുന്നു	കൃഷി സ്ഥലങ്ങളിൽ ജോലി ചെയ്യുന്നവർ
ഷഡ്പദങ്ങളുടെ കടി		
മൂർച്ചയേറിയ ഉപകരണങ്ങൾ	ആഴമേറിയ മുറിവുകൾ ജീവനു തന്നെ ഭീഷണിയാകുന്നു	ഉപകരണങ്ങൾ ഉപയോഗിക്കുന്നതിനുള്ള കഴിവ്
ഭാരം വഹിക്കുമ്പോഴുണ്ടാവുന്നവ	നടുവേദന/ശരീരവേദന	
കീടനാശിനികൾ	കണ്ണിന്റെ കാഴ്ച ശക്തി കുറയുന്നു, കാൻസർ പോലുള്ള അസുഖങ്ങൾ ഉണ്ടാകുന്നു	
വിഷപ്പുല്ലുകൾ		
രോഗാണുക്കൾ	ത്വക്ക് രോഗം, അലർജി, മലേറിയ, ഉറക്കത്തകരാറ്	

കുട്ടികൾ ചാർട്ട് പൂർത്തിയാക്കുന്നു.

കൃഷിയിടങ്ങളിലെ അപകടങ്ങളെക്കുറിച്ചുള്ള കൂടുതൽ പത്ര റിപ്പോർട്ടുകൾ കണ്ടെത്തുവാൻ പറയുന്നു.
കർഷകർക്കു വേണ്ടിയുള്ള ഗവൺമെന്റിന്റെ ഇൻഷൂറൻസ് പദ്ധതികൾ അന്വേഷിച്ചു കണ്ടെത്താൻ പറയുന്നു.

Hints:
E- Nam
National Mission for sustainable agriculture

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

കൃഷിയിടങ്ങളിലെ അപകട സാധ്യതകൾ, മുൻകരുതലുകൾ

SRL activities (10 minutes)

Step 2

Summarizing the ideas

കൃഷിയിടങ്ങളിലെ അപകട സാധ്യതകൾ, മുൻകരുതലുകൾ

Step 3

Note-taking

കർഷകർക്കു വേണ്ടിയുള്ള ഗവൺമെന്റിന്റെ ഇൻഷൂറൻസ് പദ്ധതികൾ

Step 4

Mapping

കർഷകരുടെ ആരോഗ്യ പ്രശ്നങ്ങൾ

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

കേരളത്തിലെ കർഷകർ സുരക്ഷിതരാണോ? വിശദീകരിക്കുക

കൃഷിയിടങ്ങളിലെ അപകട സാധ്യതകൾക്ക് കാരണങ്ങളേവ?

കൃഷിയിടങ്ങളിലെ അപകട സാധ്യതകൾ ഒഴിവാക്കാനാവശ്യമായ മുൻകരുതലുകൾ ഏവ?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL (10 Minutes)

Step 1

Presentation

Participants present the output of SRL through activities such as:

1) Discussion of learning points:

ഗവൺമെന്റിന്റെ കർഷകർക്കുള്ള പോളിസികൾ
കീടനാശിനികൾ ഉപയോഗിക്കുമ്പോൾ കർഷകർ എന്തൊക്കെ മുൻകരുതലുകൾ എടുക്കണം?

2) Single presentation of the ideas:

പ്രഥമ ശുശ്രൂഷയുടെ പ്രാധാന്യം
സൂര്യാഘാതം, പാമ്പുകടി, നിർജ്ജലീകരണം

Step 2

Peer Assessment

Peer Assessment is carried out through the above activities.

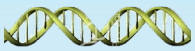
- Discussion on Learning Point: കർഷകരുടെ ആരോഗ്യ പ്രശ്നങ്ങളും സുരക്ഷിതത്വവും
- Single Presentation of the Ideas: കൃഷിയിടങ്ങളിലെ അപകട സാധ്യതകൾ, മുൻകരുതലുകൾ
- Parallel presentation: ആരോഗ്യ പ്രശ്നങ്ങളും കൃഷിരീതികളും

Step 3

Conclusion

Teacher concluded the learning points.

Ladder V



Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

Completion of chart (കൃഷിയിടങ്ങളിലെ അപകടങ്ങളുമായി ബന്ധപ്പെട്ട ചാർട്ട്)

Step 2

Reflection on Summary of topic

- പ്രഥമ ശുശ്രൂഷയുടെ പ്രാധാന്യം

Step 3

Reflection of the learning process

(5 minutes)

- Group discussion and chart completion

Step 4

Review Question

(4 Minutes)

1) കർഷകരുടെ പ്രശ്നങ്ങൾ എന്തൊക്കെയാണ്?
2) കർഷകർക്ക് വേണ്ടി ഗവൺമെന്റ് കൊണ്ടുവന്ന പദ്ധതികൾ എന്തെല്ലാം?
3) കീടനാശിനികൾ കൊണ്ടുള്ള അപകടങ്ങൾക്ക് എന്തൊക്കെ മുൻകരുതലുകൾ എടുക്കാം?

Step 5

Follow-up activities

(2 minutes)

കർഷകരുമായുള്ള കൂടിക്കാഴ്ച നടത്താനുള്ള ചോദ്യാവലി തയ്യാറാക്കുക.

References

1) VIIIth std Basic science text books
2) VIIth std social science text book
3) Samagra
4) Teachers handbook

മോഡ്യൂൾ 4
ജൈവകൃഷി

പഠന നേട്ടങ്ങൾ

- ജൈവകൃഷി എന്ന ആശയം വിശദീകരിക്കാൻ കഴിയുന്നു.
- ജൈവകൃഷിയുടെ പ്രാധാന്യം വിശദീകരിക്കാൻ കഴിയുന്നു.
- ജൈവവളം, രാസവളം എന്നീ ആശയങ്ങൾ വിശദീകരിക്കാൻ കഴിയുന്നു.
- ഗവൺമെന്റ് കർഷകർക്ക് നൽകുന്ന പ്രധാന ബഹുമതികളെക്കുറിച്ച് മനസ്സിലാക്കുന്നു.

CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

ടീച്ചർ

മുമ്പു കാലത്ത് പച്ചക്കറികളെല്ലാം വിളവെടുപ്പിനുശേഷം രണ്ടും, മൂന്നും ദിവസങ്ങൾ മാത്രമേ കേടുവരാതെ നിലനിൽക്കുമായിരുന്നുള്ളു. എന്നാൽ ഇന്ന് വളരെയധികം ദിവസങ്ങൾ കടകളിലും, മാർക്കറ്റുകളിലും പച്ചക്കറികൾ കേടുകൂടാതെ നിലനിൽക്കുന്നു. എന്തായിരിക്കും കാരണം?

കുട്ടികൾ

രാസകീടനാശിനികൾ തളിക്കുന്നതു മൂലം കീടാണുക്കളുടെ ആക്രമണം കുറവായിരിക്കും. ഇങ്ങനെ വിഷമയമായ പച്ചക്കറികളും, പഴങ്ങളും കഴിക്കുന്നതു കാരണം പല ആരോഗ്യ പ്രശ്നങ്ങളും ഉണ്ടാകുന്നു.

ടീച്ചർ
ഈ പ്രശ്നങ്ങളെ എങ്ങനെയൊക്കെ മിറകടക്കാൻ കഴിയും?

Participants work in groups to identify the problem.

Step 2

Identification of Facts

1. ജൈവവളവും, ജൈവ കീടനാശിനികളും ഉപയോഗിക്കുന്നതിലൂടെ ഗുണമേൻമയുള്ള വിളകൾ ലഭിക്കുന്നു.
2. രാസകീടനാശിനികളുടെ ഉപയോഗം പല ആരോഗ്യ പ്രശ്നങ്ങളും ഉണ്ടാക്കുന്നു.
3. ജൈവ പച്ചക്കറികൾ ഉപയോഗിക്കുന്നതിലൂടെ ഒരു പരിധി വരെ ആരോഗ്യ പ്രശ്നങ്ങൾ ഒഴിവാക്കാൻ കഴിയുന്നു.

Step 3

Generation of Ideas

1. ആരോഗ്യകരമായ ജീവിതത്തിന് ജൈവ പച്ചക്കറികളുടെയും, പഴങ്ങളുടെയും പ്രാധാന്യം മനസ്സിലാക്കുന്നു.
2. ജൈവവളത്തിന്റെ പ്രത്യേകതകൾ മനസ്സിലാക്കുന്നു.
3. രാസവളത്തെക്കുറിച്ചും, രാസ കീടനാശിനികളെക്കുറിച്ചും മനസ്സിലാക്കുന്നു.
4. കർഷകർക്കു നൽകുന്ന അവാർഡുകളെക്കുറച്ച് മനസ്സിലാക്കുന്നു.
    - കർഷകോത്തമ അവാർഡ്
    - യുവകർഷക അവാർഡ്
    - യുവകർഷകൻ അവാർഡ്
    - കർഷകതിലകം അവാർഡ്
    - കേരകേസരി അവാർഡ്

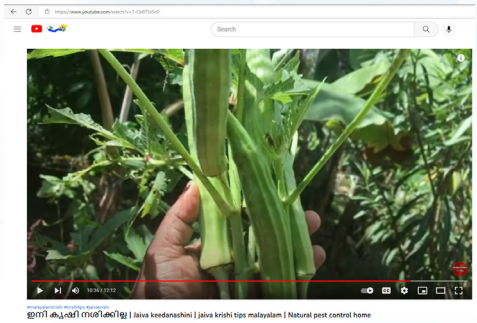
Step 4

Developmental Phase

Activity I വീഡിയോ പ്രദർശനം (10 Minutes)

ജൈവവളം, ജൈവകൃഷി എന്നിവയുമായി ബന്ധപ്പെട്ട വീഡിയോ കാണിക്കുന്നു.

Working Groups



Jaiva keedanashini | jaiva krishi tips malayalam | Natural pest control home
https://www.youtube.com/watch?v=7-Cb0T5x5c0

ജൈവകൃഷിയെക്കുറിച്ച് റിപ്പോർട്ട് തയ്യാറാക്കാൻ പറയുന്നു. കുട്ടികൾ സഹവർത്തിത ഗ്രൂപ്പുകളിൽ (Think-Pair-Share) ചർച്ച ചെയ്ത് റിപ്പോർട്ട് തയ്യാറാക്കുന്നു.

Report Writing and presentation.
Reflection: Students reflect on concepts.

(6 minutes)

Activity II Fertilizers

(16 minutes)
Working Groups

രാസവളം, ജൈവവളം, ജീവാണു വളം എന്നിവയെക്കുറിച്ച് മനസ്സിലാക്കുന്നതിന് അതുമായി ബന്ധപ്പെട്ട Flashcards കൊടുക്കുന്നു.

കുട്ടികൾ രാസവളത്തെക്കുറിച്ചും, ജീവാണു വളത്തെക്കുറിച്ചും ജൈവവളത്തെക്കുറിച്ചും ചർച്ച ചെയ്യുന്നു.

Flash Cards:

ജൈവ വളം	രാസ വളം
പ്രകൃതിദത്ത ജീവികളുടെ അവശിഷ്ടങ്ങളിൽ നിന്നും ഉപോൽപ്പന്നങ്ങളിൽ നിന്നും ലഭിക്കുന്നു. മണ്ണിന്റെ ഫലഭൂയിഷ്ഠി വർദ്ധിപ്പിക്കുന്നു. ആരോഗ്യ പ്രശ്നങ്ങൾ ഉണ്ടാക്കുന്നില്ല. ഉദാഹരണങ്ങൾ :	കൃത്രിമമായി നിർമ്മിക്കുന്നു. മണ്ണിന്റെ ഫലഭൂയിഷ്ഠി ക്രമേണ കുറയുന്നു. നൈട്രജൻ, ഫോസ്ഫേറ്റ്, പൊട്ടാഷ് എിവ അടങ്ങിയിരിക്കുന്നു. ഉദാഹരണങ്ങൾ :

വെള്ള നിറത്തിലുള്ള കള്ളികളിൽ കുട്ടികൾ ഉദാഹരണങ്ങൾ എഴുതി ചാർട്ട് പൂർത്തിയാക്കുന്നു.

വളം തരുന്ന ജീവാണുക്കൾ

മണ്ണിന്റെ ഫലപുഷ്ടി വർധിപ്പിക്കാൻ സഹായിക്കുന്ന സൂക്ഷ്മജീവികൾ അടങ്ങിയ പദാർഥങ്ങളാണ് ജീവാണുവളങ്ങൾ. ജീവാണുക്കളുടെ സാന്നിധ്യം മണ്ണിലെ സസ്യവളർച്ചയ്ക്കാവശ്യമായ ഘടകങ്ങളുടെ അളവു കൂട്ടാൻ സഹായിക്കുന്നു. മണ്ണിൽ നൈട്രജന്റെ അളവു കൂട്ടുന്നതിനായി റൈസോബിയം, അസറ്റോബാക്ടർ, അസോസ്പൈറില്ലം തുടങ്ങിയ ബാക്ടീരിയകളെയും അസോള എന്ന ജലസസ്യത്തെയും ഉപയോഗിക്കാം.

ശ്രദ്ധിക്കേണ്ട കാര്യങ്ങൾ

- മണ്ണിൽ ജൈവവള ലഭ്യത ഉറപ്പുവരുത്തണം.
- മതിയായ ജലസേചനം ഉണ്ടാകണം.
- രാസവളവും രാസകീടനാശിനികളും ഉപയോഗിക്കരുത്.

ഈ മുൻകരുതലുകൾ പാലിച്ചാൽ മാത്രമേ സൂക്ഷ്മജീവികൾക്കു മണ്ണിൽ നിലനിൽക്കാൻ കഴിയുകയുള്ളൂ.

Students research on the Topic:

1) ഗവൺമെന്റ് കർഷകർക്കു നൽകുന്ന പ്രധാന ബഹുമതികളെക്കുറിച്ച് കണ്ടുപിടിച്ചുവരാൻ പറയുന്നു
2) രാസകീടനാശിനികളുടെ ദൂഷ്യഫലങ്ങൾ കണ്ടെത്തി വരാൻ പറയുന്നു.

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

- കർഷകോത്തമ അവാർഡ്
- യുവകർഷക അവാർഡ്
- യുവകർഷകൻ അവാർഡ്
- കർഷകതിലകം അവാർഡ്
- കേരകേസരി അവാർഡ്

രാസകീടനാശിനികൾ - ദൂഷ്യഫലങ്ങൾ (DDT)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

ജൈവ കൃഷി

Step 3

Note-taking

രാസവളങ്ങളുടെയും, രാസകീടനാശിനികളുടെയും ദൂഷ്യഫലങ്ങൾ

Step 4

Mapping

വിവിധ തരം വളങ്ങൾ

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

ജൈവിക ആവർധനത്തിന്റെ കാരണങ്ങൾ എന്തെല്ലാം?

രാസകീടനാശിനികളുടെ ഉപയോഗം ജീവികളിലുണ്ടാക്കുന്ന പ്രത്യാഘാതങ്ങളെക്കുറിച്ച് വിവരിക്കുന്നു.

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL (10 Minutes)

Step 1

Presentation

Participants present the output of SRL through activity. Such as:

1) Discussion on learning points: ജൈവകൃഷി
2) Single presentation: രാസവളം, ജൈവവളം , ജീവാണുവളം

Step 2

Peer Assessment

Peer Assessment is carried out through the above activities

- Discussion on Learning Point: ജൈവകൃഷി
- Single Presentation of the Ideas: രാസവളങ്ങളുടെയും, രാസകീടനാശിനികളുടെയും ദൂഷ്യഫലങ്ങൾ
- Parallel presentation: രാസ വളങ്ങളും ജൈവ വളങ്ങളും

Step 3

Conclusion

Teacher concluded the learning points.

Hints:

1. ജൈവകൃഷി
2. ജൈവകൃഷിയുടെ പ്രാധാന്യം
3. ജൈവകീടനാശിനികളുടെയും, രാസകീടനാശിനികളുടെയും പ്രത്യേകതകൾ
4. കർഷകർക്ക് നൽകുന്ന പ്രധാന ബഹുമതികൾ

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

ഗവൺമെന്റ് കർഷകർക്കു നൽകുന്ന പ്രധാന ബഹുമതികൾ

Step 2

Reflection on Summary of topic

ജൈവകൃഷി

Step 3

Reflection of the learning process

(5 minutes)

a) Summarizing the Ideas: ജൈവകൃഷി

b) Note taking on the topic: രാസവളങ്ങളുടെയും, രാസകീടനാശിനികളുടെയും ദൂഷ്യഫലങ്ങൾ.

Step 4

Review Question

(4 Minutes)

1. എന്താണ് ജൈവകൃഷി?
2. ജൈവകൃഷിയുടെ മേൻമകൾ എന്തെല്ലാം?
3. രാസകീടനാശിനികൾക്ക് രണ്ട് ഉദാഹരണങ്ങൾ?
4. ജൈവകീടനാശിനികൾക്ക് രണ്ട് ഉദാഹരണങ്ങൾ?

Step 5

Follow-up activities

(2 minutes)

1. ഫാമുകൾ സന്ദർശിച്ച് ജൈവ പച്ചക്കറികളുടെ വിത്തുകൾ ശേഖരിക്കുക.
2. പ്രദേശത്തെ കർഷകനുമായി അഭിമുഖം നടത്തുക.

References

1) VIIIth std Basic science text books
2) VIIth std social science text book
3) Samagra
4) Teachers handbook
5) https://www.youtube.com/watch?v=7-Cb0T5x5c0

മോഡ്യൂൾ 5

ആധുനിക കൃഷിരീതികളും ഓൺലൈൻ കൂട്ടായ്മകളും

പഠന നേട്ടങ്ങൾ

- ആധുനിക കൃഷിരീതികൾ തിരിച്ചറിഞ്ഞ് വിശദീകരിക്കാൻ കഴിയുന്നു.
- വിഷവിമുക്തമായ പച്ചക്കറികൾക്കുള്ള ഓൺലൈൻ കൂട്ടായ്മകളെക്കുറിച്ച് മനസ്സിലാക്കുന്നു.
- ഭക്ഷ്യവസ്തുക്കളുമായി ബന്ധപ്പെട്ട ഓൺലൈൻ ആപ്പുകളെക്കുറിച്ച് വിശദീകരിക്കാൻ കഴിയുന്നു.
- കൃഷിയുമായി ബന്ധപ്പെട്ട വിവിധ ദൃശ്യ ശ്രാവ്യ മാധ്യമങ്ങൾ തിരിച്ചറിയുന്നതിനും അവ പ്രചരിപ്പിക്കുന്നതിനും കഴിയുന്നു.

CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

ടീച്ചർ
കാലാവസ്ഥാ വ്യതിയാനം പരമ്പരാഗത കൃഷിരീതികളെ പ്രതികൂലമായി ബാധിക്കുന്നു. ഇവയെ എങ്ങനെയൊക്കെ മറികടക്കാം? വിഷമയമായ പച്ചക്കറികൾ കഴിക്കുന്നതിലൂടെ നമുക്ക് പല രോഗങ്ങളും ഉണ്ടാകുന്നു. ഈ സ്ഥിതി തുടർന്ന് പോയാൽ നമ്മുടെ ആരോഗ്യസ്ഥിതി എന്താകും?

Step 2

Identification of Facts

1) കാലാവസ്ഥാമാറ്റം പരമ്പരാഗത കൃഷിരീതികളെ പലരീതിയിൽ ബാധിക്കുന്നു.
2) Hydroponics , Aeroponics എന്നിവ മണ്ണില്ലാതെയുള്ള കൃഷിരീതികളാണ്.
3) Vertical Farming, മട്ടുപ്പാവ് കൃഷി, Growbag ലെ കൃഷി എന്നിവ സ്ഥലനഷ്ടം കുറയ്ക്കുന്നു.

Step 3

Generation of Ideas

1. ആധുനിക കൃഷി രീതികളായ Hydroponics, Aeroponics എന്നിവയുടെ പ്രാധാന്യം മനസ്സിലാക്കുന്നു.
2. മട്ടുപ്പാവ് കൃഷി, Vertical farming, Growbagലെ കൃഷി എന്നിവയുടെ പ്രത്യേകതകൾ മനസ്സിലാക്കുന്നു.
3. ജൈവപച്ചക്കറികൾ ലഭ്യമാകുന്നതിൽ ഓൺലൈൻ കൂട്ടായ്മകളുടെ പങ്ക്.
4. ഭക്ഷ്യ വസ്തുക്കളുമായി ബന്ധപ്പെട്ട ഓൺലൈൻ ആപ്പുകൾ.
5. ടെലിവിഷൻ പ്രോഗ്രാം
   - കൃഷിദീപം
   - നാട്ടുപച്ച
6. റേഡിയോ പ്രോഗ്രാം
   - കൃഷിപാഠം
   - വയലും വീടും
7. Online applications to food supplies
   - Uber Eats
   - Zomato
   - Swiggy Food

Step 4

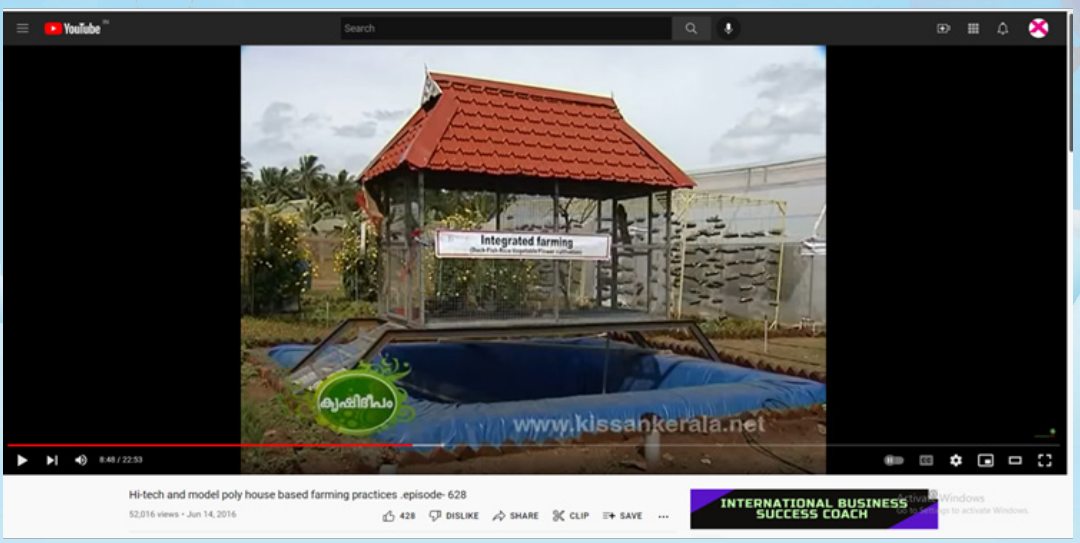
Developmental Phase

(10 Minutes)

Working Groups

Activity I ആധുനിക കൃഷി രീതികളുമായി ബന്ധപ്പെട്ട വീഡിയോ

വിവിധ തരം ആധുനിക കൃഷി രീതികളുമായി ബന്ധപ്പെട്ട വീഡിയോ കാണിക്കുന്നു. Hydroponics, Aeroponics, Polyhouse Farming എന്നിവ സഹവർത്തിത ഗ്രൂപ്പുകളിൽ (Jigsaw) ചർച്ച ചെയ്ത് റിപ്പോർട്ട് തയ്യാറാക്കുന്നു.



https://www.youtube.com/watch?v=c-dLZUVxP3Y

Report Writing and presentation. (6 minutes)
Reflection: Students reflect on concepts.

Hints:

- Hydroponics
- Aeroponics
- Polyhouse farming

ചിത്രം 3.3
പോളിഹൗസ് ഫാമിങ്

ചിത്രം 3.5
ഹൈഡ്രോപോണിക്സ്

ചിത്രം 3.6
എയ്റോപോണിക്സ്

Activity II

(16 minutes)

സ്ഥല പരിമിതി പ്രശ്നം ഒഴിവാക്കുന്നതിനും ജീവിത ചുറ്റുപാടുകൾക്ക് അനുസരിച്ചുള്ള കൃഷിരീതികൾ കാണിക്കുന്ന ചിത്രങ്ങൾ. ഇത്തരം കൃഷിരീതികൾ മനസ്സിലാക്കി അവയുടെ പ്രാധാന്യം, ഓൺലൈൻ കൂട്ടായ്മകൾ എന്നിവ സഹവർത്തിത ഗ്രൂപ്പുകളിൽ ചർച്ച ചെയ്ത് റിപ്പോർട്ട് അവതരിപ്പിക്കാൻ പറയുന്നു.

Photographs:

ടെറസിലെ കൃഷി ഗ്രോ ബാഗിലെ കൃഷി

വെർട്ടിക്കൽ ഫാമിംഗ്

Students research on the topics: കൃഷിയുമായി ബന്ധപ്പെട്ട ടെലിവിഷൻ പ്രോഗ്രാം, റേഡിയോ പ്രോഗ്രാം

Hints:

- കൃഷിദീപം
- നാട്ടുപച്ച
- വയലും വീടും
- കൃഷിപാഠം

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

- കൃഷിദീപം
- നാട്ടുപച്ച
- വയലും വീടും
- കൃഷിപാഠം

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

ആധുനിക കൃഷിരീതികൾ മേന്മകൾ

Step 3

Note-taking

സ്ഥല പരിമിതി പ്രശ്നം ഒഴിവാക്കുന്നതിനുള്ള കൃഷിരീതികൾ
ഓൺലൈൻ കൂട്ടായ്മകൾ

Step 4

Mapping

ആധുനിക കൃഷിരീതികൾ

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

പരമ്പരാഗത കൃഷിരീതികൾ അന്യം നിന്നുപോകുന്നതിനുള്ള കാരണങ്ങൾ എന്തെല്ലാം?

കർഷകർ ചൂഷണം ചെയ്യപ്പെടാനുള്ള കാരണങ്ങൾ എന്തൊക്കെ?
കാലാവസ്ഥാ വ്യതിയാനങ്ങൾ കൃഷിരീതിയെ ഏതൊക്കെ വിധത്തിൽ ബാധിക്കുന്നു?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL (10 Minutes)

Step 1

Presentation

Participants present the output of SRL through activity.
Such as:
Discussion on learning points:

1. വിവിധ തരം ആധുനിക കൃഷിരീതികൾ.
2. ഓൺലൈൻ കൂട്ടായ്മകളുടെ പ്രാധാന്യം.

Single Presentation:

1. മട്ടുപ്പാവ് കൃഷി
2. ഗ്രോബാഗിലെ കൃഷി
3. വെർട്ടിക്കൽ ഫാമിങ്

Step 2

Peer Assessment

Peer Assessment through Questioning.

- Discussion on Learning Point: ആധുനിക കൃഷിരീതികൾ
- Single Presentation of the Ideas: സ്ഥല പരിമിതി പ്രശ്നം ഒഴിവാക്കുന്നതിനുള്ള കൃഷിരീതികൾ, ഓൺലൈൻ കൂട്ടായ്മകൾ
- Parallel presentation: കൃഷിയുമായി ബന്ധപ്പെട്ട ടെലിവിഷൻ പ്രോഗ്രാം, റേഡിയോ പ്രോഗ്രാം

Step 3

Conclusion

Teacher concluded the learning points.

Hints:

1) ആധുനിക കൃഷിരീതികൾ
2) കൃഷിയുമായി ബന്ധപ്പെട്ട ടെലിവിഷൻ പ്രോഗ്രാം, റേഡിയോ പ്രോഗ്രാം
3) ഭക്ഷ്യ വസ്തുക്കളുമായി ബന്ധപ്പെട്ട ഓൺലൈൻ ആപ്പുകൾ

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

കൃഷിയുമായി ബന്ധപ്പെട്ട ടെലിവിഷൻ പ്രോഗ്രാം, റേഡിയോ പ്രോഗ്രാം

Step 2

Reflection on Summary of topic

ആധുനിക കൃഷിരീതികൾ

Step 3

Reflection of the learning process

(5 minutes)

a) Summarizing the Ideas: ആധുനിക കൃഷിരീതികൾ, മേന്മകൾ

b) Note taking on the topic: ദൃശ്യശ്രാവ്യ മാധ്യമങ്ങൾ - കൃഷിയുമായി ബന്ധപ്പെട്ടവ.

Step 4

Review Question

(4 Minutes)

1) വിഷവിമുക്തമായ പച്ചക്കറികൾക്ക് ഏതൊക്കെ കൃഷിരീതികൾ ഉപയോഗിക്കാം?
2) കർഷകരുടെ ചൂഷണം ഒഴിവാക്കുന്നതിനുള്ള മാർഗ്ഗങ്ങൾ ഏവ?
3) കൃഷിയുമായി ബന്ധപ്പെട്ട ഒരു റേഡിയോ പ്രോഗ്രാം ഏത്?
4) കൃഷിയുമായി ബന്ധപ്പെട്ട ഒരു ടെലിവിഷൻ പ്രോഗ്രാം ഏത്?
5) ഭക്ഷ്യവസ്തുക്കൾക്കുള്ള ഓൺലൈൻ ആപ്പുകൾ ഏവ?

Step 5

Follow-up activities

(2 minutes)

1) വീട്ടിലൊരു പച്ചക്കറി കൃഷി എന്ന ആശയം പ്രാവർത്തികമാക്കുക
2) കൃഷിയുമായി ബന്ധപ്പെട്ട ഏതെങ്കിലും ഒരു ആനുകാലികം വായിച്ച് റിപ്പോർട്ട് തയ്യാറാക്കുക.

References

1) VIIIth std Basic science text books
2) VIIth std social science text book
3) Samagra
4) Teachers handbook
5) *https://www.youtube.com/watch?v=c-dLZUVxP3Y*

STD VIII: അടിസ്ഥാന ശാസ്ത്രം
Diversity for Sustenance

മോഡ്യൂൾ 6
ജീവ മണ്ഡലം

പഠന നേട്ടങ്ങൾ

- ജീവമണ്ഡലം എന്ന ആശയം വിശദീകരിക്കാൻ കഴിയുന്നു.
- ജീവമണ്ഡലത്തിൽ അജീവീയ ഘടകങ്ങളുടെയും, ജീവീയ ഘടകങ്ങളുടെയും പ്രാധാന്യത്തെ കുറിച്ച് വിശദീകരിക്കാൻ കഴിയുന്നു.
- അന്തരീക്ഷത്തിലെ വിവിധ പാളികളെക്കുറിച്ച് മനസ്സിലാക്കാൻ കഴിയുന്നു.

CLASS I

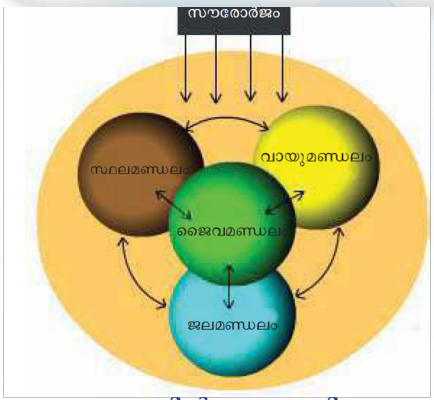
Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

ടീച്ചർ

സസ്യങ്ങളുടെ നിലനിൽപ്പിനു ആവശ്യമായ ഘടകങ്ങളാണ് ജലം, വായു, സൂര്യ പ്രകാശം, ധാതു ലവണങ്ങൾ ഇതിൽ ഏതെങ്കിലും ഘടകം മാറ്റി നിർത്തിയാൽ ഭൂമിയിൽ സസ്യങ്ങളും ജന്തുക്കളും നിലനിൽക്കുമോ?



Participants work in groups to identify the problem

ഈ ഘടകങ്ങളിൽ എന്തെങ്കിലും മാറ്റങ്ങൾ വന്നാൽ അത് നമ്മെ എങ്ങനെ ബാധിക്കും?

Step 2

Identification of Facts

1) ജീവമണ്ഡലം – ഭൗമോപരിതലത്തിലും, സമുദ്രത്തിലും, അന്തരീക്ഷത്തിലുമായി ജീവൻ നിലനിൽക്കുന്ന ഭാഗം.
2) അജീവീയ ഘടകങ്ങൾ: ജീവികളുടെ നിലനിൽപ്പിനു വേണ്ട ജീവനില്ലാത്ത ഘടകങ്ങൾ
3) ജീവ മണ്ഡലത്തിൽ ജീവീയ ഘടകങ്ങളും, അജീവീയ ഘടകങ്ങളും ഉൾപ്പെടുന്നു.
4) അന്തരീക്ഷത്തിൽ വിവിധ ഉയരങ്ങളിലെ താപമനുസരിച്ച് വിവിധ മണ്ഡലങ്ങൾ ഉണ്ട്.

Step 3

Generation of Ideas

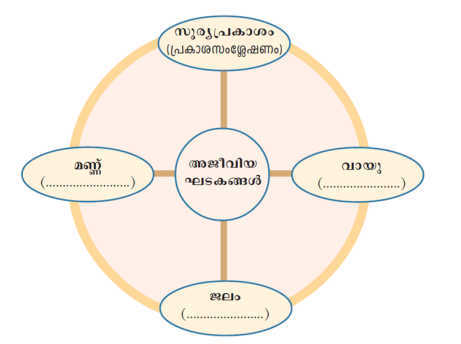
1. ഭൗമോപരിതലത്തിലും, അന്തരീക്ഷത്തിലും, സമുദ്രത്തിലുമായി ജീവൻ നിലനിൽക്കുന്ന ഭാഗമാണ് ജീവമണ്ഡലം.
2. ജീവ മണ്ഡലത്തിൽ ജീവീയ ഘടകങ്ങളും, അജീവീയ ഘടകങ്ങളും ഉൾപ്പെടുന്നു.
3. അജീവീയ ഘടകങ്ങളായ മണ്ണ്, വായു, ജലം എന്നിവയുടെ ഘടനയെക്കുറിച്ച് മനസ്സിലാക്കുന്നു.
4. ട്രോപ്പോസ്ഫിയർ, സ്ട്രാറ്റോസ്ഫിയർ, മീസോസ്ഫിയർ, തെർമ്മോസ്ഫിയർ എന്നിവ അന്തരീക്ഷത്തിലെ പാളികളാണ്.

Step 4

Developmental Phase

Activity I Chart on Elements of Biosphere (10 Minutes)

ജീവ മണ്ഡലത്തിലെ അജീവീയ ഘടകങ്ങളുടെ ചാർട്ട് കാണിക്കുന്നു. ചാർട്ട് ശ്രദ്ധിച്ച് അതിലെ ഭാഗങ്ങൾ പൂരിപ്പിക്കുക.



ജീവമണ്ഡലത്തിലെ ഘടകങ്ങൾ

ജീവമണ്ഡലം (Biosphere)

ഭൂമിയിൽ ജീവൻ കാണപ്പെടുന്ന ഭാഗമാണ് ജീവമണ്ഡലം. ഇത് ഭൗമോപരിതലത്തിലും അന്തരീക്ഷത്തിലും സമുദ്രത്തിനടിയിലുമായി വ്യാപിച്ചു കിടക്കുന്നു.

കുട്ടികൾ സഹവർത്തിത ഗ്രൂപ്പുകളിലിരുന്ന് ജീവ മണ്ഡലത്തിലെ അജീവീയ ഘടകങ്ങളെ കുറിച്ച് ചർച്ച ചെയ്യുന്നു.

Activity II അന്തരീക്ഷ ഘടന (16 minutes)

വിവിധതരം അന്തരീക്ഷ പാളികളെക്കുറിച്ചും അവയുടെ പ്രത്യേകതകളും കാണിക്കുന്ന Flash Cards നൽകുന്നു. കുട്ടികൾ സഹവർത്തിത ഗ്രൂപ്പുകളിൽ ചർച്ച ചെയ്ത് റിപ്പോർട്ട് തയ്യാറാക്കുന്നു.

Flash Cards:

അന്തരീക്ഷ ഘടന

- ഭൗമോപരിതലത്തിൽ നിന്നും ഏകദേശം 90 KM ഉയരം വരെ വാതക സംരചന ഏറെക്കുറെ ഒരുപോലെയാണ്.
- അന്തരീക്ഷത്തിന്റെ ഈ ഭാഗത്തെ ഹോമോസ്ഫിയർ എന്ന് പറയുന്നു.
- 90 KM ന മുകളിലുള്ള അന്തരീക്ഷ ഭാഗത്തെ ഹെടെറോസ്ഫിയർ എന്ന് പറയുന്നു.

ട്രോപ്പോസ്ഫിയർ

- ഭൂമിയോട് ചേർന്നുള്ള 13 KM ഉയരം.
- മേഘരൂപീകരണം, മഴ, മഞ്ഞ്, കാറ്റ്, ഇടിമിന്നൽ തുടങ്ങിയ അന്തരീക്ഷ പ്രതിഭാസങ്ങൾ
- ട്രോപ്പോപാസ് - ട്രോപ്പോസ്ഫിയറിന്റെ മുകളിലുള്ള സംക്രമണ മേഖല

മിസോസ്ഫിയർ

- ഭൂമിയിൽ നിന്നും 50 മുതൽ 80 KM ഉയരം വരെ.
- ഉയരത്തിനനുസരിച്ച് താപം കുറയുന്നു. (800c മുതൽ 1000c വരെ)
- ഉൽക്കകൾ ഘർഷണത്താൽ കത്തിച്ചാരമാവുന്നു.
- മിസോസ്ഫിയറിനു മുകളിലുള്ള സംക്രമണ മേഖല - മിസോപാസ്

സ്ട്രാറ്റോസ്ഫിയർ

- ട്രോപ്പോപാസിൽ തുടങ്ങി ഭൂമിയിൽ നിന്ന് ഏകദേശം 50 KM ഉയരം വരെ.
- താഴ്ന്ന വിതാനങ്ങളിൽ ഉയരം കൂടുന്നതിന് അനുസരിച്ച് താപനിലയിൽ മാറ്റം അനുഭവപ്പെടുന്നില്ല.
- സമതാപ മേഖലയായി അറിയപ്പെടുന്നു.
- ഓസോൺ പാളി സ്ഥിതി ചെയ്യുന്നു.
- ജറ്റ് വിമാനങ്ങളുടെ സുഗമ സഞ്ചാരത്തിന് കഴിയുന്നു.
- സ്ട്രാറ്റോപ്പാസ് - സ്ട്രാറ്റോസ്ഫിയറിനു മുകളിലുള്ള സംക്രമണ മേഖല.

തെർമോസ്ഫിയർ

- ഏകദേശം 80 മുതൽ 600 KM വരെ ഉയരത്തിൽ സ്ഥിതിചെയ്യുന്നു.
- ഉയരുംതോറും താപനില ഗണ്യമായി വർദ്ധിക്കുന്നു.
- തെർമോസ്ഫിയറിന്റെ താഴ്ന്ന ഭാഗത്തെ അയണോസ്ഫിയർ എന്ന് വിളിക്കുന്നു.
- അയണോസ്ഫിയർ റേഡിയോ പരിപാടികളുടെ ദീർഘദൂര പ്രക്ഷേപണം സാധ്യമാക്കുന്നു.

Students Present the Report
Students research on the topics:

1) ഓസോൺപാളിയുടെ പ്രത്യേകതകൾ എന്തെല്ലാം?
2) അന്തരീക്ഷപാളിയുടെ ഘടന വരയ്ക്കുക.

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

- ഓസോൺപാളിയുടെ പ്രത്യേകതകൾ
- അന്തരീക്ഷപാളികൾ

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

ജീവ മണ്ഡലത്തിലെ ഘടകങ്ങൾ

Step 3

Note-taking

അന്തരീക്ഷ പാളികൾ

Step 4

Mapping

അന്തരീക്ഷ പാളികൾ

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

ഓസോൺപാളിയുടെ ശോഷണത്തിന്റെ കാരണങ്ങൾ കണ്ടെത്തുക

ജറ്റ് വിമാനങ്ങളുടെ സഞ്ചാരം സ്ട്രാറ്റോസ്ഫിയറിൽ സുഗമമാവാനുള്ള കാരണമെന്ത്?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL (10 Minutes)

Step 1

Presentation

Participants present the output of SRL through activity.
Such as:
Discussion on learning points:

ജീവമണ്ഡലത്തിന്റെ ഘടകങ്ങൾ
ജലം, വായു, മണ്ണ് എന്നിവയുടെ ഘടന.

Parallel Presentation - Quiz about Layers of Atmosphere.

Group A	Group B
• 50 മുതൽ 80 കി.മീ. വരെ ഉയരത്തിലുള്ള അന്തരീക്ഷപാളി. • ഓസോൺപാളി എവിടെ കാണപ്പെടുന്നു. • മഞ്ഞ്, ഇടിമിന്നൽ എന്നിവ ഏത് അന്തരീക്ഷപാളിയിൽ	• ജറ്റ് വിമാനങ്ങൾ പറക്കുന്നത് ഏത് പാളിയിൽക്കൂടെ. • ഓസോൺപാളിയുടെ നാശത്തിന് കാരണമായ ഒരു വാതകം. • റേഡിയോ പരിപാടിയുടെ പ്രക്ഷേപണം സാധ്യമാക്കുന്ന അന്തരീക്ഷപാളി.

Step 2

Peer Assessment

Peer Assessment through Questioning.

Step 3

Conclusion

Teacher concluded the learning points.

- ജീവ മണ്ഡലം.
- ജീവ മണ്ഡലത്തിൽ ജീവീയ ഘടകങ്ങളും, അജീവീയ ഘടകങ്ങളും ഉൾപ്പെടുന്നു.
- അന്തരീക്ഷത്തിൽ വിവിധ ഉയരങ്ങളിലെ താപമനുസരിച്ച് വിവിധ മണ്ഡലങ്ങൾ ഉണ്ട്.

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

ഓസോൺപാളിയുടെ പ്രത്യേകതകൾ

Step 2

Reflection on Summary of topic

ജീവ മണ്ഡലം

Step 3

Reflection of the learning process (5 minutes)

a) Summarizing the Ideas: ജീവമണ്ഡലത്തിലെ ഘടകങ്ങൾ

b) Diagrammatic Representation: അന്തരീക്ഷപാളികൾ

Overall Reflection of the Topic: ജീവ മണ്ഡലം

Step 4

Review Question (4 Minutes)

1. മണ്ണിൽ ഏറ്റവും കൂടുതലുള്ള ഘടകങ്ങൾ ഏവ?
2. ജീവ മണ്ഡലത്തിൽ സൂക്ഷ്മ ജീവികളുടെ പ്രാധാന്യം എന്ത്?
3. അന്തരീക്ഷ പാളികൾ ഏതൊക്കെ?
4. ജറ്റ് വിമാനങ്ങൾ പറക്കുന്നത് ഏത് അന്തരീക്ഷപാളിയിലൂടെയാണ്?

Step 5

Follow-up activities (2 minutes)

ജീവ മണ്ഡലത്തിന്റെ സംരക്ഷണവുമായി ബന്ധപ്പെട്ട പോസ്റ്റർ തയ്യാറാക്കുക.
ജീവ മണ്ഡലത്തിൽ അജീവീയ ഘടകങ്ങളുടെ പ്രാധാന്യം സയൻസ് ഡയറിയിൽ രേഖപ്പെടുത്തുക

References

1) VIIIth std Basic science text books
2) VIIth std social science text book
3) Samagra
4) Teachers handbook

മോഡ്യൂൾ 7
ജൈവവൈവിധ്യം

പഠന നേട്ടങ്ങൾ

- ജൈവവൈവിധ്യം എന്താണെന്ന ധാരണ കൈവരിക്കുതിന്.
- ജൈവവൈവിധ്യത്തിന്റെ പ്രാധാന്യം മനസിലാക്കുന്നതിന്
- ജൈവവൈവിധ്യശോഷണം എന്താണെന്ന് മനസിലാക്കുതിന്.
- ജൈവവൈവിധ്യസംരക്ഷണത്തിന്റെ പ്രാധാന്യം മനസിലാക്കുന്നതിന്.
- ജൈവവൈവിധ്യസംരക്ഷണവുമായി ബന്ധപ്പെട്ട റിപ്പോർട്ടുകൾ, സിദ്ധാന്തങ്ങൾ എന്നിവയെക്കുറിച്ചുള്ള ധാരണ കൈവരിക്കുതിന്.

CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

ടീച്ചർ:
ഭൂമിയിൽ വിവിധ തരത്തിലുള്ള ജീവജാലങ്ങൾ കാണപ്പെടുന്നു. എല്ലാ ജീവികളെയും ഇപ്പോഴും കാണാറുണ്ടോ? പണ്ടുകാലത്ത് നിലം കിളക്കുമ്പോൾ കാളകളുടെ പിന്നാലെ നിരവധി കാക്കകളും കൊറ്റിയുമൊക്കെ കാണാം. ഇപ്പോഴും അവയെ കാണാറുണ്ടോ? കാലാവസ്ഥയിലുണ്ടാകുന്ന മാറ്റം കടുവയുടെ എണ്ണത്തെ ബാധിച്ചാൽ അത് നമ്മെ എങ്ങനെ ബാധിക്കും. നിങ്ങൾ ചിന്തിച്ചിട്ടുണ്ടോ?

Participants work in groups to identify the problem

Step 2

Identification of Facts

1. ജൈവവൈവിധ്യം - ഭൂമിയിലെ വിവിധങ്ങളായ സസ്യങ്ങളും ജന്തുക്കളും, സൂക്ഷ്മജീവികളും ചേർന്ന ജൈവസമ്പന്നതയാണ് ജൈവവൈവിധ്യം.
2. ആഗോളതാപനവും, കാലാവസ്ഥാവ്യതിയാനവും ജൈവവൈവിധ്യത്തെ ബാധിക്കുന്ന ഘടകങ്ങളാണ്.
3. ജൈവവാവിധ്യശോഷണം നാം നേരിടുന്ന വെല്ലുവിളിയാണ്.

Step 3

Generation of Ideas

1. ജൈവവൈവിധ്യശോഷണത്തിന്റെ കാരണങ്ങൾ മനസിലാക്കുന്നു.
   - പ്രകൃതി വിഭവ ചൂഷണം.
   - ആവാസവ്യവസ്ഥയുടെ നാശവും ശിഥിലീകരണവും, കുന്നിടിക്കൽ, ജലമലിനീകരണം, ജനസംഖ്യാ വർധനവ്, കീടനാശിനി പ്രയോഗം.
2. ജൈവവൈവിധ്യ സംരക്ഷണവുമായി ബന്ധപ്പെട്ട റിപ്പോർട്ടുകളെക്കുറിച്ച് മനസ്സിലാക്കുന്നു.
   e.g. ഗാഡ്ഗിൽ റിപ്പോർട്ട്

Step 4

Developmental Phase
Activity I Video on Biodiversity

(10 Minutes)

ജൈവവൈവിധ്യം കാണിക്കുന്ന വീഡിയോ കാണിക്കുന്നു. ജൈവവൈവിധ്യത്തിന്റെ പ്രാധാന്യം ചർച്ച ചെയ്ത് എഴുതുവാൻ പറയുന്നു.

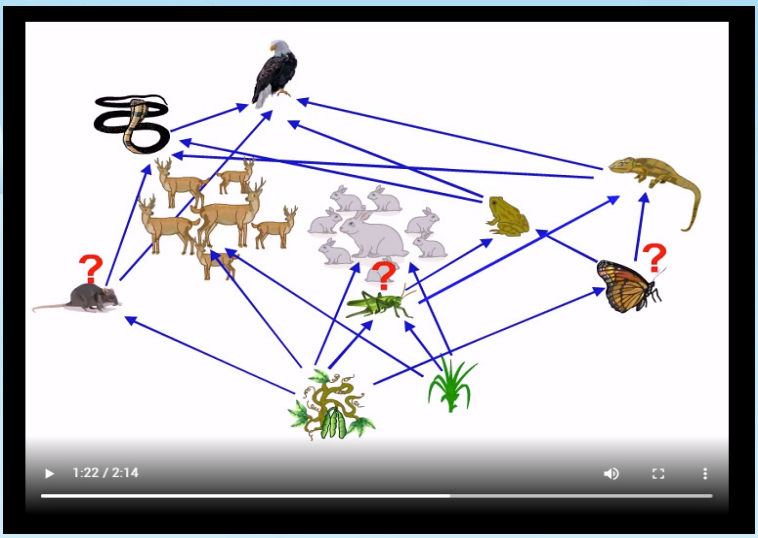
Working Groups

ജൈവവൈവിധ്യത്തിന്റെ പ്രാധാന്യത്തെ കുറിച്ച് റിപ്പോർട്ട് തയ്യാറാക്കുക.

Activity II Biodiversity Depletion

(16 minutes)

ജൈവവൈവിധ്യശോഷണം കാണിക്കുന്ന വീഡിയോ.



ജൈവവൈവിധ്യ ശോഷണത്തെകുറിച്ച് റിപ്പോർട്ട് തയ്യാറാക്കുക.
Students research on the topic - പരിസ്ഥിതി സംരക്ഷണവുമായി ബന്ധപ്പെട്ട സിദ്ധാന്തങ്ങൾ/ റിപ്പോർട്ടുകൾ ശേഖരിക്കുക

Hints:

പ്രകൃതിവിഭവചൂഷണം
ആവാസവ്യവസ്ഥയുടെ നാശവും
ശിഥിലീകരണവും
കുന്നിടിക്കൽ
മലിനീകരണം മുതലായവ

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

പരിസ്ഥിതി സംരക്ഷണവുമായി ബന്ധപ്പെട്ട സിദ്ധാന്തങ്ങൾ

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

ജൈവവൈവിധ്യത്തിന്റെ പ്രാധാന്യം

Step 3

Note-taking

പരിസ്ഥിതി സംരക്ഷണവുമായി ബന്ധപ്പെട്ട സിദ്ധാന്തങ്ങൾ/റിപ്പോർട്ടുകൾ

Step 4

Mapping

പരിസ്ഥിതിയുടെ പ്രാധാന്യത്തെക്കുറിച്ച് ചിത്രീകരണം നടത്തുക

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

എല്ലാ ആവാസവ്യവസ്ഥകളും ജൈവസമ്പത്തിൽ ഒരുപോലെയാണോ?

സ്വാഭാവിക ആവാസവ്യവസ്ഥ സംരക്ഷിക്കേണ്ടതിന്റെ ആവശ്യകതയെന്ത്

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL

(10 Minutes)

Step 1

Presentation

Participants present the output of SRL such as:
Discussion on learning points:

ജൈവവൈവിധ്യം

Parallel presentation

ജൈവവൈവിധ്യശോഷണം
ജൈവവൈവിധ്യസംരക്ഷണം

Step 2

Peer Assessment

Carried Out Through the Activities 1 & 2

Video showing biodiversity
Video showing biodiversity dipletion

Step 3

Conclusion

Teacher concluded the learning points.

ജൈവവൈവിധ്യം
ജൈവവൈവിധ്യസംരക്ഷണം
ജൈവവൈവിധ്യശോഷണം

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

പരിസ്ഥിതി സംരക്ഷണവുമായി ബന്ധപ്പെട്ട സിദ്ധാന്തങ്ങൾ/റിപ്പോർട്ടുകൾ

Step 2

Reflection on Summary of topic

ജൈവവൈവിധ്യം

Step 3

Reflection of the learning process (5 minutes)

a) വീഡിയോ നിരീക്ഷണം
b) സംഘ ചർച്ച

Overall Reflection of the Topic: ജൈവവൈവിധ്യം

Step 4

Review Question (4 Minutes)

1. ജൈവവൈവിധ്യം എന്നാലെന്ത്?
2. ജൈവവൈവിധ്യത്തിന്റെ പ്രാധാന്യം എന്ത്?
3. ജൈവവൈവിധ്യശോഷണത്തിന്റെ കാരണങ്ങൾ ഏവ?

Step 5

Follow-up activities (2 minutes)

1. Poster making on environmental protection
2. Role play showing the importance of biodiversity

References

1) VIIIth std Basic science text books
2) VIIth std social science text book
3) Samagra
4) Teachers handbook

മോഡ്യൂൾ 8

ജൈവവൈവിധ്യ സംരക്ഷണം – ഇൻസിറ്റു കൺസർവേഷൻ

പഠന നേട്ടങ്ങൾ

- ജൈവ വൈവിധ്യം എന്താണെന്ന് വിശദീകരിക്കാൻ കഴിയുന്നു.
- ജൈവ വൈവിധ്യം പരിരക്ഷിക്കേണ്ടതിന്റെ പ്രാധാന്യം തിരിച്ചറിഞ്ഞ് സംരക്ഷണ പ്രവർത്തനങ്ങളിൽ ഏർപ്പെടുന്നു.
- പരിസ്ഥിതി സംരക്ഷകരെ കുറിച്ച് മനസ്സിസാക്കുന്നു. ജൈവ വൈവിധ്യ സംരക്ഷണത്തിനുള്ള മനോഭാവം ഉണ്ടാകുന്നു.
- വിവിധ തരം ഇൻസിറ്റു കൺസർവേഷനുകൾ വിശദീകരിക്കാൻ കഴിയുന്നു.

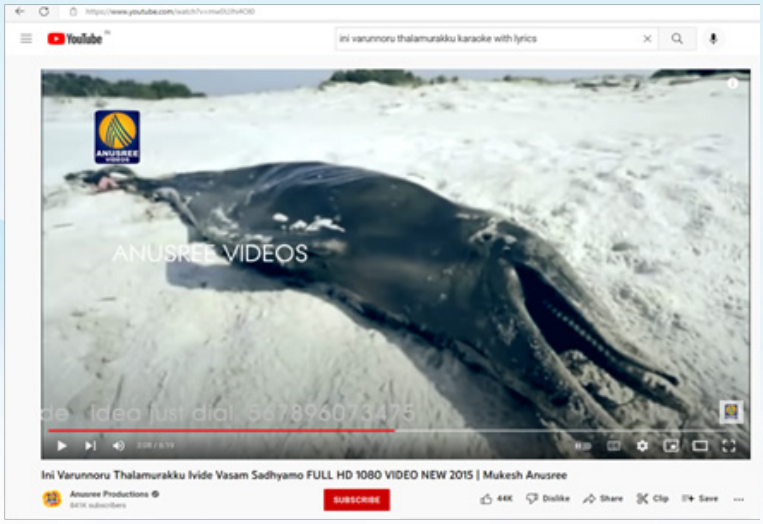
CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem മലിനമായ ജലാശയം

Video of Malayalam poem- 'ഇനി വരുന്നൊരു തലമുറയ്ക്ക് ഇവിടെ വാസം സാധ്യമോ.'



https://youtu.be/mw0UJhi4Ol0

ടീച്ചർ:
'ഇനി വരുന്നൊരു തലമുറയ്ക്ക് ഇവിടെ വാസം സാധ്യമോ....?'
ഈ വരികളിൽ നിന്നും നമുക്ക് എന്തൊക്കെ കാര്യങ്ങൾ മനസ്സിലാക്കാം?

Participants work in groups to identify the problem

Step 2

Identification of Facts

1. ജൈവ വൈവിധ്യം – ഭൂമിയിലെ വിവിധങ്ങളായ സസ്യങ്ങളും, ജന്തുക്കളും സൂക്ഷ്മ ജീവികളും ചേർന്ന ജൈവസമ്പന്നതയാണ് ജൈവവൈവിധ്യം.
2. ആഗോള താപനവും, കാലാവസ്ഥാ വ്യതിയാനവും ജൈവവൈവിധ്യത്തെ ബാധിക്കുന്ന ഘടകങ്ങളാണ്.
3. ജൈവ വൈവിധ്യ ശോഷണം നാം നേരിടുന്ന വെല്ലുവിളിയാണ്.
4. ജൈവവൈവിധ്യ സംരക്ഷണത്തിന് In-Situ സംരക്ഷണം, എക്സ്-സിറ്റു സംരക്ഷണം എന്നീ തരത്തിൽ ഉണ്ട്.

Step 3

Generation of Ideas

1. ജൈവ വൈവിധ്യത്തോടുള്ള വിവേകപൂർണമായ സമീപനത്തിലൂടെ ജൈവ വൈവിധ്യം സംരക്ഷിക്കാം.
2. ഇൻസിറ്റു കൺസർവേഷൻ: ജീവജാലങ്ങളെ അവയുടെ സ്വാഭാവിക ആവാസവ്യവസ്ഥകളിൽ തന്നെ സംരക്ഷിക്കുന്ന രീതിയാണ് ഇൻസിറ്റു കൺസർവേഷൻ
3. വന്യജീവി സങ്കേതങ്ങൾ, നാഷണൽ പാർക്കുകൾ, കമ്മ്യൂണിറ്റി റിസർവുകൾ, ബയോസ്ഫിയർ റിസർവുകൾ, കാമ്പുകൾ, ഇക്കോളജിക്കൽ ഹോട്ട്സ്പോട്ടുകൾഎന്നിവഇൻസിറ്റുകൺസർവേഷനുദാഹരണങ്ങളാണ്.
4. വന്യ ജീവി സങ്കേതങ്ങൾ: ആവാസ വ്യവസ്ഥകളെ പരിരക്ഷിച്ചുകൊണ്ട്, വന്യജീവികളുടെ വംശനാശം തടയാനായി പ്രഖ്യാപിക്കപ്പെട്ടിട്ടുള്ള വനമേഖലകളാണിവ. പേപ്പാറ, പെരിയാർ, വയനാട് തുടങ്ങിയവ കേരളത്തിലെ വന്യജീവി സങ്കേതങ്ങൾക്ക് ഉദാഹരണങ്ങളാണ്.
5. നാഷണൽ പാർക്കുകൾ: വന്യജീവി സംരക്ഷണത്തോടൊപ്പം, ഒരു മേഖലയിലെ ചരിത്രസ്മാരകങ്ങൾ, പ്രകൃതി വിഭവങ്ങൾ, ഭൗമസവിശേഷതകൾ എന്നിവ കൂടി സംരക്ഷിക്കുന്നതിനായി രൂപീകരിക്കപ്പെട്ടവയാണ് നാഷണൽ പാർക്കുകൾ. ഇരവികുളം, സൈലന്റ് വാലി, ആനമുടിച്ചോല, മതികെട്ടാൻ ചോല, പാമ്പാടും ചോല എന്നിവയാണ് കേരളത്തിലെ നിലവിലുള്ള നാഷണൽ പാർക്കുകൾ.
6. കമ്യൂണിറ്റി റിസർവ്വുകൾ: പൊതുജന പങ്കാളിത്തത്തോടെ സംരക്ഷിക്കപ്പെടുന്ന പ്രദേശങ്ങളാണ് കമ്യൂണിറ്റി റിസർവുകൾ, ജനവാസ കേന്ദ്രങ്ങൾക്കിടയിലെ പരിസ്ഥിതി പ്രാധാന്യമേറിയ പ്രദേശങ്ങളാണിവ. മലപ്പുറം, കോഴിക്കോട് ജില്ലകളിലായി സ്ഥിതി ചെയ്യുന്ന കടലുണ്ടി കമ്യൂണിറ്റി റിസർവ് ഇതിന് ഉദാഹരണമാണ്.
7. ബയോസ്ഫിയർ റിസർവുകൾ: ലോകത്തിലെ പ്രധാനപ്പെട്ട ആവാസ വ്യവസ്ഥകളെയും ജൈവ വൈവിധ്യത്തെയും, ജനിതക സ്രോതസ്സുകളെയും സംരക്ഷിക്കുക എന്ന ഉദ്ദേശ്യത്തോടെ സ്ഥാപിക്കപ്പെട്ട വിശാലമായ

ഭൂപ്രദേശമാണിത്. നീലഗിരി, അഗസ്ത്യമല എന്നീ ബയോസ്ഫിയർ റിസർവുകളിൽ കേരളത്തിലെ പ്രദേശങ്ങൾ കൂടി ഉൾപ്പെട്ടിരിക്കുന്നു.

8. കാവുകൾ: മനുഷ്യവാസ പ്രദേശങ്ങളിൽ സംരക്ഷിക്കപ്പെട്ടു വരുന്ന വിസ്തൃതി കുറഞ്ഞ ജൈവ വൈവിധ്യ മേഖലയാണ് കാവുകൾ. ജീവിതസാഹചര്യങ്ങളിൽ വന്ന മാറ്റങ്ങളുടെ ഭാഗമായി അമൂല്യ ജൈവ സമ്പത്തായിരുന്ന കാവുകൾ പലതും നാമാവശേഷമായി. ഏതാനും കാവുകൾ മാത്രമേ ഇന്ന് അവശേഷിക്കുന്നുള്ളൂ. പ്രദേശത്തെ ജലസംരക്ഷണത്തിൽ കാവുകളുടെ പങ്ക് നിസ്തുലമാണ്.

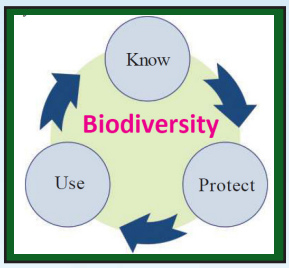
9. ഇക്കോളജിക്കൽ ഹോട്സ്പോട്ടുകൾ: തദ്ദേശീയമായ ധാരാളം സ്പീഷീസുകൾ ഉൾക്കൊള്ളുന്നതും, ആവാസ നാശ ഭീഷണി നേരിടുന്നതുമായ ജൈവവൈവിധ്യ മേഖലകളാമ് ഇവ. അതീവ പരിസ്ഥിതി പ്രാധാന്യമുള്ള ജൈവ സമ്പന്ന മേഖലയാണ് ഓരോ ഹോട്സ്പോട്ടും ലോകത്താകെയുള്ള മുപ്പത്തിനാല് ഹോട്സ്പോട്ടുകളിൽ മൂന്നെണ്ണം ഇന്ത്യയിലാണ്. പശ്ചിമഘട്ടം, വടക്കു-കിഴക്കൻ ഹിമാലയം, ഇന്തോ-ബർമ മേഖല എന്നിവയാണവ.

Step 4

Developmental Phase

Activity I Chart on Wise Approach to Biodiversity (10 Minutes)

ജൈവവൈവിധ്യത്തോടുള്ള വിവേക പൂർണമായ സമീപനം എങ്ങനെയായിരിക്കണം. ചിത്രീകരണം വിശകലനം ചെയ്ത് എഴുതുക. കുട്ടികൾ സഹവർത്തിത ഗ്രൂപ്പുകളിൽ ചർച്ച ചെയ്ത് റിപ്പോർട്ട് തയ്യാറാക്കുക.



Activity II ഇൻസിറ്റു കൺസർവേഷൻ (16 minutes)

ജീവജാലങ്ങളെ അവയുടെ ആവാസവ്യവസ്ഥയിൽ തന്നെ സംരക്ഷിക്കുന്ന രീതിയാണ് ഇൻസിറ്റു കൺസർവേഷൻ.

വിവിധതരം ഇൻസിറ്റു കൺസർവേഷൻ ടെക്സ്റ്റ് ബുക്കിന്റെ സഹായത്തോടെ ചർച്ച ചെയ്ത് എഴുതുവാൻ പറയുന്നു. കുട്ടികൾ സഹവർത്തിത ഗ്രൂപ്പുകളിൽ ചർച്ച ചെയ്ത് റിപ്പോർട്ട് തയ്യാറാക്കുന്നു. അവതരിപ്പിക്കുന്നു.

Hints:

വന്യജീവി സങ്കേതങ്ങൾ
നാഷണൽ പാർക്കുകൾ
കമ്യൂണിറ്റി റിസർവുകൾ
ബയോസ്ഫിയർ റിസർവുകൾ
കാവുകൾ
ഇക്കോളജിക്കൽ ഹോട്സ്പോട്ടുകൾ

Students research on the topic:
രണ്ട് പരിസ്ഥിതി സംരക്ഷകരുടെ ജീവചരിത്രക്കുറിപ്പ് തയ്യാറാക്കുക

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

രണ്ട് പരിസ്ഥിതി സംരക്ഷകരുടെ ജീവചരിത്രക്കുറിപ്പ്

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

ഇൻസിറ്റു – കൺസർവേഷൻ

Step 3

Note-taking

രണ്ട് പരിസ്ഥിതി സംരക്ഷകരുടെ ജീവചരിത്രക്കുറിപ്പ്

Step 4

Mapping

ഇൻസിറ്റു – കൺസർവേഷൻ

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

കാവുകൾ സംരക്ഷിക്കേണ്ടതിന്റെ ആവശ്യകതയെന്ത്.

സ്വാഭാവിക ആവാസ വ്യവസ്ഥകൾ നശിക്കാനുള്ള കാരണങ്ങൾ എന്ത്?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL

(10 Minutes)

Step 1

Presentation

Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points- ഇൻസിറ്റു – കൺസർവേഷൻ
2) Parallel presentation

Group A	Group B
1. നാഷണൽ പാർക്കുകൾക്ക് ഉദാഹരണങ്ങൾ പറയുക 3. ബയോസ്ഫിയർ റിസർവുകളുടെ പ്രാധാന്യം എന്താണ്	2. വന്യജീവി സങ്കേതങ്ങൾക്ക് ഉദാഹരണങ്ങൾ പറയുക 4. കാവുകളുടെ പ്രാധാന്യം എന്തെല്ലാമാണ്

Step 2

Peer Assessment

Carried Out Through the Activities 1 & 2

ചാർട്ട് - ജൈവവൈവിധ്യത്തോടുള്ള വിവേകപൂർണമായ സമീപനം
ഇൻ-സിറ്റു കൺസർവേഷൻ

Step 3

Conclusion

Teacher concluded the learning points.

ഇൻ-സിറ്റു കൺസർവേഷൻ

Ladder V

Overall Reflection (5 minutes)

Step 1

Reflection on Homework/exercise

രണ്ട് പരിസ്ഥിതി പ്രവർത്തകരെക്കുറിച്ച് വിവരിക്കുക

Step 2

Reflection on Summary of topic

ഇൻസിറ്റു കൺസർവേഷൻ

Step 3

Reflection of the learning process (5 minutes)

ഗ്രൂപ്പ് ചർച്ച

കൊളാഷ് നിരീക്ഷണം

Overall Reflection of the Topic: ഇൻസിറ്റു കൺസർവേഷൻ

Step 4

Review Question (4 Minutes)

1. ഇൻസിറ്റു കൺസർവേഷൻ എന്നാൽ എന്ത്?
2. നാഷണൽ പാർക്കുകൾക്ക് ഉദാഹരണങ്ങൾ നൽകുക
3. ഇരവികുളം നാഷണൽ പാർക്കിൽ സംരക്ഷിച്ചു പോരുന്ന ജീവി ഏത്?

Step 5

Follow-up activities (2 minutes)

വിവിധ തരം ഇൻസിറ്റു കൺസർവേഷന്റെ Picture Album തയ്യാറാക്കുക

References

1) VIIIth std Basic science text books
2) https://youtu.be/mw0UJhi4Ol0
3) Samagra
4) Teachers handbook

മോഡ്യൂൾ 9

ജൈവവൈവിധ്യ സംരക്ഷണം – എക്സിറ്റു കൺസർവേഷൻ

പഠന നേട്ടങ്ങൾ

- ജൈവ വൈവിധ്യം എന്ന ആശയം വിശദീകരിക്കാൻ കഴിയുന്നു.
- ജൈവ വൈവിധ്യം പരിരക്ഷിക്കേണ്ടതിന്റെ പ്രാധാന്യം തിരിച്ചറിഞ്ഞ് സംരക്ഷണ പ്രവർത്തനങ്ങളിൽ ഏർപ്പെടുന്നു.
- പരിസ്ഥിതി സംരക്ഷണവുമായി ബന്ധപ്പെട്ട സാഹിത്യങ്ങൾ വായിക്കുന്നതിനുള്ള താൽപര്യം ഉണ്ടാകുന്നു.
- വിവിധ തരം എക്സിറ്റു കൺസവേഷനുകൾ വിശദീകരിക്കാൻ കഴിയുന്നു.

CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

ടീച്ചർ
അപ്പുവിന്റെ യാത്രാവിവരണം
വായിക്കുന്നു...

അപ്പുവിന്റെ യാത്രാ വിവരണം

പഠനയാത്രയ്ക്ക് പുറപ്പെട്ടപ്പോൾ ഞാനും അമ്മുവും വളരെ സന്തോഷത്തിലായിരുന്നു, പഠനയാത്രയിലെ ആദ്യ ദിവസം തിരുവന്തപുരം, മൃഗശാലയിലാണ് ആദ്യം പോയത്, വളരെ വ്യത്യസ്തമായ ജീവികളെ അവിടെ കാണാനിടയായി. സിംഹവും, കടുവയും, ആനയുമൊക്കെ അവിടെ ഉണ്ടായിരുന്നു. അപ്പോഴാണ് എന്റെ മനസ്സിൽ ഒരു ചോദ്യം ഉയർന്നത്. എന്തിനായിരിക്കാം ഈ ജീവികളെയൊക്കെ ഇങ്ങനെ സംരക്ഷിക്കുന്നത്?

ടീച്ചർ: മൃഗശാലയിലെ വിവിധതരം ജീവികളെ കാണുമ്പോൾ നിങ്ങൾക്കും ഇതുപോലെയുള്ള സംശയം ഉണ്ടാകാം. ഈ ജീവികളെയൊക്കെ എന്തിനാണ് ഇങ്ങനെ സംരക്ഷിക്കുന്നത്.?
കുട്ടികൾ: വംശനാശം വരാതിരിക്കാനാണ് ഇവയെ സംരക്ഷിക്കുന്നത്.
ടീച്ചർ: നമ്മൾ കഴിഞ്ഞ ക്ലാസ്സിൽ പഠിച്ചതിൽ നിന്നും കുറച്ച് വ്യത്യസ്തമായിട്ടാണ് ഈ രീതിയുള്ള സംരക്ഷണം
"എക്സിറ്റു കൺസർവേഷൻ"

Step 2

Identification of Facts

1. ജൈവ വൈവിധ്യം – ഭൂമിയിലെ വിവിധങ്ങളായ സസ്യങ്ങളും, ജന്തുക്കളും സൂക്ഷ്മ ജീവികളും ചേർന്ന ജൈവസമ്പന്നതയാണ് ജൈവവൈവിധ്യം

Step 3

Generation of Ideas

1. ജൈവവൈവിധ്യത്തോടുള്ള വിവേക പൂർണവമായ സമീപനത്തിലൂടെ ജൈവവൈവിധ്യം സംരക്ഷിക്കാം.
2. ജീവജാലങ്ങളെ അവയുടെ സ്വാഭാവിക ആവാസ വ്യവസ്ഥക്ക് പുറത്തു സംരക്ഷിക്കുന്ന രീതിയാണ് എക്സിറ്റു കൺസർവേഷൻ.
3. വ്യത്യസ്ത ഇനങ്ങളില് പെട്ട ജന്തുക്കളെ പ്രത്യേകമായി പാർപ്പിച്ചു പരിപാലിക്കുകയും വംശവർധനവിന വേണ്ട സാഹചര്യങ്ങൾ ഒരുക്കുകയും ചെയ്യുന്ന സംരക്ഷണ കേന്ദ്രങ്ങളാണ് സുവോളജിക്കൽ ഗാർഡനുകൾ. വനമേഖലയിലെ വംശനാശം സംഭവിച്ച ജീവികളുടെ സംരക്ഷണ കേന്ദ്രം കൂടിയാണ് ഇവിടം.
4. കേരളത്തിൽ തിരുവനന്തപുരം, തൃശൂർ എന്നിവിടങ്ങളിൽ സുവോളജിക്കൽ ഗാർഡനുകളുണ്ട്.
5. വൈവിധ്യമാർന്ന സ്പീഷീസുകളിൽ പെട്ട അപൂർവം പ്രധാനപെട്ടതുമായ സസ്യങ്ങളെ സംരക്ഷിക്കുന്ന വിശാലമായ ഗവേഷണ കേന്ദ്രങ്ങളാണിവ. ഒട്ടുമിക്ക സസ്യങ്ങളേയും തിരിച്ചറിയാനും, അവയെ കുറിച്ചു കൂടുതൽ വിവരങ്ങൾ അറിയുവാനും കഴിയുന്നു.
6. പാലോട് ജവഹർലാൽ നെഹ്റു ട്രോപ്പിക്കൽ ബൊട്ടാണിക്കൽ ഗാർഡൻ ആന്റ് റിസേർച് ഇൻസ്റ്റിറ്റ്യൂട്ട്, കോഴിക്കോട് ഒളവണ്ണയിലെ മലബാർ ബൊട്ടാനിക്കൽ ഗാർഡൻ എന്നിവ ബൊട്ടാണിക്കൽ ഗാർഡന് ഉദാഹരണങ്ങളാണ്.
7. വിത്തുകൾ, ബീജങ്ങൾ മുതലായവ ശേഖരിക്കാനും ദീർഘ കാലത്തേക്ക് സംരക്ഷിക്കാനുമുള്ള സംവിധാനങ്ങളുള്ള ഗവേഷണ കേന്ദ്രമാണ് ജീൻ ബാങ്കുകൾ. ആവശ്യമായ അവസരങ്ങളിൽ ഇവ ഉപയോഗിച്ച് ജീവികളെ പുനഃസൃഷ്ടിക്കാൻ കഴിയും. ഉദാഹരണം തിരുവനന്തപുരത്തെ രാജീവ്ഗാന്ധി സെന്റർ ഫോർ ബയോടെക്നോളജി.

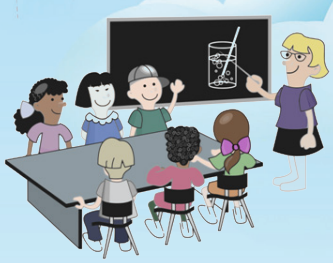
Step 4

Developmental Phase

Activity I Photo Collage

(10 Minutes)

Working Groups



Hints:

സൂവോളജിക്കൽ ഗാർഡനുകൾ
ബൊട്ടാണിക്കൽ ഗാർഡനുകൾ
ജീൻ ബാങ്കുകൾ

ജീവികളെ അതിന്റെ ആവാസ വ്യവസ്ഥയ്ക്ക് പുറത്ത് സംരക്ഷിക്കുന്ന രീതിയാണ് എക്സിറ്റു കൺസർവേഷൻ. കുട്ടികളോട് സഹവർത്തിത ഗ്രൂപ്പുകളിലിരുന്ന് ചിത്രം വിശകലനം ചെയ്ത് റിപ്പോർട്ട് തയ്യാറാക്കി അവതരിപ്പിക്കാൻ പറയുന്നു.

Activity II Group Discussion

(16 minutes)

1. ജീൻ ബാങ്കുകളുടെ പ്രാധാന്യം എന്ത്?
2. ശാസ്ത്രം നന്മയ്ക്കോ തിന്മയ്ക്കോ?

Students research on the topic
പരിസ്ഥിതി സംരക്ഷണവുമായി ബന്ധപ്പെട്ട വ്യത്യസ്ത സോണുകൾ

കുട്ടികൾ സഹവർത്തിത ഗ്രൂപ്പുകളിൽ ചർച്ച ചെയ്യുന്നു.

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

സുവോളജിക്കൽ ഗാർഡനുകൾ

Step 3

Note-taking

പരിസ്ഥിതി സംരക്ഷണവുമായി ബന്ധപ്പെട്ട വ്യത്യസ്ത കവിതകൾ

Step 4

Mapping

എക്സ്കർഷൻ കൺസർവേഷനുകൾ

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

ആവാസ വ്യവസ്ഥ നിലനിൽക്കുന്നതിന് ഓരോ ജീവിയെയും സംരക്ഷിക്കേണ്ടതിന്റെ ആവശ്യകത എന്ത്?

ജീൻ ബാങ്കുകളുടെ ഉപയോഗം ശാസ്ത്ര നന്മയ്ക്കാണോ തിന്മയ്ക്കാണോ?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL

(10 Minutes)

Step 1

Presentation

Presentation of the product of self-regulated learning. Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points
   a) ബൊട്ടാനിക്കൽ ഗാർഡനുകൾ
   b) സൂവോളജിക്കൽ ഗാർഡനുകൾ
2) Single presentation of the ideas:
   a) എക്സ്-സിറ്റു കൺസർവേഷൻ
   b) പ്രത്യേകതകൾ

Step 2

Peer Assessment

Carried out through the above activities

Group Discussion - ജീൻ ബാങ്കുകൾ

Single Presentation - സൂവോളജിക്കൽ ഗാർഡനുകൾ, ബൊട്ടാനിക്കൽ ഗാർഡനുകൾ

Step 3

Conclusion

Teacher concluded the learning points.

എക്സ്-സിറ്റു കൺസർവേഷൻ

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

പരിസ്ഥിതി സംരക്ഷണവുമായി ബന്ധപ്പെട്ട വ്യത്യസ്ത സോണുകൾ

Step 2

Reflection on Summary of topic

a. എക്സ്-സിറ്റു കൺസർവേഷൻ
b. സുവോളജിക്കൽ ഗാർഡനുകൾ
c. ബൊട്ടാണിക്കൽ ഗാർഡനുകൾ
d. ജീൻ ബാങ്കുകൾ

Step 3

Reflection of the learning process (5 minutes)

a. Students present the learned ideas
b. Summarizing the ideas: എക്സ് സിറ്റു കൺസർവേഷൻ
c. Overall reflection on the topic: എക്സ് സിറ്റു കൺസർവേഷൻ

Step 4

Review Question (4 Minutes)

1. പരിസ്ഥിതി സംരക്ഷണത്തിന്റെ രണ്ട് രീതികൾ ഏവ?
2. ജീൻ ബാങ്കുകളുടെ പ്രാധാന്യം എന്ത്?
3. സുവോളജിക്കൽ ഗാർഡനുകൾക്ക് ഉദാഹരണങ്ങൾ പറയുക?

Step 5

Follow-up activities (2 minutes)

വിവിധ തരം ex-situ കൺസർവേഷന്റെ Picture Album തയ്യാറാക്കുക

References

1) VIIIth std Basic science text books
2) Samagra
3) Teachers handbook

മോഡ്യൂൾ 10

ദുരന്ത നിവാരണം

പഠന നേട്ടങ്ങൾ

- ദുരന്തം എന്ന ആശയം മനസിലാക്കാൻ കഴിയുന്നു.
- പ്രകൃതി ദുരന്തങ്ങൾ, മനുഷ്യ നിർമ്മിത ദുരന്തങ്ങൾ എന്നിവയെക്കുറിച്ച് വിശദീകരിക്കാൻ കഴിയുന്നു.
- ദുരന്തനിവാരണം എന്ന ആശയം വിശദീകരിക്കാൻ കഴിയുന്നു.
- പ്രഥമ ശുശ്രൂഷ, എമർജൻസി കിറ്റ് എന്നിവയുടെ പ്രാധാന്യത്തെക്കുറിച്ച് മനസ്സിലാക്കാൻ കഴിയുന്നു.
- ദുരന്തനിവാരണത്തിനുള്ള ഗവണ്മെന്റിന്റെ വിവിധ വകുപ്പുകളെ കുറിച്ച് മനസിലാക്കാൻ കഴിയുന്നു.
- പരിസ്ഥിതി സംരക്ഷണത്തിനുള്ള മനോഭാവം ഉണ്ടാകുന്നു.

CLASS I

Ladder I Presentation of the Problem

Step 1

Video Presentatoin

കേരളത്തിൽ സമീപകാലത്ത് ഉണ്ടായ വെള്ളപ്പൊക്കവുമായി ബന്ധപ്പെട്ട വീഡിയോ പ്രദർശിപ്പിക്കുന്നു. ഇങ്ങനെയുള്ള ദുരന്തങ്ങൾ നമ്മുടെ നാടിനെ എങ്ങനെയൊക്കെ ബാധിക്കുമെന്ന് ചർച്ച ചെയ്യാൻ പറയുന്നു.

https://www.youtube.com/watch?v=lOlg4dvuc7k

Participants work in collaborative learning groups

Step 2

Identification of Facts

ദുരന്തം - ഒരു ദുരന്തം വിനാശകമായ സംഭവമാണ്. അത് പെട്ടെന്ന് സംഭവിക്കുകയും ജീവനും, സ്വത്തിനും നഷ്ടമുണ്ടാക്കുകയും ചെയ്യുന്നു.

ദുരന്തനിവാരണം - പ്രകൃതിദത്തമോ, മനുഷ്യനിർമ്മിതമോ ആയ ദുരന്തങ്ങളിൽ നിന്ന് ജീവന്റെയും, സ്വത്തിന്റെയും സുരക്ഷയ്ക്കും സംരക്ഷണത്തിനുമായി സ്വീകരിച്ച നടപടികളാണ് ദുരന്ത നിവാരണം എന്ന് പറയുന്നത്.

പ്രകൃതി ദുരന്തങ്ങൾ - പ്രകൃതിയിൽ സ്വാഭാവികമായി ഉണ്ടാകുന്നതും മനുഷ്യന്റെ ജീവനും, സ്വത്തിനും കനത്ത നാശമുണ്ടാക്കുന്നതുമായ പ്രതിഭാസമാണ് പ്രകൃതി ദുരന്തങ്ങൾ.

പ്രഥമ ശുശ്രൂഷ - ഒരു വ്യക്തിക്ക് പരിക്കേൽക്കുകയോ, രോഗം ബാധിക്കുകയോ ചെയ്യുമ്പോൾ പൂർണ്ണ വൈദ്യ ചികിൽസ ലഭിക്കുന്നതുവരെ അടിയന്തിരമായി നൽകുന്ന പരിചരണം.

Step 3

Generation of Ideas

1. ദുരന്തങ്ങൾ പ്രധാനമായും രണ്ടുതരത്തിലാണ്. പ്രകൃതി ദുരന്തങ്ങൾ, മനുഷ്യ നിർമ്മിതമായ ദുരന്തങ്ങൾ.
2. പ്രകൃതി ദുരന്തങ്ങൾ - ഭൂകമ്പങ്ങൾ, അഗ്നിപർവ്വത സ്ഫോടനങ്ങൾ, സുനാമി, വെള്ളപ്പൊക്കം, ചുഴലിക്കാറ്റുകൾ, മണ്ണിടിച്ചിൽ, ഹിമപാതങ്ങൾ, വരൾച്ച മുതലായവ.
3. മനുഷ്യനിർമ്മിത ദുരന്തങ്ങൾ - ഭീകരവാദം, യുദ്ധം, ബോംബ് സ്ഫോടനങ്ങൾ, വിഷവസ്തുക്കളുടെ ചോർച്ച, പരിസ്ഥിതി മലിനീകരണം, പകർച്ച വ്യാധികൾ, വ്യാവസായിക അപകടങ്ങൾ.
4. ദുരന്ത നിവാരണത്തിന് നാല് ഘട്ടങ്ങൾ ഉണ്ട്. ലഘൂകരണം, തയ്യാറാക്കൽ, പ്രതികരണം, വീണ്ടെടുക്കൽ എന്നിവ.
5. പ്രഥമ ശുശ്രൂഷ, എമർജൻസി കിറ്റുകൾ എന്നിവ ദുരന്ത സമയത്ത് വളരെ പ്രാധാന്യമുള്ളവയാണ്.
6. പ്രഥമശുശ്രൂഷക്കായി പ്രധാനമായും മൂന്ന് ലക്ഷ്യങ്ങൾ ഉണ്ട്
    - ജീവൻ സംരക്ഷിക്കുക.
    - കൂടുതൽ പരിക്ക് തടയുക.
    - വീണ്ടെടുക്കൽ പ്രോൽസാഹിപ്പിക്കുക.
7. ദുരന്തനിവാരണവുമായി ബന്ധപ്പെട്ട പദ്ധതികൾ/ വകുപ്പുകൾ
    - കേരള റവന്യു ദുരന്തനിവാരണ വകുപ്പ്
    - സംസ്ഥാന ദുരന്തനിവാരണ വകുപ്പ്
    - ദുരന്തസാധ്യതാ അപഗ്രഥന സെൽ
    - ലാന്റ് & ഡിസാസ്റ്റർ മാനേജ്മെന്റ് ഇൻസ്റ്റിറ്റ്യൂട്ട്.

Step 4

Developmental Phase

പ്രകൃതി ദുരന്തങ്ങൾ, മനുഷ്യ നിർമ്മിത ദുരന്തങ്ങൾ എന്നിവയുടെ ഉദാഹരണങ്ങൾ പല സ്ലിപ്പുകളിൽ കൊടുക്കുന്നു. കുട്ടികളോട് ദുരന്തങ്ങളെ പട്ടികപ്പെടുത്താൻ പറയുന്നു.

Participants work in collaborative learning groups

Hints:

പ്രകൃതി ദുരന്തങ്ങൾ
ഭൂകമ്പങ്ങൾ
അഗ്നിപർവ്വത സ്ഫോടനങ്ങൾ
സുനാമി
വെള്ളപ്പൊക്കം
ചുഴലിക്കാറ്റുകൾ
മണ്ണിടിച്ചിൽ
ഹിമപാതങ്ങൾ
വരൾച്ച

മനുഷ്യ നിർമ്മിത ദുരന്തങ്ങൾ
ഭീകരവാദം
യുദ്ധം
ബോംബ് സ്ഫോടനങ്ങൾ
വിഷവസ്തുക്കളുടെ ചോർച്ച
പരിസ്ഥിതി മലിനീകരണം
വ്യാവസായിക അപകടങ്ങൾ
പകർച്ച വ്യാധികൾ

Students tabulate and present them.

Activity II Chart on Stages of Disaster Management

(16 Minutes)

ദുരന്തനിവാരണത്തിനുള്ള ഘട്ടങ്ങൾ കാണിക്കുന്ന ചാർട്ട് പ്രദർശിപ്പിക്കുന്നു.

ദുരന്ത നിവാരണ ചക്രം

ഒരോ ഘട്ടത്തെക്കുറിച്ചും ചർച്ച ചെയ്ത (Think- Pair – Share) റിപ്പോർട്ട് അവതരിപ്പിക്കാൻ പറയുന്നു.

ലക്ഷ്യങ്ങൾ

1) ദുരന്ത നിവാരണത്തിന്റെ അപകടസാധ്യതകൾ കുറയ്ക്കുക.
2) ദുരന്ത ബാധിതർക്ക് ഉടനടി ഉചിതമായ സഹായം നൽകുക.
3) വേഗത്തിലും ഫലപ്രദമായും വീണ്ടെടുക്കൽ
   a) ലഘൂകരണം - ദുരന്തത്തിന്റെ ഫലങ്ങൾ കുറയ്ക്കുന്നു.
   ഉദാ: കോഡുകളും, സോണിംഗും ദുർബലത വിശകലനങ്ങൾ
   b) തയ്യാറെടുപ്പ് - എങ്ങനെ പ്രതികരിക്കണമെന്ന് ആസൂത്രണം ചെയ്യുന്നു.
   ഉദാ: തയ്യാറെടുപ്പ് പദ്ധതികൾ, അടിയനതിര വ്യായാമങ്ങൾ, പരിശീലനം, മുന്നറിയിപ്പ് സംവിധാനങ്ങൾ.
   c) പ്രതികരണം - ഒരു ദുരന്തം സൃഷ്ടിക്കുന്ന അപകടങ്ങൾ കുറയ്ക്കുന്നതിനുള്ള ശ്രമങ്ങൾ.
   ഉദാ: തിരയലും, രക്ഷപ്പെടുത്തലും, അടിയന്തിര ആശ്വാസം.
   d) വീണ്ടെടുക്കൽ - സമൂഹത്തെ സാധാരണ നിലയിലേക്ക് തിരികെ കൊണ്ടു വരുന്നു.
   ഉദാ: താൽക്കാലിക പാർപ്പിടം ഗ്രാന്റുകൾ വൈദ്യ പരിചരണം

Students Research on the Topics by using ICT facilities

1) പ്രഥമ ശുശ്രൂഷയുടെ പ്രാധാന്യം
2) ദുരന്തനിവാരണത്തിനുള്ള ഗവണ്മെന്റിന്റെ വിവിധ വകുപ്പുകൾ

പ്രകൃതിദുരന്തങ്ങളുടെ നിവാരണത്തിനും ലഘൂകരണത്തിനുമായി പ്രവർത്തിക്കുന്ന സർക്കാർ വകുപ്പും സംവിധാനങ്ങളും

- കേരള റവന്യൂ-ദുരന്തനിവാരണ വകുപ്പ്
- സംസ്ഥാന ദുരന്തനിവാരണ അതോറിറ്റി
- ദുരന്ത സാധ്യതാ അപഗ്രഥന സെൽ
- ലാന്റ് & ഡിസാസ്റ്റർ മാനേജ്മെന്റ് ഇൻസ്റ്റിറ്റ്യൂട്ട്

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

ദുരന്തങ്ങൾ, പ്രകൃതി ദുരന്തങ്ങൾ

Step 3

Note-taking

ദുരന്ത നിവാരണ ചക്രം, പ്രഥമ ശുശ്രൂഷ

Step 4

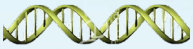
Mapping

മനുഷ്യ നിർമ്മിത ദുരന്തങ്ങൾ

Step 5

Reflection on the above topics

Ladder III



Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

1) പ്രകൃതി ദുരന്തങ്ങൾക്ക് ആക്കം കൂടാൻ കാരണമെന്ത്?

2) വെള്ളപ്പൊക്കം ഉണ്ടാകുമ്പോൾ എന്തൊക്കെ മുൻകരുതൽ എടുക്കണം?

3) പ്രളയമുണ്ടാകാൻ കാരണമെന്ത്?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL

(10 Minutes)

Step 1

Presentation

Presentation of the product of self-regulated learning. Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points:
   ദുരന്തങ്ങൾ
2) Single presentation of the ideas:
   ദുരന്തനിവാരണ ചക്രം

Step 2

Peer Assessment

Carried out through the above activities

Step 3

Conclusion

Teacher concluded the learning points.

- ദുരന്തങ്ങൾ
- വിവിധ തരത്തിലുള്ള ദുരന്തങ്ങൾ
- ദുരന്തനിവാരണ ചക്രം
- പ്രഥമ ശുശ്രൂഷ

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

പ്രഥമ ശുശ്രൂഷയുടെ പ്രാധാന്യം

Step 2

Reflection on Summary of topic

പ്രകൃതി ദുരന്തങ്ങളും മനുഷ്യ നിർമിത ദുരന്തങ്ങളും

Step 3

Reflection of the learning process (5 minutes)

a) Summarizing the ideas: ദുരന്തം

b) Diagrammatic Representation: ദുരന്ത നിവാരണ ചക്രം.

Overall reflection of the topic: ദുരന്ത നിവാരണം.

Step 4

Review Question (4 Minutes)

1. എന്താണ് ദുരന്തം.
2. ദുരന്ത നിവാരണ ചക്രത്തിലെ 4 ഘട്ടങ്ങൾ ഏവ?
3. എമർജൻസി കിറ്റിലെ വസ്തുക്കൾ ഏവ?
4. പ്രഥമ ശുശ്രൂഷയുടെ പ്രാധാന്യം എന്ത്?

Step 5

Follow-up activities (2 minutes)

1. ദുരന്ത നിവാര ണത്തിനായി ഗവൺമെന്റിന്റെ വിവിധ വകുപ്പുകളും, സംഘടനകളും കണ്ടുപിടിക്കുക.
2. വെള്ളപ്പൊക്കം ഉണ്ടാകുമ്പോൾ നാം സ്വീകരിക്കേണ്ട മുൻകരുതലുകൾ എന്തെല്ലാമെന്ന് സയൻസ് ഡയറിയിൽ രേഖപ്പെടുത്തുക.

References

1) VIIIth std Basic science text books
2) Samagra
3) Teachers handbook

STD VIII: അടിസ്ഥാന ശാസ്ത്രം
For the Continuity of Generations

മോഡ്യൂൾ 11

കൗമാരം - പ്രത്യേകതകൾ

പഠന നേട്ടങ്ങൾ

- മനുഷ്യ വളർച്ചയുടെ വിവിധ ഘട്ടങ്ങൾ മനസ്സിലാക്കുന്നു.
- കാമാരഘട്ടത്തിന്റെ പ്രത്യേകതകൾ മനസ്സിലാക്കുന്നു.
- കൗമാരഘട്ടത്തിൽ ആൺകുട്ടികൾക്കും, പെൺകുട്ടികൾക്കും ഉണ്ടാകുന്ന ശാരീരിക മാറ്റങ്ങൾ വിശദീകരിക്കുന്നു.
- വാർദ്ധക്യത്തിലെ പ്രത്യേകതകൾ മനസ്സിലാക്കുന്നു

CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem ചാർട്ട് - മനുഷ്യന്റെ വളർച്ചയുടെ വിവിധ ഘട്ടങ്ങൾ

ടീച്ചർ മനുഷ്യന്റെ വളർച്ചാ ഘട്ടങ്ങൾ ഉൾപ്പെടുന്നചാർട്ട് പ്രദർശിപ്പിക്കുന്നു.

ടീച്ചർ: ഇതിൽ നിങ്ങളുടെ സ്ഥാനം എവിടയാണ്?

കുട്ടികൾ ചർച്ച ചെയ്യുന്നു.

ടീച്ചർ: ഓരോ വളർച്ചാഘട്ടത്തിന് പ്രത്യേകതകൾ ഉണ്ട്. നിങ്ങളുടെ വളർച്ചാഘട്ടത്തിന്റെ പ്രത്യേകതകൾ എന്തെല്ലാം?

Step 2

Identification of Facts

1. മനുഷ്യ വളർച്ചയിലെ വിവിധഘട്ടങ്ങളാണ് ശൈശവം, ബാല്യം, കൗമാരം, പ്രായപൂർത്തി, വാർദ്ധക്യം മുതലായവ.
2. ബാല്യത്തിൽനിന്നും പ്രായപൂർത്തിയിലേക്കുള്ള ത്വരിത വളർച്ചാഘട്ടമാണ് കൗമാരം. (11-19 വയസ്സ്)
3. തലച്ചോറിന്റെ വികാസം, ഉയരത്തിലും തൂക്കത്തിലും പെട്ടെന്നുള്ള വർദ്ധന, ഗ്രന്ഥികളുടെ പ്രവർത്തനക്ഷമത എന്നിവ കൗമാരത്തിന്റെ പ്രത്യേകതകളാണ്.
4. തീവ്രമായ മാനസിക വൈകാരിക മാറ്റങ്ങളും കൗമാര വളർച്ചാഘട്ടത്തിന്റെ സവിശേഷതകളാണ്.
5. കൗമാരഘട്ടത്തിൽ ആൺകുട്ടികൾക്കും, പെൺകുട്ടികൾക്കും ശാരീരികമായിട്ടുള്ള മാറ്റങ്ങൾ കാണപ്പെടുന്നു.

Step 3

Generation of Ideas

1. കൗമാരഘട്ടത്തിന്റെ പ്രത്യേകതകൾ മനസ്സിലാക്കുന്നു.
2. കൗമാരഘട്ടത്തിലെ ആൺകുട്ടികൾക്കും, പെൺകുട്ടികൾക്കും ശാരീരിക മാറ്റങ്ങൾ ഉണ്ട്.
3. തീവ്രമായ മാനസിക വൈകാരിക മാറ്റങ്ങളും കൗമാര വളർച്ചാഘട്ടത്തിന്റെ പ്രത്യേകതകളാണ്.
4. ശൈശവം, ബാല്യം, കൗമാരം, പ്രായപൂർത്തി, വാർദ്ധക്യം എന്നീ ഓരോ ഘട്ടങ്ങൾക്കും പലപ്രത്യേകതകളും ഉണ്ട്.
5. വാർദ്ധക്യത്തിന്റെ സവിശേഷതകൾ മനസ്സിലാക്കുന്നു.

Step 4

Developmental Phase

Activity I മനുഷ്യന്റെ വളർച്ചാഘട്ടങ്ങൾ കാണിക്കുന്ന ചാർട്ട് (10 Minutes)

ശൈശവം, ബാല്യം, കൗമാരം, പ്രായപൂർത്തി, വാർദ്ധക്യം എന്നീ ഘട്ടങ്ങളുടെ പ്രത്യേകതകൾ ചർച്ച ചെയ്ത് റിപ്പോർട്ട് ചെയ്യാൻ പറയുന്നു.
Think-Pair –Share method ഉപയോഗിച്ച് കുട്ടികൾ ചർച്ച ചെയ്ത് റിപ്പോർട്ട് തയ്യാറാക്കി വിശദീകരിക്കുന്നു.

Activity II Flash Card

(16 minutes)

കൗമാരഘട്ടത്തിൽ ആൺകുട്ടികളും പെൺകുട്ടികളും തമ്മിലുള്ള വ്യത്യാസങ്ങൾ കാണിക്കുന്ന ഫ്ളാഷ് കാർഡ് നൽകുന്നു.
കുട്ടികൾ ചർച്ച ചെയ്ത് റിപ്പോർട്ട് തയ്യാറാക്കി അവതരിപ്പിക്കുന്നു.

കൗമാരഘട്ടത്തിലെ ശാരീരികമാറ്റങ്ങൾ

ആൺകുട്ടികളിൽ	പെൺകുട്ടികളിൽ
വളർച്ച ത്വരിതപ്പെടുന്നു.	വളർച്ച ത്വരിതപ്പെടുന്നു.
ലൈംഗികാവയവങ്ങളുടെ വളർച്ച ദ്രുതഗതിയിലാകുന്നു.	ലൈംഗികാവയവങ്ങളുടെ വളർച്ച ദ്രുതഗതിയിലാകുന്നു.
ശരീരത്തിന്റെ വിവിധ ഭാഗങ്ങളിൽ (ജനനേന്ദ്രിയഭാഗം, കക്ഷം, മുഖം, മാറ്) രോമങ്ങൾ വളരുന്നു.	ജനനേന്ദ്രിയഭാഗത്തും കക്ഷത്തിലും രോമങ്ങൾ വളരുന്നു.
ശബ്ദത്തിന് ഗാംഭീര്യം കൂടുന്നു.	ശബ്ദസൗകുമാര്യം കൂടുന്നു.
ത്വക്കിലെ ഗ്രന്ഥികളുടെ പ്രവർത്തനം വർധിക്കുന്നു.	ത്വക്കിലെ ഗ്രന്ഥികളുടെ പ്രവർത്തനം വർധിക്കുന്നു, സ്തനവളർച്ച ഉണ്ടാകുന്നു.
തോളെല്ലുകൾക്ക് വികാസം സംഭവിക്കുന്നു.	ഇടുപ്പെല്ലുകൾക്ക് വികാസം സംഭവിക്കുന്നു.
ശുക്ലവിസർജനം ആരംഭിക്കുന്നു.	ആർത്തവം ആരംഭിക്കുന്നു.

Students Research on the Topic: വാർദ്ധക്യത്തിന്റെ സവിശേഷതകൾ.

Hints:

CLASS II

Step 5

Reflection: Students reflect on perceived ideas

(3 minutes)

- വാർദ്ധക്യത്തിന്റെ സവിശേഷതകൾ

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

വാർദ്ധക്യത്തിന്റെ സവിശേഷതകൾ

Step 3

Note-taking

മനുഷ്യന്റെ ഓരോ വളർച്ചാഘട്ടത്തിന്റെയും പ്രത്യേകതകൾ

Step 4

Mapping

കൗമാരഘട്ടത്തിൽ ആൺകുട്ടികളുടെയും, പെൺകുട്ടികളുടെയും വളർച്ചയുടെ വ്യത്യാസങ്ങൾ

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

കൗമാരത്തിൽ ആൺകുട്ടികളേക്കാൾ വളർച്ച പെൺകുട്ടികൾക്കായിരിക്കും കാരണമെന്ത്?

മറ്റു ജീവിതഘട്ടങ്ങളെ അപേക്ഷിച്ച് കൗമാരം കൂടുതൽ പ്രാധാന്യം അർഹിക്കുന്നു. കാരണമെന്ത്?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL

(10 Minutes)

Step 1

Presentation

Presentation of the product of self-regulated learning. Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points
   കൗമാരം
   കൗമാരഘട്ടത്തിലെ പ്രത്യേകതകൾ
2) Single presentation of the ideas:
   വാർദ്ധക്യത്തിന്റെ സവിശേഷതകൾ
3) Parallel presentation :
   കൗമാരഘട്ടത്തിൽ ആൺകുട്ടികളുടെയും, പെൺകുട്ടികളുടെയും വളർച്ചയുടെ വ്യത്യാസങ്ങൾ

Step 2

Peer Assessment

Carried out through the above activities
Group Discussion, Single Presentation and Parallel Presentation

Step 3

Conclusion

Teacher concluded the learning points.

Ladder V

Overall Reflection (5 minutes)

Step 1

Reflection on Homework/exercise

വാർദ്ധക്യത്തിന്റെ സവിശേഷതകൾ

Step 2

Reflection on Summary of topic

കൗമാരഘട്ടത്തിലെ സവിശേഷതകൾ

Step 3

Reflection of the learning process (5 minutes)

a. Students present the learned ideas

b. Summarizing the ideas: Characteristics of Adolescence

Overall Reflection of the Topic: Adolescence- Characteristics

Step 4

Review Question (4 Minutes)

1. കൗമാരഘട്ടത്തിന്റെ പ്രധാന പ്രത്യേകതകൾ ഏവ?
2. കൗമാരത്തിൽ ആൺകുട്ടികളേക്കാൾ പെൺകുട്ടികളിലാണ് വളർച്ച കൂടുതൽ. കാരണമെന്ത് ?
3. ശൈശവഘട്ടത്തിലെ രണ്ട് പ്രത്യേകതകൾ ഏവ?

Step 5

Follow-up activities (2 minutes)

1) ഇന്നത്തെ കാലത്ത് വൃദ്ധസദനങ്ങളുടെ പ്രാധാന്യത്തെ കുറിച്ച് കുറിപ്പ് തയ്യാറാക്കുക

2) കൗമാരഘട്ടത്തിലെ പ്രത്യേകതകളടങ്ങിയ ചാർട്ട് തയ്യാറാക്കുക

References

1) VIIIth std Basic science text books
2) IXth std Basic science text books
3) Samagra
4) Teachers handbook

മോഡ്യൂൾ 12

കൗമാരത്തിലെ സ്വഭാവ രൂപീകരണം

പഠന നേട്ടങ്ങൾ

- മനുഷ്യ വളർച്ചയുടെ വിവിധ ഘട്ടങ്ങൾ മനസ്സിലാക്കുന്നു.
- കൗമാരഘട്ടത്തിന്റെ പ്രത്യേകതകളെക്കുറിച്ച് വിശദീകരിക്കാൻ കഴിയുന്നു
- കുടുംബം എന്ന ആശയം വിശദീകരിക്കാൻ കഴിയുന്നു
- കുടുംബങ്ങൾ പലതരമുണ്ടെന്ന് മനസ്സിലാക്കുന്നു
- കൗമാരക്കാരുടെ സ്വഭാവ രൂപീകരണത്തിൽ കുടുംബത്തിന്റെ പങ്ക് വിശദീകരിക്കാൻ കഴിയുന്നു
- സ്വഭാവ രൂപീകരണത്തിൽ സ്കൂൾ, സമൂഹം, ചങ്ങാതിക്കൂട്ടം എന്നിവയുടെ പ്രാധാന്യം മനസ്സിലാക്കുന്നു.

CLASS I

Ladder I Presentation of the Problem

Step 1

പത്രറിപ്പോർട്ട്

സമീപകാലത്ത് ബ്ലൂവെയിൽ എന്ന ഓൺലൈൻ ഗെയിം കളിച്ച കുറച്ചു കുട്ടികൾ ആത്മഹത്യ ചെയ്തിട്ടുണ്ട്. ഇങ്ങനെയുള്ള പ്രശ്നങ്ങൾക്കെല്ലാം കാരണം കുട്ടികളുടെ വൈകാരിക തലങ്ങളെ മനസ്സിലാക്കാതിരിക്കുന്നതും, വഴികാട്ടാൻ ആരും തന്നെയില്ലാത്തതുമാണ്. നിങ്ങളുടെ പ്രശ്നങ്ങളിൽ ഇടപെട്ട് വഴികാട്ടാൻ നിങ്ങളുടെ കുടുംബം സഹായിക്കാറുണ്ടോ?

പാലക്കാട്ടെ ബിരുദ വിദ്യാർഥിയുടേതും ബ്ലൂവെയ്ൽ ആത്മഹത്യ?; സംശയവുമായി അമ്മ

സ്വന്തം ലേഖകൻ August 20, 2017 08:01 AM IST

Step 2

Identification of Facts

1. മനുഷ്യവളർച്ചയിലെ വിവിധ ഘട്ടങ്ങളാണ് ശൈശവം, ബാല്യം, കൗമാരം, പ്രായപൂർത്തി, വാർദ്ധക്യം മുതലായവ.
2. ബാല്യത്തിൽനിന്നും പ്രായപൂർത്തിയിലേക്കുള്ള ത്വരിതവളർച്ച ഘട്ടമാണ് കൗമാരം. (11-19 വയസ്സ്)
3. അച്ഛനും, അമ്മയും, മക്കളും, അടുത്തബന്ധുക്കളും അടങ്ങുന്നതാണ് കുടുംബം.
4. കുടുംബം സമൂഹത്തിന്റെ അടിസ്ഥാന ഘടകം ആകുന്നു.
5. സാർവലൗകികത, വൈകാരിക ബന്ധം, പരിമിതമായ വലുപ്പം, ഉത്തരവദിത്വ ബോധം എന്നിവ കുടുംബത്തിന്റെ പ്രത്യേകതകളാണ്.

Step 3

Generation of Ideas

1) കൗമാരഘട്ടത്തിന്റെ പ്രത്യേകതകളെക്കുറിച്ച് മനസ്സിലാക്കുന്നു.
2) കൗമാരക്കാരുടെ വൈകാരികതലങ്ങളെക്കുറിച്ച് മനസ്സിലാക്കുന്നു.
3) കൗമാരക്കാരുടെ സ്വഭാവ രൂപീകരണത്തിൽ കുടുംബത്തിന്റെ പങ്ക് മനസ്സിലാക്കുന്നു.
4) കുടുംബങ്ങൾ പലതരം - അണുകുടുംബം, വിസ്തൃത കുടുംബം, കൂട്ടുകുടുംബം മുതലായവ.
5) സാർവലൗകികത, വൈകാരികബന്ധം, പരിമിതമായ വലുപ്പം, ഉത്തരവാദിത്വ ബോധം എന്നിവ കുടുംബത്തിന്റെ പ്രത്യേകതകളാണ്.
6) സുരക്ഷിതത്വം ഉറപ്പുവരുത്തുക, അടിസ്ഥാന ആവശ്യങ്ങൾ നിറവേറ്റുക, സ്നേഹ വാൽസല്യങ്ങൾ നൽകുക, നല്ല പെരുമാറ്റ ശീലങ്ങൾ വളർത്തിയെടുക്കുക തുടങ്ങിയവയാണ് കുടുംബത്തിന്റെ ധർമ്മങ്ങൾ.
7) കുടുംബം സമൂഹത്തിന്റെ അടിസ്ഥാനഘടകം.
8) സാമൂഹിക ബന്ധങ്ങൾക്ക് തുടക്കമിടുന്നതും, അവ വളർത്തുന്നതും, നിലനിർത്തുന്നതും കുടുംബമാണ്.അതുകൊണ്ടാണ് കുടുംബം സമൂഹത്തിന്റെ അടിസ്ഥാന ഘടകം എന്ന് പറയുന്നത്.

Step 4

Developmental Phase

Activity I കഥ

(10 Minutes)

ടീച്ചർ കഥ പറയുന്നു.

ഒരു കുട്ടിയുടെ ജീവിതത്തിൽ കുടുംബത്തിന്റെ പ്രാധാന്യം മനസ്സിലാക്കുന്ന കഥ

https://youtu.be/CPm0-edBYnc

ഇതിൽ നിന്നും കുട്ടികൾക്കു മനസ്സിലായ കാര്യങ്ങൾ പറയുന്നു.
ടീച്ചർ ചാർട്ട് പ്രദർശിപ്പിക്കുന്നു.
ഇന്നത്തെ സമൂഹത്തിൽ പ്രധാനമായും മൂന്നുതരം കുടുംബങ്ങളാണ് കാണാൻ കഴിയുന്നത്.

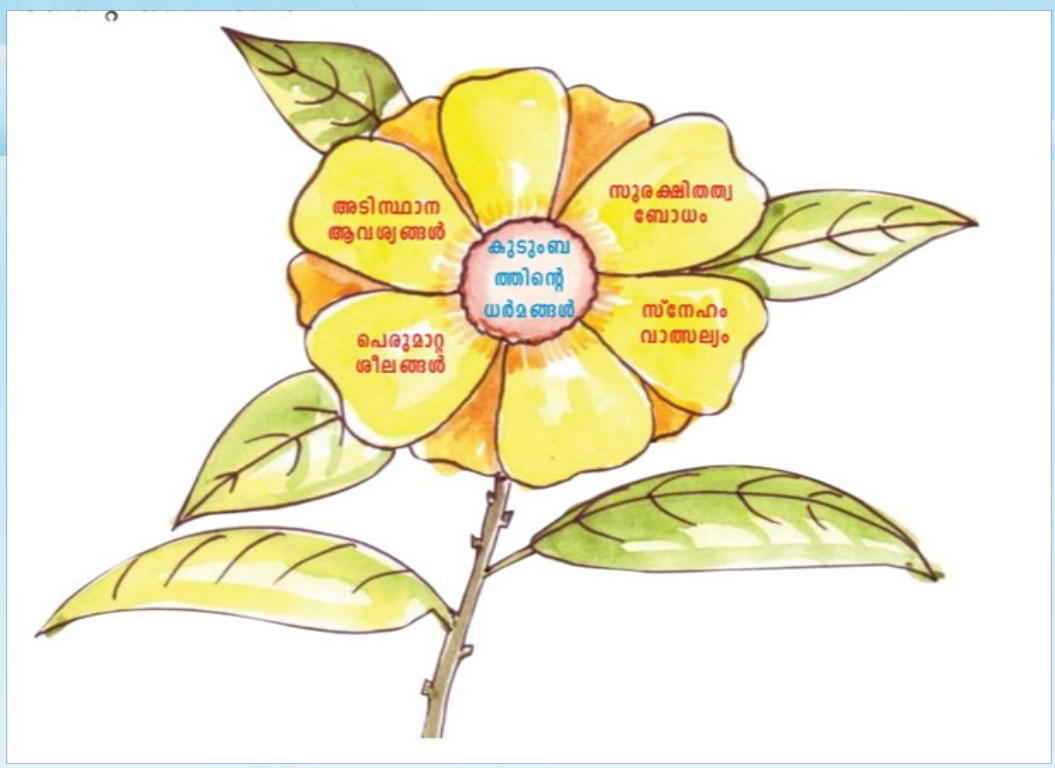
Three main types of families can be seen in the society		
A	B	C
Nuclear Family	Extended Family	Joint Family

വിവിധതരം കുടുംബങ്ങൾ

ഈ മൂന്നു കുടുംബങ്ങളുടെയും പ്രത്യേകതകളെഴുതാൻ പറയുന്നു കുട്ടികൾ *(Think, Pair, Share)* ചർച്ച ചെയ്ത് റിപ്പോർട്ട് തയ്യാറാക്കുന്നു.

Activity II Chart on Roles of a Family (16 minutes)

ടീച്ചർ കുടുംബത്തിന്റെ ധർമ്മങ്ങൾ കാണിക്കുന്ന ചാർട്ട് കാണിക്കുന്നു



കുട്ടികൾ സഹവർത്തിത പഠന ഗ്രൂപ്പുകളായി തിരിയുന്നു. ചർച്ച ചെയ്ത് റിപ്പോർട്ട് തയ്യാറാക്കുന്നു അവതരിപ്പിക്കുന്നു.

കുട്ടികളുടെ സ്വഭാവ രൂപീകരണത്തിൽ സഹായിക്കുന്ന മറ്റ് ഘടകങ്ങൾ ഏതൊക്കെയെന്ന് കണ്ടെത്തി വരാൻ പറയുന്നു.

Students Research on the Topic:

കുട്ടികളുടെ സ്വഭാവ രൂപീകരണത്തിന് സഹായിക്കുന്ന മറ്റ് ഘടകങ്ങൾ

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

കൗമാരക്കാരുടെ സ്വഭാവരൂപീകരണത്തിൽ കുടുംബത്തിന്റെ പങ്ക്.

Step 3

Note-taking

കൗമാരഘട്ടത്തിലെ പ്രത്യേകതകൾ

Step 4

Mapping

വിവിധതരം കുടുംബങ്ങൾ

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

കുട്ടികളുടെ സ്വഭാവരൂപീകരണത്തിന് കുടുംബത്തിന്റെ പങ്ക് വളരെ വലുതാണ്. കാരണമെന്ത്?

ആൺകുട്ടികളുടെയും, പെൺകുട്ടികളുടെയും സ്വഭാവരൂപീകരണത്തിൽ വ്യത്യാസങ്ങളുണ്ടോ? കാരണമെന്ത്?

സമൂഹത്തിൽ അണുകുടുംബം കൂടിവരാൻ കാരണമെന്ത്?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL

(10 Minutes)

Step 1

Presentation

Presentation of the product of self-regulated learning. Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points
   കൗമാരഘട്ടത്തിലെ പ്രത്യേകതകൾ
   കൗമാരക്കാരുടെ സ്വഭാവരൂപീകരണത്തിൽ കുടുംബത്തിന്റെ പങ്ക്
2) Single presentation of the ideas:
   സ്വഭാവരൂപീകരണത്തിന് സഹായിക്കുന്ന മറ്റ് ഘടകങ്ങൾ

Hints:
സ്കൂൾ
സമൂഹം
ചങ്ങാതിക്കൂട്ടം

Step 2

Peer Assessment

Carried out through the above activities

Group Discussion and Single Presentation

Step 3

Conclusion

Teacher concluded the learning points.

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

സ്വഭാവരൂപീകരണത്തിന് സഹായിക്കുന്ന മറ്റ് ഘടകങ്ങൾ

Step 2

Reflection on Summary of topic

കൗമാരത്തിലെ സ്വഭാവരൂപീകരണത്തിൽ കുടുംബത്തിന്റെ പങ്ക്

Step 3

Reflection of the learning process (5 minutes)

a. Students present the learned ideas

b. Summarizing the ideas: കൗമാരത്തിലെ സ്വഭാവരൂപീകരണത്തിൽ കുടുംബത്തിന്റെ പങ്ക്

Overall Reflection of the Topic:

കൗമാരത്തിലെ സ്വഭാവരൂപീകരണത്തിൽ കുടുംബത്തിന്റെ പങ്ക്

Step 4

Review Question

(4 Minutes)

1. കൗമാരത്തിലെ പ്രത്യേകതകൾ?
2. കുടുംബം എന്നാൽ എന്ത്?
3. കുടുംബത്തിന്റെ ധർമ്മങ്ങൾ എന്തെല്ലാം?
4. കുടുംബം എത്ര തരത്തിൽ?

Step 5

Follow-up activities

(2 minutes)

1) കൗമാരക്കാരുടെ സ്വഭാവരൂപീകരണത്തിന് കുടുംബത്തിന്റെ പങ്ക് കാണിക്കുന്ന പോസ്റ്റർ നിർമ്മിക്കുക.
2) കുട്ടികളുടെ സ്വഭാവരൂപീകരണത്തിൽ സമൂഹത്തിന്റെ പങ്ക് കാണിക്കുന്ന വിവരണം തയ്യാറാക്കുക.

References

1) VIIIth std Basic science text books
2) IXth std Basic science text books
3) Samagra
4) Teachers handbook
5) https://youtu.be/CPm0-edBYnc

മോഡ്യൂൾ 13

കൗമാരവും ആരോഗ്യ പ്രശ്നങ്ങളും

പഠന നേട്ടങ്ങൾ

- കൗമാരത്തിലെ ആരോഗ്യ പ്രശ്നങ്ങൾ തിരിച്ചറിയുന്നു.
- കൗമാരഘട്ടത്തിന്റെ പ്രത്യേകതകൾ മനസ്സിലാക്കുന്നു.
- കൗമാരക്കാരുടെ വളർച്ചക്കാവശ്യമായ ഭക്ഷണ ശീലങ്ങളെക്കുറിച്ചു മനസ്സിലാക്കുന്നു.
- കൗമാരത്തിലെ യോഗ പരിശീലനവും, അതിന്റെ പ്രാധാന്യത്തെക്കുറിച്ചും വിശദീകരിക്കുന്നു.

CLASS I

Ladder I Presentation of the Problem

Step 1

Health Problems in Adolescence

കൗമാരത്തിലുണ്ടാകുന്ന ആരോഗ്യ പ്രശ്നങ്ങൾ കാണിക്കുന്ന ചിത്രം പ്രദർശിപ്പിക്കുന്നു.

എന്തൊക്കെ ആരോഗ്യ പ്രശ്നങ്ങളാണ് ഉണ്ടാകുന്നത്.
നിങ്ങൾക്കും ഇതുപോലുള്ള ആരോഗ്യ പ്രശ്നങ്ങൾ ഉണ്ടോ?

Working Groups
(Think, Pair, Share)

Step 2

Identification of Facts

1. കൗമാരക്കാരുടെ ശാരീരികവും, മാനസികവുമായ വളർച്ചയ്ക്ക് പോഷകാഹാരം ആവശ്യമാണ്.
2. കൗമാരത്തിൽ നല്ല ഭക്ഷണശീലം പാലിച്ചില്ലെങ്കിൽ പല ആരോഗ്യ പ്രശ്നങ്ങളും ഉണ്ടാകുന്നു.
3. ശാരീരികവും, മാനസികവുമായ ആരോഗ്യത്തിന് യോഗ വളരെ പ്രാധാന്യം അർഹിക്കുന്നു.
4. ചുവന്ന രക്തകോശങ്ങളുടെയോ (RBC) ഹീമോഗ്ലോബിന്റെയോ കുറവുമൂലം ഉണ്ടാകുന്ന വിളർച്ചയുമാണ് അനീമിയ.

Step 3

Generation of Ideas

1. കൗമാരക്കാരുടെ ആരോഗ്യ പ്രശ്നങ്ങളായ പൊണ്ണത്തടി, കാൻസർ, അനീമിയ, മാനസിക പിരിമുറുക്കങ്ങൾ എന്നിവയെക്കുറിച്ച് മനസ്സിലാക്കുന്നു.
2. രക്തത്തിലോ, ചുവന്ന രക്താണുക്കളുടെ എണ്ണത്തിലുള്ള കുറവു കൊണ്ടോ അയേണിന്റെ കുറവു കൊണ്ടോ ഉണ്ടാകുന്ന അവസ്ഥയാണ് അനീമിയ.
3. അയേൺ-ഫോളിക് ആസിഡ് ഗുളികകൾ കഴിക്കുകയും, പോഷകങ്ങളുടെ ലഭ്യത ഉറപ്പു വരുത്തുകയും ചെയ്യുന്നതിലൂടെ ഒരു പരിധിവരെ അനീമിയ തടയാനാകും.
4. ജങ്ക് ഫുഡുകൾ, ലഹരി പദാർത്ഥങ്ങൾ, കൃത്രിമപാനീയങ്ങൾ എന്നിവ കൗമാരക്കാരിൽ പല ആരോഗ്യ പ്രശ്നങ്ങളും ഉണ്ടാക്കുന്നു.
5. കൗമാര വളർച്ചയ്ക്ക് സഹായകമായ ഭക്ഷണ ശീലത്തിനുള്ള മാർഗ്ഗനിർദ്ദേശങ്ങൾ നൽകുന്നു.
6. യോഗ ആരോഗ്യകരമായ ശരീരത്തിനെയും ആരോഗ്യകരമായ മനസ്സിനെയും ലക്ഷ്യമിടുന്ന ഒരു ജീവിതരീതിയാണ്. മനുഷ്യന്റെ ശാരീരികവും, മാനസികവും, ആത്മീയവുമായ സമതുലിതമായ വികസനം പ്രോൽസാഹിപ്പിക്കാൻ യോഗ സഹായിക്കുന്നു.
7. യോഗയുടെ പ്രാധാന്യം -
    - തലച്ചോറിന്റെ പ്രവർത്തനം മെച്ചപ്പെടുത്തുന്നു
    - മാനസിക പിരിമുറുക്കം കുറയ്ക്കുന്നു.
    - രക്തസമ്മർദ്ദം കുറയ്ക്കുന്നു.
    - ശ്വാസകോശ ശേഷി വർദ്ധിപ്പിക്കുന്നു.
    - ശ്രദ്ധ, ഏകാഗ്രത വർദ്ധിപ്പിക്കുന്നു.

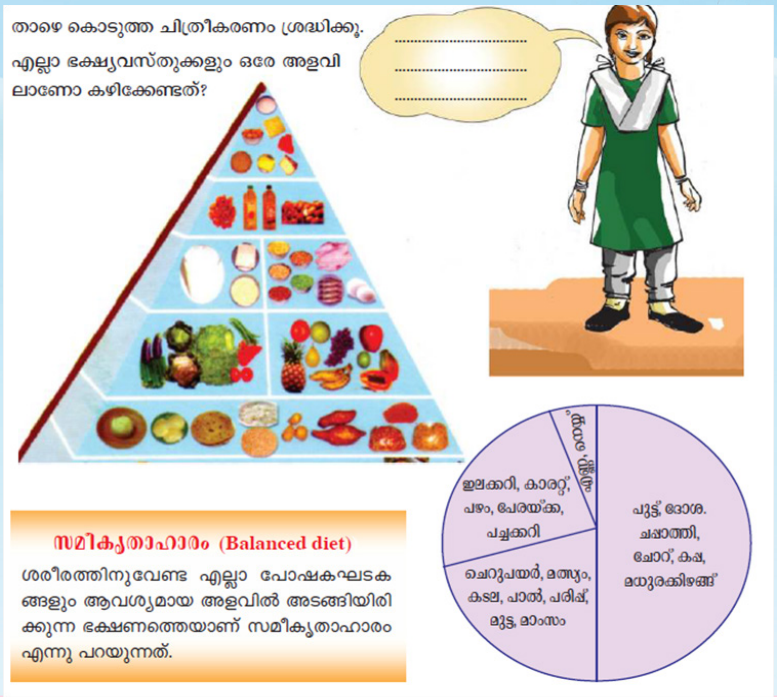
Step 4

Developmental Phase

Activity I

(10 Minutes)

കൗമാരക്കാരുടെ ആരോഗ്യപ്രശ്നങ്ങൾ പരിഹരിക്കാനുള്ള ഭക്ഷണശീലങ്ങൾക്ക് മാർഗ്ഗനിർദ്ദേശങ്ങൾ നൽകുക.



Hints:

പ്രഭാത ഭക്ഷണം ഉപേക്ഷിക്കരുത്.

മതിയായ അളവിൽ മാത്രം കഴിക്കുക.

ഭക്ഷണത്തിൽ ഉൾപ്പെടുത്തേണ്ട വൈറ്റമിനുകൾ, ധാതുക്കൾ, ലവണങ്ങൾ എന്നിവ ഉൾപ്പെടുത്തുക.

കുട്ടികൾ സഹവർത്തിത ഗ്രൂപ്പുകളിൽ ചർച്ചചെയ്ത് റിപ്പോർട്ട് അവതരിപ്പിക്കുന്നു. (Jig Saw)

Activity II Video on Yoga Practice

(16 Minutes)

നല്ല ഭക്ഷണ ശീലത്തോടൊപ്പം തന്നെ യോഗയുടെ പ്രാധാന്യവും കാണിക്കുന്ന വീഡിയോ പ്രദർശിപ്പിക്കുന്നു.

https://www.youtube.com/watch?v=k1CZ_np3jjM

കൗമാരക്കാരിൽ മയക്കുമരുന്ന്, പാൻമസാല, കഞ്ചാവ്, ഇന്റർനെറ്റ് അഡിഷൻ എന്നിവയുടെ ഫലമായി പല ആരോഗ്യ-മാനസിക പ്രശ്നങ്ങളും സൃഷ്ടിക്കുന്നു. അതിനാൽ നിത്യജീവിതത്തിൽ യോഗയുടെ പ്രാധാന്യം ചർച്ചചെയ്ത് റിപ്പോർട്ട് അവതരിപ്പിക്കാൻ പറയുന്നു.

Students Research on the Topic: കൗമാരക്കാരുടെ ആരോഗ്യപ്രശ്നങ്ങൾ പരിഹരിക്കാൻ എന്തൊക്കെ ഭക്ഷണം കഴിക്കണം. അവയുടെ ഇനങ്ങൾ കണ്ടെത്തുക.

CLASS II

Step 5

Reflection: Students reflect on perceived ideas

(3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

കൗമാരക്കാരിലെ യോഗയുടെ പ്രാധാന്യം

Step 3

Note-taking

കൗമാരക്കാരിലെ നല്ല ഭക്ഷണശീലങ്ങൾ

Step 4

Mapping

കൗമാരക്കാരിലെ ആരോഗ്യപ്രശ്നങ്ങൾ

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

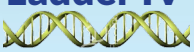
കൗമാരക്കാരുടെ ആരോഗ്യപ്രശ്നങ്ങൾക്ക് കാരണങ്ങൾ കണ്ടെത്തുക.

കൗമാരക്കാരിലുണ്ടാകുന്ന അനീമിയയുടെ കാരണങ്ങൾ കണ്ടെത്തുക.

Step 3

Preparation of Report

Ladder IV



Presentation of product of the SRL

(10 Minutes)

Step 1

Presentation

Presentation of the product of self-regulated learning. Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points
   കൗമാരക്കാരിൽ യോഗയുടെ പ്രാധാന്യം
2) Parallel presentation of the ideas:
   നല്ല ഭക്ഷണശീലത്തിനുള്ള മാർഗ്ഗ നിർദ്ദേശങ്ങൾ

Group A	Group B
1. പ്രഭാതഭക്ഷണം പ്രധാനമാണ്. തിരക്കിനിടയിൽ അതൊഴിവാക്കരുത്.	1. ശരിയായ സമയത്ത് ശരിയായ അളവിൽ ഭക്ഷണം കഴിക്കുക.
2. പഴങ്ങളും, പച്ചക്കറികളും, പയറുവർഗ്ഗങ്ങളും ഭക്ഷണത്തിൽ ഉൾപ്പെടുത്തുക.	2. വറുത്തതും, പൊരിച്ചതുമായ ഭക്ഷ്യവസ്തുക്കൾ കുറക്കുക.
3. പഞ്ചസാര, ഉപ്പ് എന്നിവ മിതമായി ഉപയോഗിക്കുക.	3. ഫാസ്റ്റ്ഫുഡ്, ജങ്ക് ഫുഡ്, കൃത്രിമപാനീയങ്ങൾ ഒഴിവാക്കുക.
4. ഇളനീർ, കഞ്ഞിവെള്ളം, നാരങ്ങാവെള്ളം പോലുള്ള വീട്ടിൽ നിർമ്മിക്കുന്നവ കഴിക്കുക.	4. മധുരപലഹാരങ്ങൾ, ചോക്ലേറ്റ്, ഐസ്ക്രീം എന്നിവ കുറക്കുക.
5. ആഹാര സാധനങ്ങളോടുള്ള അമിത ഇഷ്ടാനിഷ്ടങ്ങൾ, നിബന്ധനകൾ എന്നിവ ആരോഗ്യത്തെ ബാധിക്കുന്നു.	5. ജൈവകൃഷി വർദ്ധിപ്പിച്ച് വിഷവിമുക്തമായ പച്ചക്കറികൾ ഉപയോഗിക്കുക.

Step 2

Peer Assessment

Carried out through the above activities

Group Discussion and Parallel Presentation

Step 3

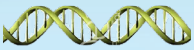
Conclusion

Teacher concluded the learning points.

കൗമാരക്കാരുടെ ഭക്ഷണശീലവും, ആരോഗ്യ പ്രശ്നങ്ങളും

കൗമാരക്കാരിൽ യോഗയുടെ പ്രാധാന്യം

Ladder V



Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

കൗമാരക്കാരുടെ ആരോഗ്യപ്രശ്നങ്ങൾ പരിഹരിക്കാൻ എന്തൊക്കെ ഭക്ഷണം കഴിക്കണം

Step 2

Reflection on Summary of topic

കൗമാരക്കാരുടെ ഭക്ഷണശീലവും, ആരോഗ്യപ്രശ്നങ്ങളും

Step 3

Reflection of the learning process (5 minutes)

a. Students present the learned ideas: കൗമാരക്കാരിലെ ആരോഗ്യപ്രശ്നങ്ങൾ

b. Summarizing the ideas: കൗമാരക്കാരുടെ ഭക്ഷണശീലവും, ആരോഗ്യപ്രശ്നങ്ങളും

Overall Reflection of the Topic:

കൗമാരക്കാരുടെ ഭക്ഷണശീലവും, ആരോഗ്യപ്രശ്നങ്ങളും

Step 4

Review Question

(4 Minutes)

1. കൗമാരക്കാരെ ബാധിക്കുന്ന രണ്ട് ആരോഗ്യപ്രശ്നങ്ങൾ?
2. അയേൺ-ഫോളിക് ആസിഡ് ഗുളികകൾ ഭക്ഷണത്തിൽ ഉൾപ്പെടുത്തേണ്ടതിന്റെ ആവശ്യകത എന്ത്?
3. Vitamin C അടങ്ങിയ ഭക്ഷണപദാർത്ഥങ്ങൾ ഏവ?
4. യോഗയുടെ രണ്ട് ഗുണങ്ങൾ ഏവ?

Step 5

Follow-up activities

(2 minutes)

1) 'നല്ല ആരോഗ്യത്തിന് നല്ല ഭക്ഷണശീലം' എന്നതിനെ ആസ്പദമാക്കി ഒരു കാർട്ടൂൺ വരയ്ക്കുക.
2) അടുത്തുള്ള അംഗനവാടി സന്ദർശിച്ച് കൗമാരക്കാർക്ക് അവർ നൽകുന്ന ഭക്ഷണപദാർത്ഥങ്ങൾ കണ്ടെത്തുക

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References

1) VIIIth std Basic science text books
2) IXth std Basic science text books
3) Samagra
4) Teachers handbook
5) https://www.youtube.com/watch?v=k1CZ_np3jjM

മോഡ്യൂൾ 14

കൗമാരം - ലഹരി പദാർത്ഥങ്ങളുടെ ഉപയോഗം
കൗമാര കുറ്റകൃത്യങ്ങൾ

പഠന നേട്ടങ്ങൾ

- മനുഷ്യ വളർച്ചയുടെ വിവിധ ഘട്ടങ്ങൾ മനസ്സിലാക്കുന്നു.
- കൗമാരഘട്ടത്തിന്റെ പ്രത്യേകതകളെക്കുറിച്ച് മനസ്സിലാക്കുന്നു.
- ആധുനിക ലോകത്തിൽ ഇന്റർനെറ്റ് അഡിഷൻ, സൈബർ ക്രൈം എന്നിവയെക്കുറിച്ച് വിശദീകരിക്കാൻ കഴിയുന്നു.
- ലഹരി പദാർത്ഥങ്ങളുടെ അഭിനിവേശം കൗമാരക്കാരെ ഏതൊക്കെ രീതിയിൽ ബാധിക്കുന്നു എന്ന് വിശദീകരിക്കാൻ കഴിയുന്നു.
- കൗമാര കുറ്റകൃത്യം തടയുന്നതിൽ കൗൺസലിംഗ് സെന്ററുകൾ, ചൈൽഡ് ഹെൽപ് ലൈൻ, ജുവനൈൽ കോടതികൾ എന്നിവയുടെ പങ്ക് മനസ്സിലാക്കുന്നു.

CLASS I

Ladder I Presentation of the Problem

Step 1

Audio (Recording)

പുകയില, മദ്യം, മയക്കുമരുന്ന് തുടങ്ങിയ ലഹരിപദാർത്ഥങ്ങൾ ആദ്യമൊക്കെ നിയന്ത്രിച്ച് ഉപയോഗിക്കണമെന്ന് കരുതുന്നവർ വൈകാതെ അതിനു കീഴടങ്ങും. ക്രമേണ ലഹരിയുടെ അടിമകളായിത്തീരുകയും ചെയ്യുന്നു. വ്യക്തികളിൽ ആരോഗ്യ പ്രശ്നങ്ങൾ ഉണ്ടാക്കുന്നതിനോടൊപ്പം കുടുംബ ശൈഥില്യത്തിനും, സാമൂഹികമായ ഒറ്റപ്പെടലിനും ലഹരിയുടെ ഉപയോഗം കാരണമായി തീരുന്നു. ലഹരി പദാർത്ഥങ്ങളുടെ അഭിനിവേശം ഒരു രോഗമാണ്.

കൗമാരക്കാരെ ഇവയൊക്കെ എങ്ങനെ ബാധിക്കുന്നു?

Collaborative Working Groups
(Think, Pair, Share)

Step 2

Identification of Facts

1. മനുഷ്യ വളർച്ചയിലെ വിവിധഘട്ടങ്ങളാണ് ശൈശവം, ബാല്യം, കൗമാരം, പ്രായപൂർത്തി, വാർദ്ധക്യം മുതലായവ.
2. ബാല്യത്തിൽ നിന്നും പ്രായപൂർത്തിയിലേക്കുള്ള ത്വരിത വളർച്ച ഘട്ടമാണ് കൗമാരം.(11 - 19) വയസ്സ്.
3. ലഹരിപദാർത്ഥങ്ങളുടെ ഉപയോഗം കൗമാരക്കാരിൽ ആരോഗ്യപ്രശ്നങ്ങൾ ഉണ്ടാക്കുന്നു

Step 3

Generation of Ideas

1. കൗമാരഘട്ടത്തിന്റെ പ്രത്യേകതൾ മനസ്സിലാക്കുന്നു.
2. പുകയില, മദ്യം, മയക്കുമരുന്ന് തുടങ്ങിയ ലഹരി പദാർത്ഥങ്ങൾ കൗമാരത്തിലുണ്ടാക്കുന്ന പ്രശ്നങ്ങളെക്കുറിച്ച് മനസ്സിലാക്കുന്നു.
3. കുട്ടികൾ ചെയ്യുന്ന കുറ്റകൃത്യം ഒരു സാമൂഹിക പ്രശ്നമായി മാറിയിരിക്കുകയാണെന്ന് മനസ്സിലാക്കുന്നു.

Step 4

Developmental Phase

Activity I

(10 Minutes)

ടീച്ചർ ക്ലാസ്സിൽ ഒരു ചാർട്ട് പ്രദർശിപ്പിക്കുന്നു.

ലഹരിപദാർത്ഥങ്ങളുടെ ഉപയോഗം കൊണ്ടുള്ള പ്രശ്നങ്ങൾ

Items	Problems
പുകയില മദ്യം മയക്കുമരുന്ന്	ശാരീരികവും മാനസികവുമായ പ്രശ്നങ്ങൾ .... കുറ്റകൃത്യങ്ങൾ വർദ്ധിക്കുന്നു

ലഹരിപദാർത്ഥങ്ങളുടെ ഉപയോഗം കൊണ്ടുണ്ടാ?ുന്ന ആരോഗ്യ പ്രശ്നങ്ങളും സാമൂഹിക പ്രശ്നങ്ങളും ഗ്രൂപ്പിൽ ചർച്ച ചെയ്ത് അവതരിപ്പിക്കാൻ പറയുന്നു. അതിനുവേണ്ടി കുട്ടികളെ സഹവർത്തിത ഗ്രൂപ്പുകളാക്കുന്നു.

Activity II Audio- Presentation (16 Minutes)

കുട്ടികൾക്കിടയിലെ കുറ്റകൃത്യങ്ങൾ ഇന്ന് വലിയ സാമൂഹിക പ്രശ്നമായി മാറിയിരിക്കുകയാണ്. 18 വയസ്സിനു താഴെയുള്ള കുട്ടികൾ ചെയ്യുന്ന കുറ്റകൃത്യങ്ങളെ കൗമാര കുറ്റകൃത്യങ്ങളായാണ് കണക്കാക്കുന്നത്. ഇവർ കൗമാര കുറ്റാരോപിതർ എന്നറിയപ്പെടുന്നത്.

ചെറുപ്രായത്തിൽ തന്നെ കുട്ടികൾ കുറ്റവാളികളായി തീരാനുള്ള കാരണങ്ങൾ പലതാണ്. കണ്ടെത്തി എഴുതുക.

Collaborative Working Groups
(Think, Pair, Share)

Hints:
കുടുംബ ബന്ധങ്ങളിലെ ശിഥിലീകരണം
ലഹരിയുടെ ഉപയോഗം
ദൃശ്യമാധ്യമങ്ങളുടെ ദുരുപയോഗം
സാമൂഹിക മൂല്യങ്ങളുടെ തകർച്ച.

കുട്ടികൾ സഹവർത്തിത ഗ്രൂപ്പിൽ ചർച്ച ചെയ്ത് റിപ്പോർട്ട് തയ്യാറാക്കുന്നു
(Jig Saw)

Students research on the Topic:
സ്കൂളിൽ കൗമാരക്കാരുടെ കുറ്റകൃത്യങ്ങളെക്കുറിച്ച് അവബോധം ഉണ്ടാക്കുന്നതിനുള്ള പദ്ധതികൾ കണ്ടെത്തുക.

Hints:
കൗൺസലിങ്ങ് സെന്റർ
ജുവനൈൽ കോടതി
ചൈൽഡ്ലൈൻ പദ്ധതികൾ

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

ലഹരിപദാർത്ഥങ്ങളുടെ ദൂഷ്യഫലങ്ങൾ

Step 3

Note-taking

കൗൺസലിങ്ങ് സെന്റർ, ജുവനൈൽ കോടതി, ചൈൽഡ്‌ലൈൻ

Step 4

Mapping

ലഹരിപദാർത്ഥങ്ങളുടെ ദൂഷ്യഫലങ്ങൾ

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

ചെറുപ്രായത്തിൽ തന്നെ കുട്ടികൾ കുറ്റവാളികളാകുന്നതിന്റെ കാരണങ്ങൾ കണ്ടെത്തുക?

സാമൂഹിക മൂല്യങ്ങളുടെ തകർച്ചയ്ക്കുള്ള കാരണങ്ങൾ എന്തെല്ലാം?

എന്തൊക്കെ കാരണങ്ങളാലാണ് കുട്ടികൾ ലഹരിപദാർത്ഥങ്ങളുടെ അടിമകളാകുന്നത്?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL (10 Minutes)

Step 1

Presentation

Presentation of the product of self-regulated learning. Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points:
കുട്ടികളിലെ കുറ്റകൃത്യങ്ങൾ തടയുന്നതിൽ കൗൺസലിങ്ങ് സെന്ററുകളുടെ പങ്ക്

2) Single presentation of the ideas:
ലഹരിപദാർത്ഥങ്ങളുടെ ഉപയോഗം കുട്ടികളിലുണ്ടാക്കുന്ന ദൂഷ്യഫലങ്ങൾ

Step 2

Peer Assessment

Carried out through Question Answering

Group A	Group B
a) പുകയിലയിൽ അടങ്ങിയ വിഷപദാർത്ഥം?	Answering
Answering	b) മദ്യപാനം മൂലമുണ്ടാകുന്ന രോഗം
c) ഇന്റർനെറ്റ് അഡിഷൻ കാരണമുണ്ടാകുന്ന രോഗം?	Answering

Peer Assessment is carried out through the above activities.

Step 3

Conclusion

Teacher concluded the learning points.

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

കൗമാരക്കാരുടെ കുറ്റകൃത്യങ്ങളെക്കുറിച്ച് അവബോധം ഉണ്ടാക്കുന്നതിനുള്ള പദ്ധതികൾ

Step 2

Reflection on Summary of topic

കൗമാര കുറ്റകൃത്യങ്ങൾ

Step 3

Reflection of the learning process (5 minutes)

a. Students present the learned ideas

b. Summarizing the ideas: ലഹരിപദാർത്ഥങ്ങളുടെ ഉപയോഗം മൂലമുണ്ടാകുന്ന ആരോഗ്യപ്രശ്നവും, സാമൂഹികവുമായ പ്രശ്നങ്ങൾ

Overall Reflection of the Topic: കൗൺസലിങ്ങ് സെന്ററുകൾ, ജുവനൈൽ കോടതികൾ, ചൈൽഡ് ഗൈഡൻസ് etc ലഹരിപദാർത്ഥങ്ങളുടെ ഉപയോഗം മൂലമുണ്ടാകുന്ന പ്രശ്നങ്ങൾ. കുട്ടികുറ്റവാളികൾ പെരുകാനുള്ള കാരണങ്ങൾ

Step 4

Review Question (4 Minutes)

1. ലോകലഹരി വിരുദ്ധ ദിനം എന്നാണ്?
2. ലഹരി പദാർത്ഥങ്ങളുടെ രണ്ട് ദൂഷ്യഫലം?
3. സ്കൂളുകളിലെ കൗൺസലിങ്ങ് സെന്ററിന്റെ ഉപയോഗം?
4. കൗമാരക്കാർക്കുള്ള രണ്ട് പദ്ധതികൾ?

Step 5

Follow-up activities (2 minutes)

1. ലഹരി വിരുദ്ധ പോസ്റ്ററുകൾ തയ്യാറാക്കുക.
2. സൈബർ ക്രൈമിനെക്കുറിച്ച് കുറിപ്പ് തയ്യാറാക്കുക.

References

1) VIIIth std Basic science text books
2) IXth std Basic science text books
3) Samagra
4) Teachers handbook

മോഡ്യൂൾ 15
IVF- In Vitro Fertilisation

പഠന നേട്ടങ്ങൾ

- പ്രത്യുൽപ്പാദനം എന്നതിനെക്കുറിച്ച് ധാരണ കൈവരിക്കുന്നു.
- സ്ത്രീകളിലെയും, പുരുഷൻമാരിലെയും പ്രത്യുൽപ്പാദന അവയവങ്ങളെക്കുറിച്ച് ധാരണ കൈവരിക്കുന്നു.
- വന്ധ്യതയെക്കുറിച്ച് ധാരണ കൈവരിക്കുന്നു.
- സ്ത്രീകളിലും, പുരുഷൻമാരിലും വന്ധ്യതയ്ക്കുള്ള കാരണങ്ങൾ വിശദീകരിക്കാൻ സാധിക്കുന്നു.
- IVF - In Vitro Fertilisation എന്ന ആശയം വിശദീകരിക്കാൻ കഴിയുന്നു.

CLASS I

Ladder I Presentation of the Problem

Step 1

Illustrations

ചിത്രീകരണം പ്രദർശിപ്പിക്കുന്നു.

ടീച്ചർ

ദമ്പതികൾ വേർപിരിയാൻ പോകുന്നു. വേർപിരിയുന്നതിന് മുമ്പ് അവർ ഗൈനക്കോളജി ഡോക്ടറെ കാണുന്നതാണ് ഈ ചിത്രീകരണത്തിൽ. ഈ ചിത്രത്തിൽ നിന്നും നിങ്ങൾക്ക് എന്ത് മനസ്സിലായി?

കുട്ടികൾ

വന്ധ്യതയുടെ ഫലമായി കുട്ടികളില്ലാത്തതാണ് ദമ്പതിമാർ വേർപിരിയുവാനുള്ള കാരണം.

ടീച്ചർ

എങ്ങനെ നമുക്ക് ഇതിനൊരു പരിഹാരം നിർദ്ദേശിക്കാൻ കഴിയും

Step 2

Identification of Facts

പ്രത്യുൽപ്പാദനം: ജൈവശാസ്ത്രപരമായും, ജനിതകപരമായും, മാതൃജീവിയുമായി സാമ്യമുള്ള സന്തതികളെ ഉൽപ്പാദിപ്പിക്കുന്ന പ്രക്രിയയാണ് പ്രത്യുൽപ്പാദനം.

വന്ധ്യത: സ്ഥിരമായി സുരക്ഷിതമല്ലാത്ത ലൈംഗിക ബന്ധത്തിനു ശേഷം ദമ്പതികൾക്ക് ഗർഭം ധരിക്കാനാവാത്ത സാഹചര്യമാണ് വന്ധ്യത

IVF : പ്രത്യുൽപ്പാദനത്തെ സഹായിക്കുന്നതിനോ, ജനിതക പ്രശ്നങ്ങൾ തടയുന്നതിനോ ഗർഭധാരണത്തെ സഹായിക്കുന്നതിനോ ഉപയോഗിക്കുന്ന സങ്കീർണ്ണമായ നടപടിക്രമങ്ങളാണ് IVF

Step 3

Generation of Ideas

1) സ്ത്രീ ലൈംഗികാവയവങ്ങൾ: അണ്ഡാശയം, അണ്ഡവാഹിനി, ഗർഭാശയം, എൻഡോമെട്രിയം, യോനി.

2) പുരുഷ ലൈംഗികാവയവങ്ങൾ: ബീജവാഹിനി, പ്രോസ്റ്റേറ്റ് ഗ്രന്ഥി, ലിംഗം, വൃഷണം.

3) പുരുഷനിലെയും, സ്ത്രീകളിലെയും വന്ധ്യതയ്ക്കുള്ള കാരണങ്ങൾ

- അണ്ഡവാഹിനിക്കുഴലുകൾക്കുള്ള കേടുപാടുകൾ
- അണ്ഡോൽപ്പാദനത്തിലെ തകരാറുകൾ
- എൻഡോമെട്രിയോസിസ്
- ഗർഭാശയ മുഴകൾ
- ശുക്ല ഉൽപാദനം അല്ലെങ്കിൽ പ്രവർത്തനം തകരാറിലാവുക
- ജനിതകതകരാറ്.

4) IVF സമയത്ത് അണ്ഡാശയത്തിൽ നിന്നും പൂർണ്ണ വളർച്ചയെത്തിയ അണ്ഡം ശേഖരിക്കുകയും ലാബിൽ വച്ച് ബീജവുമായി ചേർത്ത് ബീജസങ്കലനം നടത്തുകയും ചെയ്യുന്നു. ബീജസങ്കലനത്തിനു ശേഷമുള്ള ഭ്രൂണത്തെ ഗർഭാശയത്തിലേക്ക് മാറ്റുന്നു.

Step 4

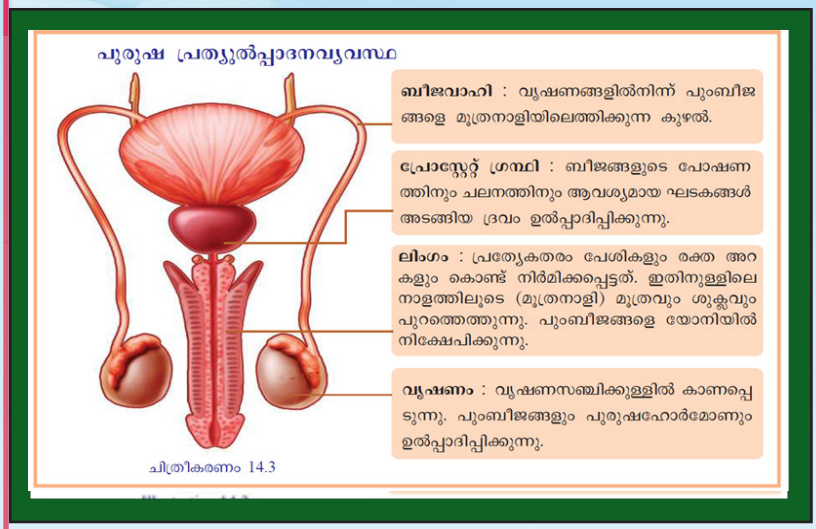
Developmental Phase

Collaborative Working Groups

Activity I Picture

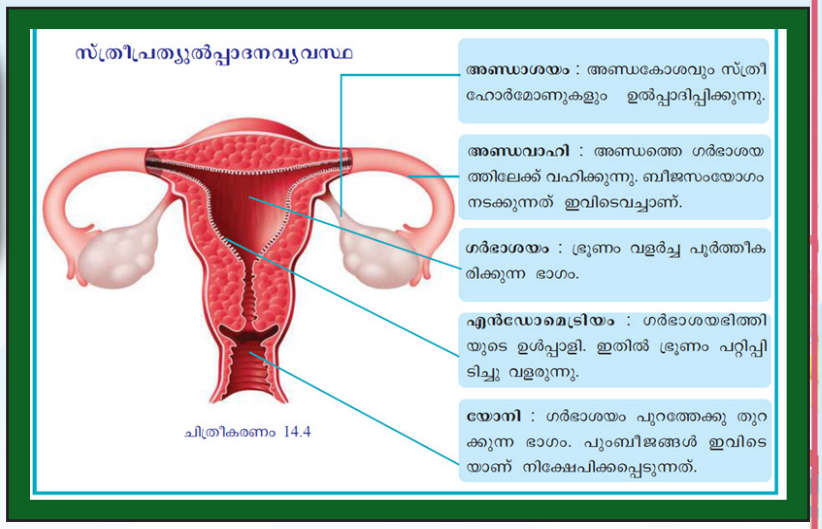
(10 Minutes)

പുരുഷ പ്രത്യുൽപ്പാദന വ്യവസ്ഥ, സ്ത്രീ പ്രത്യുൽപ്പാദന വ്യവസ്ഥ കാണിക്കുന്ന ചിത്രം പ്രദർശിപ്പിക്കുന്നു. സഹവർത്തിത ഗ്രൂപ്പിലിരുന്ന് (jigsaw) സ്ത്രീ പ്രത്യുൽപ്പാദനാവയവങ്ങൾ, പുരുഷ പ്രത്യുൽപ്പാദനാവയവങ്ങൾ എന്നിവ ചർച്ച ചെയ്ത് റിപ്പോർട്ട് തയ്യാറാക്കാൻ പറയുന്നു.



Hints:

പ്രത്യുൽപ്പാദനം പ്രത്യുൽപ്പാദനം മനുഷ്യനിൽ (Video Link- Samagra)



പുരുഷന്റെയും സ്ത്രീയുടെയും പ്രത്യുൽപ്പാദന അവയവങ്ങൾ ഏതൊക്കെയെന്ന് കണ്ടെത്തുക. (Jig saw)

Activity II Video related to IVF

(16 Minutes)

https://www.youtube.com/watch?v=JYYEtp0MxKs

IVF മായി ബന്ധപ്പെട്ട വീഡിയോ സഹവർത്തിത ഗ്രൂപ്പിലിരുന്ന് ചർച്ച ചെയ്ത് റിപ്പോർട്ട് തയ്യാറാക്കാൻ പറയുന്നു

Students research on the Topic:
IVF (Invitro Fertilization)

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

പ്രത്യുൽപ്പാദനം മനുഷ്യനിൽ

Step 3

Note-taking

വന്ധ്യതയും IVFഉം

Step 4

Mapping

Invitro Fertilization

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

സ്ത്രീകളിലെ വന്ധ്യതയ്ക്കുള്ള കാരണങ്ങൾ കണ്ടെത്തുക

പുരുഷൻമാരിലെ വന്ധ്യതയ്ക്കുള്ള കാരണങ്ങൾ കണ്ടെത്തുക

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL (10 Minutes)

Step 1

Presentation

Presentation of the product of self-regulated learning. Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points:
   സ്ത്രീപ്രത്യുൽപ്പാദന വ്യവസ്ഥ
   പുരുഷ പ്രത്യുൽപ്പാദന വ്യവസ്ഥ
2) Parallel presentation of the ideas:
   വന്ധ്യതയും IVFഉം

Step 2

Peer Assessment
Carried out through a Quiz Programme

Group A	Group B
1) ഇന്ത്യയിൽ ആദ്യമായി IVF ലൂടെ പിറന്ന ശിശു	1) ആദ്യമായി IVF ലൂടെ ശിശു പിറന്ന വർഷം
2) പ്രത്യുൽപ്പാദനവുമായി ബന്ധപ്പെട്ട വൈറ്റമിൻ	2) വന്ധ്യതയ്ക്കുള്ള ഒരു കാരണം

Peer Assessment is carried out through the above activities.

Step 3

Conclusion
Teacher concluded the learning points.

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise
IVF

Step 2

Reflection on Summary of topic
പ്രത്യുൽപ്പാദനം മനുഷ്യനിൽ

Step 3

Reflection of the learning process (5 minutes)

വന്ധ്യത, IVF

Step 4

Review Question (4 Minutes)

1) എന്താണ് പ്രത്യുൽപ്പാദനം?
2) വന്ധ്യത എന്നാൽ എന്ത്?
3) വന്ധ്യതയ്ക്കുള്ള രണ്ട് കാരണങ്ങൾ ഏവ?
4) പ്രത്യുൽപ്പാദനവുമായി ബന്ധപ്പെട്ട വൈറ്റമിൻ ഏത്?

Step 5

Follow-up activities (2 minutes)

1) IVFന്റെ പ്രധാന ഘട്ടങ്ങൾ കണ്ടെത്തുക.
2) IVF മായി ബന്ധപ്പെട്ട ആരോഗ്യ റിപ്പോർട്ടുകൾ സംഘടിപ്പിക്കുക

References

1) VIIIth std Basic science text books
2) IXth std Basic science text books
3) Samagra
4) Teachers handbook
5) https://www.youtube.com/watch?v=JYYEtp0MxKs

SPACE FOR ROUGH WORKS

SPACE FOR ROUGH WORKS

Appendix III

Collaborative Problem Based Learning

Modules for Secondary School Students

Developed by

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Research Scholar

and

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2019

contents...

Collaborative Problem Based Learning (CBPL) Modules

Modules are self-study tools that help a student to achieve specific goals related to particular content. It includes an introduction, goals, basic intents, ideas, support materials, evaluations, codifications, follow-ups, and references related to the content.

These modules are a great way to explain and help to use the 3C3R model to teach by linking the core subject with other subjects in a Collaborative problem-based learning approach for Secondary students. They help us to understand how each subject is related to other subjects. It also promotes Critical Thingking Skill, Problem Solving and Communication Skills in children.

STD VIII: Basic Science Chapter 3
Let's Regain our Fields

Module 1
Food Security

Learning Outcomes

- The learner can explain the idea of food scarcity.
- The learner can explain the idea about food security.
- The learner can identify and explain changes related to food production.
- The learner can identify and explain food security bill.
- The learner can identify and explain the importance of the public distribution system in Kerala.

CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

Chicken a la carte subtitulado en español - YouTube
https://www.youtube.com/watch?v=XldZMuLCFCY

- What did the students understand from this?
- Children understand food scarcity and wastage of food.

Step 2

Identification of Facts

A) Food scarcity- a condition in which required food is not available on demand for everyone to lead a healthy life is called food scarcity.

B) Food security- a condition in which required food is available on-demand for everyone to lead a healthy life is called food security. Ensuring food security is essential for a healthy society without the fear of poverty or problems of malnutrition.

C) The Public distribution outlets in Kerala supply rice, food products and other essential commodities to the needy at a fair price.

D) The public distribution system provides food items and other essential commodities to people at reasonable prices and the entire chain of such organizations are controlled by the government.

E) Food security Act - The parliament passed the bill in 2013.

F) Green Revolution - The Green revolution was widely used in research and development, technology to increase the productivity in the agricultural sector at a global level from the year 1940 to 1970.

Step 3

Generation of Ideas

1) Understand the reasons for food scarcity.
2) Understand the importance of food security.
3) Understand the consequences of the Green Revolution in Kerala.
4) Understand the role of the public distribution system in ensuring food security.
5) Understands about Food Security Bill and Food Security Act.
6) Understands how food security is related to population growth.

Step 4

Developmental Phase

Activity I Food Scarcity

(10 Minutes)

Collaborative Working Groups

Students discuss and prepare a report about food scarcity and challenges faced by food security sector.

Hints: Reasons of food scarcity (Discussion)

- Crop failure due to natural calamities
- Using agricultural land for non- agricultural purposes
- Reducing the rate of subsidies
- Unable to purchase agricultural machines
- Climate change
- Unable to ensure crop insurance
- Excessive use of fertilizers, reducing soil fertility.

Report Writing and presentation. (6 minutes)
Reflection: Students reflect on concepts.

Activity II The role of science in solving food scarcity

(16 minutes)

Working Groups

Hints: Biography of M.S Swaminathan

Flash Cards:

1. Green Revolution in Kerala

MS Swaminathan

The famous agricultural scientist M.S Swaminathan, Mankomb Sambashiva Swaminathan is known as the father of the Green Revolution in India. He acquired a Ph.D. in Genetics from Cambridge University in 1952 and became a great figure in the agriculture sector of India. He developed Indian eco-friendly and highly productive seeds and propagated them among the farmers.

In 1966, he acclimatized Mexican wheat varieties to Indian conditions and harvested the highest yield in Punjab agricultural lands.

This made him the Father of the green revolution in India. The country honored him by awarding the Padma Shri and Padma Bhushan.

2. Role of Public distribution system in ensuring Food Security bill and Food Security Act.

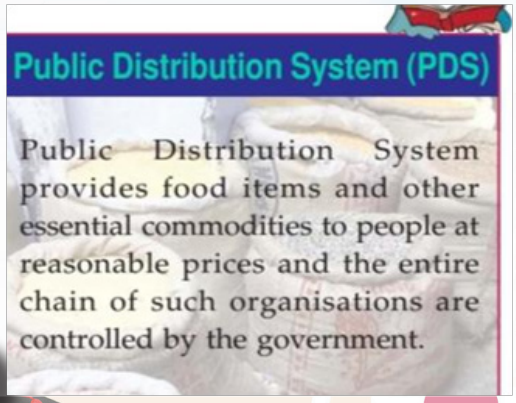
July 11 is followed as World population day.

Prepare a report on
1) M.S Swaminathan
2) Green revolution- Kerala
3) Food Security Act

(6 minutes)

Students research the topics by using ICT facilities.

(5 minutes)



CLASS II

Step 5

Reflection: students reflect on perceived ideas (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

Agencies functioning with the objective of providing essential commodities to people at fair price.

SRL activities (10 minutes)

Step 2

Summarizing the ideas
M.S Swaminathan, Green Revolution

Step 3

Note-taking
Food Security Bill

Step 4

Mapping
Public Distribution System

Step 5

Reflection on the above topics

Ladder III

Group Discussion phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting.

Step 2

Reasoning about the topic

The consequences of the Green Revolution in Kerala

Hints:

- increase in agricultural yield
- increase in employment opportunities
- Imports decreased
- Increase in Farmers' gains

Reasons for population explosion

Hints:

- decrease in mortality rate
- Decrease in maternal and infant mortality
- Control in infectious diseases
- Increase in life expectancy

How to ensure food hygiene

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL (10 Minutes)

Step 1

Presentation

Participants present the output of SRL

Step 2

Peer Assessment

Peer Assessment is carried out through activities such as:

- Discussion on Learning Points: Food Scarcity and Food Safety
- Single Presentation of the Ideas: Green Revolution in Kerala

Step 3

Conclusion

Teacher concluded the learning points.

Hints: Food scarcity, Food security
Green Revolution, M.S Swaminathan
Food Security Act

Ladder V

Overall Reflection

5 minutes)

Step 1

Reflection on Homework/exercise

MS Swaminathan, Green Revolution in Kerala, Food Security Act

Step 2

Reflection on Summary of topic

- Food Scarcity
- Food security
- Reasons for population growth
- Green Revolution
- Public distribution system

Step 3

Reflection of the learning process (5 minutes)

- Students present the learned ideas.
- Summarizing the ideas: Green Revolution, M.S Swaminathan
- Mapping of the ideas: Public Distribution system
- Note-taking on the topic: Food security Act
- Overall reflection of the topic: Food safety and food scarcity.

Step 4

Review Question

(4 Minutes)

1. What is the significance of Food Security?
2. What is the significance of the Green Revolution?
3. What is the significance of the Food Security Bill?
4. What are the reasons for Food Scarcity?

Step 5

Follow-up activities

(2 minutes)

1) Prepare a poster depicting the Importance of Food security.
2) Show the significance of agriculture through role play.

References

1) VIII Std. textbooks.
2) Samagra
3) Teachers handbook
4) https://www.youtube.com/watch?v=XldZMuLCFCY

Module 2
Crises in the Agricultural Sector

Learning Outcomes

- The learner can identify various crises in agriculture.
- The learner can identify the greatness of agriculture and learn to respect farmers.
- The learner can evaluate different Poverty alleviation programmes implemented by the government.

CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

Suicides of farmers in Wayanad are on the rise. The whole agricultural sector is affected by this.

https://www.newindianexpress.com/nation/2018/sep/12

- How Can we overcome this problem?
- What might be the reason for these suicides of farmers?
- How does this problem affect us?

Step 2

Identification of Facts

1. Most of the people in Kerala depends on agriculture for their livelihood.
2. There are many crises in the agricultural sector.
3. Environmental degradation and climate change are major issues that have affected
   agriculture.
4. The government has planned a number of schemes to help the agricultural sector.
   Various projects and programmes are implemented by Government for alleviation of poverty.

Step 3

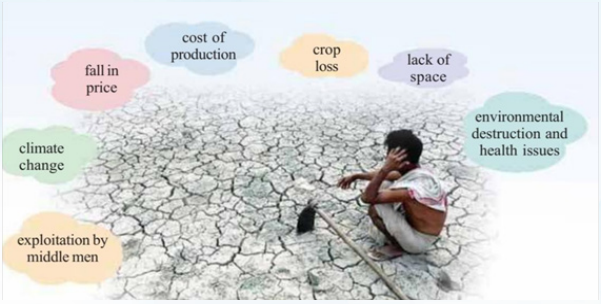
Generation of Ideas

1. Increased production costs, harvest and price losses, exploitation by intermediaries has all affected the agricultural sector.
2. Environmental degradation and climate change are major issues affecting agriculture.
3. Farmers can increase the cultivation and make profit by using various schemes provided by the government.

Step 4

Developmental Phase
Activity I Crisis in Agriculture

(10 Minutes)



Students discuss and prepare a report on crises in agricultural sector.
Report Writing and presentation. (6 minutes)

Reflection: Students reflect on concepts.

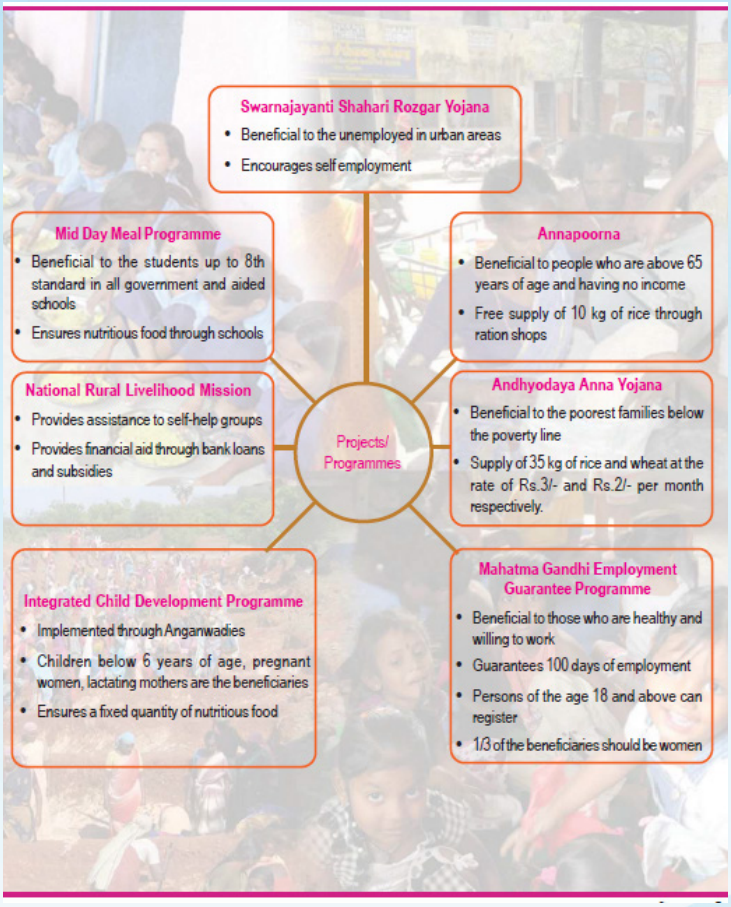
Hints: Crises in the agricultural sector

- Cost of production
- Crop loss, price loss
- Space constraints
- Environmental degradation and climate change
- Exploitation by intermediaries

Activity II Government Schemes to Ensure Food Security (16 minutes)

Various schemes introduced by the Government to ensure food security by strengthening the public distribution system and various poverty alleviation programmes.

Flash Cards:



Projects and Programs for poverty alleviation

Government projects	Government programmes
• Annapoorna	Integrated Child Development Programme
• Andhyodaya Annayojana	Mid-Day Meal Programme at schools
• Mahatma Gandhi Rural Employment Guarantee Programme	National Rural Livelihood Mission
• Swarna Jayanti Shahari Rosgar Yojana	

Prepare a report on
1) Annapoorna
2) Mid Day Meal Programme
3) Integrated Child Development Programme. (6 minutes)

Students research for more information related to this topic. (5 minutes)

CLASS II

Step 5

Reflection: students reflect on perceived ideas (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

Government projects	Government programmes
• Annapoorna	Integrated Child Development Programme
• Andhyodaya Annayojana	Mid-Day Meal Programme at schools
• Mahatma Gandhi Rural Employment Guarantee Programme	National Rural Livelihood Mission
• Swarna Jayanti Shahari Rosgar Yojana	

Poverty Alleviation programmes by Government.

SRL activities (10 minutes)

Step 2

Summarizing the ideas

Crisis in Agricultural Sector

Step 3

Note-taking

Poverty Alleviation programmes by Government

Step 4

Mapping

Government Schemes to Ensure Food Security

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting.

Step 2

Reasoning about the topic

> What are the major problems faced by the agricultural sector? Give Reasons.

> How does Environmental distruction and climate change affect the agricultural sector?

> What are the merits and demerits of Govt. policies?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL (10 Minutes)

Step 1

Presentation

Participants present the output of SRL through activities such as:
1) Discussion of learning points: Crisis in agriculture.
2) Parallel presentation: Government programmes and Projects for alleviation of poverty.

Step 2

Peer Assessment

Peer Assessment is carried out through the activities.

- Discussion on Learning Points: Cricis in agriculture
- Single Presentation of the Ideas: Various poverty alleviation programmes
- Parallel presentation: Projects and programs for poverty alleviation.

Step 3

Conclusion

Teacher concluded the learning points.

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

Report Writing - Crisis in Agricultural Sector.

Step 2

Reflection on Summary of topic

- Government programmes and Projects for alleviation of poverty.

Step 3

Reflection of the learning process (5 minutes)

- Students present the learned ideas.
- Summarizing the ideas: Crisis in Agricultural Sector
- Mapping of the ideas: Government Schemes to ensure Food Security
- Note-taking on the topic: Poverty Alleviation Programmes by the Government
- Overall reflection of the topic: Crisis in Agriculture

Step 4

Review Question

(4 Minutes)

1. What are the crises in agriculture?
2. How climate change and environmental distruction effects agri cultural field?
3. What are the poverty alleviation programmes implemented by the Government?

Step 5

Follow-up activities

(2 minutes)

Report writing on the topic Govt. policies for farmers.

References

1) VIIIth std Basic science text books
2) VIIth std social science text book
3) Samagra
4) Teachers handbook
5) https://*www.newindianexpress.com/nation/2018/sep/12*

Module 3
Health and Safety of Farmers

Learning Outcomes

- The learner identifies about the health issues and risks on Agricultural farms.
- The learner understands about the precautions required on farmland.
- The learner recognises and spreads the importance of First-aid in the agriculture field.

CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

The teacher tells a story related to the risks and occupational hazards on the farmland. Showing a picture.

What incidents can happen in this field?

To create awareness among the farmers about these risks, to take pre-cautions and care.

Step 2

Identification of Facts

1) Understand the several occupational hazards on the farmland for the farmers.
2) Understand about the precautions required to be taken by the farmers on the farmland.
3) Understand the importance of First-aid in the farmlands

Step 3

Generation of Ideas

Health and Safety of Farmers

Step 4

Developmental Phase

Activity I Living circumstances of farmers (10 Minutes)

Presentation related to living circumstances of farmers

Under what circumstances do the farmers face occupational hazards?

Students discuss, through 'Think Pair Share' and prepare a report about living circumstances of farmers.

Report Writing and presentation. (6 minutes)
Reflection: Students reflect on concepts.

Activity II Health Problems of Farmers (16 minutes)

Hints: The teacher presents the Chart. Ask them to fill in the blanks

Working Groups

Chart:

Environmental factors	Health problems	Farming Practices
Summer		Open field cultivators
Snake bite		
	Dangerous and life-threatening	Those who work on farms
Insect bites		
Sharp tools	Deep wounds can be life-threatening	Skill to use these tools
Consequences of carrying heavy weight	Backache/ body pain	
Pesticides	Acute, Chronic Loss of vision, Cancer	
Pets/fumes		
Grass/pathogen	Skin diseases, Allergy, Malaria, Sleeping sickness	

Students complete the chart by filling the white spaces.

Ask them to collect newspaper reports on the occupational hazards in agricultural fields.

Finds out the insurance schemes by the government for the farmers.
Hints:
E- Nam
National Mission for sustainable agriculture

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

Occupational hazards in the farmlands, precautions.

SRL activities (10 minutes)

Step 2

Summarizing the ideas

Occupational hazards in the farmlands, precautions

Step 3

Note-taking

Insurance schemes by the government for the farmers

Step 4

Mapping

Health Problems of Farmers

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

- Are the farmers in Kerala safe? Explain
- What are the causes of occupational hazards in agricultural farms?
- What are the precautions required to prevent risks at the farmlands?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL (10 Minutes)

Step 1

Presentation

Participants present the output of SRL through activities such as:
1) Discussion of learning points - Policies by the government for the farmers

What are the precautions required to be taken by the farmers while using pesticides?

2) Single presentation of the ideas: Importance of First-aid – Sunburn, Snakebite, Dehydration.

Step 2

Peer Assessment

Peer Assessment is carried out through the above activities.

- Discussion on Learning Point: Health and Safety of Farmers
- Single Presentation of the Ideas: Occupational hazards in the farm-lands, precautions
- Parallel presentation: Health problems and farming practices

Step 3

Conclusion

Teacher concluded the learning points.

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

Completion of chart (occupational hazards in the agricultural field)

Step 2

Reflection on Summary of topic

- Importance of first aid in the agricultural field

Step 3

Reflection of the learning process (5 minutes)

- Group discussion and chart completion

Step 4

Review Question

(4 Minutes)

1) What are the problems faced by the farmers?
2) What are the schemes introduced by the government for the farmers?
3) What precautions can be taken against the risks posed by the pesticides?

Step 5

Follow-up activities

(2 minutes)

Prepare an Interview Questions with Farmers.

References

1) VIIIth std Basic science text books
2) VIIth std social science text book
3) Samagra
4) Teachers handbook

Module 4
Organic Farming

Learning Outcomes

- The learner can understand Organic farming.
- The learner can understand the importance of Organic farming.
- The learner can understand about Organic fertilizers and Chemical fertilizers.
- The learner can understand the major honors given by the government to the farmer.

CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

Teacher

In earlier days, the vegetables would only stay intact for two to three days after the harvest. But today, the vegetables in shops and markets remain intact for many days. What would be the reason for this?

Students

The spraying of chemical pesticides reduces the attack by the pests. Ingestion of these toxic vegetables and fruits results in various health problems.

Teacher

How can these be overcome?

Participants work in groups to identify the problem

Step 2

Identification of Facts

1) Quality crops can be obtained by the use of Organic fertilizers and Organic pesticides.
2) Use of chemical fertilizers results in various health problems.
3) The use of organic vegetables can decrease these health issues to some extent.

Step 3

Generation of Ideas

1) Understands the importance of Organic vegetables and fruits for a healthy life.
2) Understands the characteristics of Organic fertilizers.
3) Understands chemical fertilizers and chemical pesticides.
4) Understands the awards given to the farmers.
   - Karshakothama Award
   - Yuvakarshaka Award
   - Yuvakarshakan Award
   - Karshakathilakam Award
   - Kerakesari Award

Step 4

Developmental Phase

Activity I Video-Organic Farming (10 Minutes)

A video related to Organic fertilizers and Organic farming is presented

Jaiva keedanashini | jaiva krishi tips malayalam | Natural pest control home
https://www.youtube.com/watch?v=7-Cb0T5x5c0

The students are asked to prepare a report on Organic farming.
Students discuss in collaborative groups (Think-Pair-Share) and prepare the report.

Report Writing and presentation. (6 minutes)
Reflection: Students reflect on concepts.

Activity II Fertilizers (16 minutes)

To understand about Chemical fertilizers, Organic fertilizers, Microbial fertilizers etc.
Flashcards related to them are given.
Students discuss about the Chemical fertilizers, Organic fertilizers and Microbial fertilizers.

Flash Cards:

Organic Fertilizers	Chemical fertilizers
• Obtained from wastes and by-products of natural living organisms. • Increase soil fertility. • Do not cause health problems. • Examples:	• Artificially synthesized. • The soil fertility gradually decreases. • Consists of Nitrogen, Phosphate, Potash, etc. • Decreases the amount of some components in the soil. • The chemicals result in the destruction of the earthworm and other microorganisms in the soil. • Examples:

Students complete the flash card by filling the white spaces

Microbes that provide fertilizers

Microbial fertilizers are substances that contain microorganisms which help to increase the fertility of soil. The presence of microbes enables increase in the soil factors which are essential for plant growth. Bacteria like *Rhizobium*, *Azotobacter*, *Azospirillum* and aquatic plants like *Azolla* can be used to increase nitrogen content in the soil.

Things to be taken care of

- ensure the availability of biofertilizers in the soil.
- proper irrigation should be provided.
- chemical fertilizers or chemical pesticides should not be used.

Microorganisms can exist in soil only if these precautions are taken.

Students research on the Topic:
1) They are asked to find out major honors given to the farmers by the government.
2) Chemical pesticides- adverse effects.

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

- Karshakothama Award
- Yuvakarshaka Award
- Yuvakarshakan Award
- Karshakathilakam Award
- Kerakesari Award
- Chemical pesticides: Adverse effects E.g.: DDT

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

Organic farming

Step 3

Note-taking

Adverse effects of Chemical fertilizers and chemical pesticides

Step 4

Mapping

Different Types of Fertilizers

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

What are the causes of Biomagnification?

Describe the consequences of the use of chemical pesticides in living organisms

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL (10 Minutes)

Step 1

Presentation

Participants present the output of SRL through activity.
Such as:

1) Discussion on learning points: Organic farming
2) Single presentation: Chemical Fertilizers, Organic Fertilizers

Step 2

Peer Assessment

Peer Assessment is carried out through the above activities

- Discussion on Learning Point: Organic Farming
- Single Presentation of the Ideas: Adverse effects of chemical pesticides and chemica fertilizers.
- Parallel presentation: Chemical fertilizers and organic fertilizers

Step 3

Conclusion

Teacher concluded the learning points.

Hints:

1) Organic farming
2) Importance of organic farming
3) Characteristics of Organic pesticides and Chemical pesticides.
4) Major honorswere given to the farmers

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

Major Honours given to the Farmers by the Government

Step 2

Reflection on Summary of topic

Organic Forming

Step 3

Reflection of the learning process (5 minutes)

a) Summarizing the Ideas: Organic farming
b) Note taking on the topic: Adverse effects of Chemical fertilizers and chemical pesticides.

Step 4

Review Question

(4 Minutes)

1) What is Organic farming?
2) What are the benefits of Organic farming?
3) Give two examples of Chemical pesticides?
4) Give wo examples of Organic pesticides?

Step 5

Follow-up activities

(2 minutes)

1) Visit farms and collect the seeds of organic vegetables.
2) Conduct an Interview with a farmer, near your locality.

References

1) VIIIth std Basic science text books
2) VIIth std social science text book
3) Samagra
4) Teachers handbook
5) https://www.youtube.com/watch?v=7-Cb0T5x5c0

Module 5
Modern Farming Methods and Online Communities

Learning Outcomes

- The learner explains about the Modern Farming methods.
- The learner recognises the Online communities for Non-toxic vegetables.
- The learner understands about the Online Applications related to Food supplies.
- The learner identifies and spreads various audio-Visual media related to Agriculture.

CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

Teacher

Climate changes adversely affect traditional farming methods. How can we overcome this? Intake of toxic vegetables can result in various diseases. What will be the result of our health if this situation continues?

Step 2

Identification of Facts

1) Climate changes adversely affect traditional farming methods in different ways.
2) Hydroponics and Aeroponics are soil-less farming methods.
3) Vertical farming, Terrace farming, Growbag cultivation etc. decreases the land loss.

Step 3

Generation of Ideas

1. Importance of Modern farming methods such as Hydroponics, Aeroponics etc.
2. Characteristics of Terrace farming, Vertical farming, Growbag Cultivation etc.
3. The role of Online communities in providing accessibility to Organic Vegetables.
4. Online Applications related to Food supplies.
5. Television programs
   - Krishideepam
   - Naattupaccha
6. Radio programs
   - Krishipadam
   - Vayalum Veedum
7. Online applications to food supplies
   - Uber Eats
   - Zomato
   - Swiggy Food

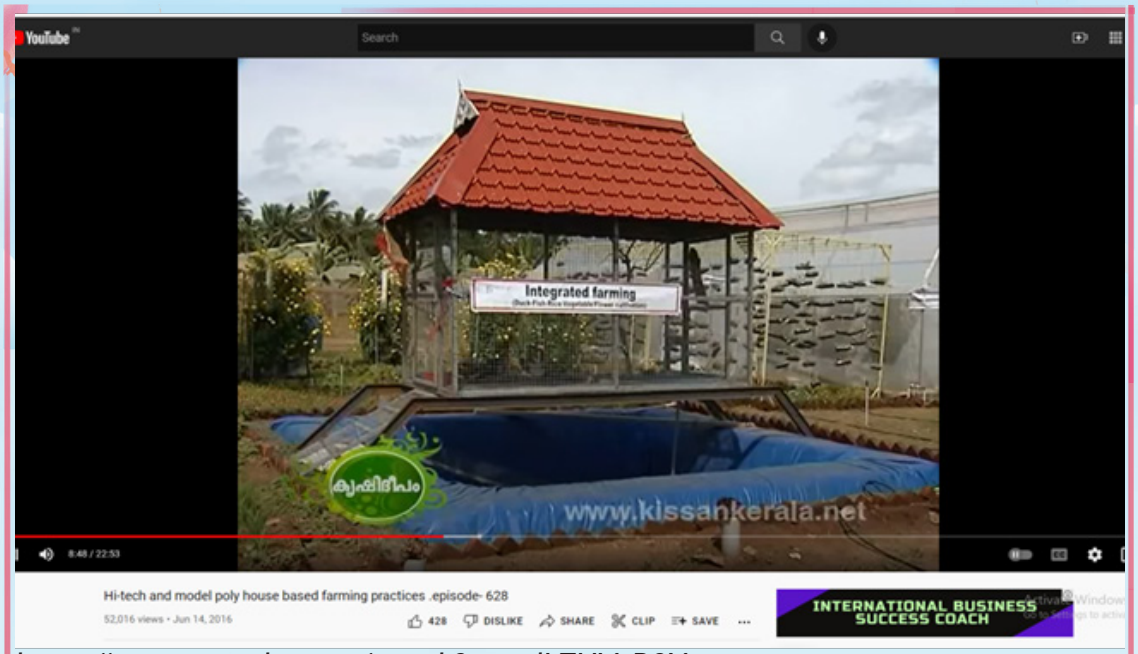
Step 4

Developmental Phase

Activity I Video on Types of Modern Farming (10 Minutes)

Collaborative Working Groups

A video related to various types of modern farming methods is presented- Hydroponics, Aeroponics, Polyhouse Farming.



https://www.youtube.com/watch?v=c-dLZUVxP3Y

Discuss in Collaborative groups (Jigsaw) and prepare a report.

Report Writing and presentation. (6 minutes)
Reflection: Students reflect on concepts.

Hints:

- Hydroponics
- Aeroponics
- Polyhouse farming

Fig 3.3
Polyhouse farming

Fig 3.5
Hydroponics

Fig 3.6
Aeroponics

Activity II Fertilizers

(16 minutes)

A photo, showing farming methods that avoid space constraint problems and are adaptable to the living conditions, is presented. These methods and their importance are discussed in collaborative groups and students are asked to prepare a report on it. Discussion about Online communities.

Photographs:

Fig. 3.7
Terrace cultivation

Fig. 3.8
Grow bag cultivation

Fig. 3.9
Vertical farming

Working Groups

Hints:

- Krishideepam
- Naatupachha
- Vayalum Veedum
- Krishipadam

Students research on the topics: Television and Radio programs related to Agriculture.

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

- Krishideepam
- Naatupachha
- Vayalum Veedum
- Krishipadam

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

Modern farming methods, Advantages

Step 3

Note-taking

Farming methods to avoid Space constraint issues, Online Communities

Step 4

Mapping

Modern Farming methods

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

The causes of abandonment of traditional farming methods.

What are the reasons for the exploitation of farmers?
How does Climate change affect the agriculture?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL (10 Minutes)

Step 1

Presentation

Participants present the output of SRL through activity.
Such as:
Discussion on learning points:

1. Various Modern farming methods.
2. Significance of Online Communities.

Single Presentation

1. Terrace farming
2. Growbag cultivation
3. Vertical farming

Step 2

Peer Assessment

Peer Assessment through Questioning.

- Discussion on Learning Point: Modern Farming Methods
- Single Presentation of the Ideas: Farming methods to avoid Space constraint issues, Online Communities
- Parallel presentation: Television and Radio Programs related to agriculture

Step 3

Conclusion

Teacher concluded the learning points.

Hints:

1) Modern farming methods
2) Television and Radio Programs related to agriculture
3) Online community applications for food supplies

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

Television and Radio Programs related to agriculture

Step 2

Reflection on Summary of topic

Modern farming methods

Step 3

Reflection of the learning process (5 minutes)

a) Summarizing the Ideas: Modern farming methods, Advantages
b) Note taking on the topic: Audio-visual media: related to Agriculture.

Step 4

Review Question

(4 Minutes)

1) Which farming methods can be used to cultivate non-toxic vegetables?
2) Solution for exploitation of farmers?
3) A radio program related to agriculture?
4) A television program?
5) Online Applications for Food supplies.

Step 5

Follow-up activities

(2 minutes)

1) Implement the concept of 'Vegetable farming at Home'.
2) Prepare a report after reading any magazine related to agriculture.

References

1) VIIIth std Basic science text books
2) VIIth std social science text book
3) Samagra
4) Teachers handbook
5) *https://www.youtube.com/watch?v=c-dLZUVxP3Y*

STD VIII: Basic Science
Diversity for Sustenance

Module 6
Biosphere

Learning Outcomes

- The learner can understand about the biosphere.
- The learner can understand the importance of biotic and abiotic components in the biosphere.
- The learner can understand different zones of the atmosphere.

CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

Teacher

The very existence of man ,plants and animals is possible because of the presence of lithosphere,hydrosphere and atmosphere.Carbon dioxide, water and minerals are essential for the existence of plants. If any one of these factors was excluded , would plant life exist on earth?

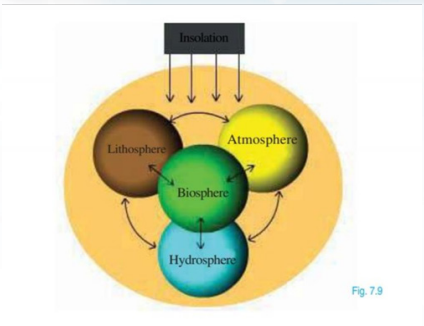


Fig. 7.9

Participants work in groups to identify the problem

How does the changes in any element of the environment affect us?

Step 2

Identification of Facts

1) Biosphere is the part of the earth where life exists. It extends to soil, atmosphere and water.
2) Abiotic Components: Non living components necessary for existence of living organisms.
3) The biosphere includes biotic and abiotic components.
4) There are different zones in the atmosphere depending on different temperatures at different heights

Step 3

Generation of Ideas

1) Biosphere is the part where life exists on the surface of earth, in the ocean and in the atmosphere.
2) The biosphere includes biotic and abiotic components.
3) Understands the structure of abiotic components such as soil, air and water.
4) Troposphere, stratosphere, mesosphere and thermosphere are dif ferent zones of the atmosphere.

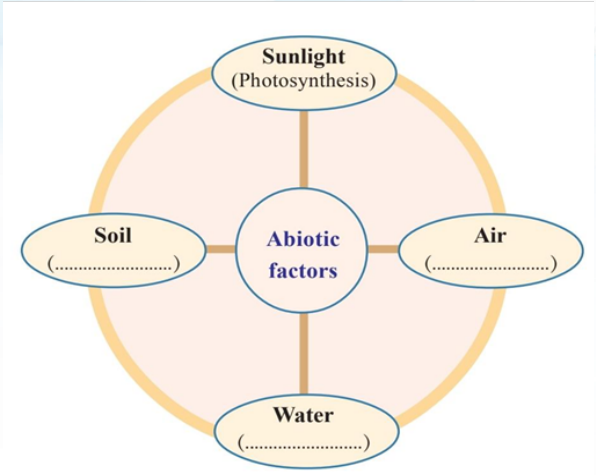
Step 4

Developmental Phase

Activity I Chart on Elements of Biosphere (10 Minutes)

Collaborative Working Groups

Show a chart of abiotic components and biotic components of the biosphere. Carefully observe the chart and fill in the blanks.



Biotic components

Biosphere

Biosphere is the part of earth where life exists. It extends to soil, atmosphere and water.

Activity II Structure of the Atmosphere (16 minutes)

Provide Flash Cards showing different zones of the atmosphere and their characteristics.
Students discuss in collaborative groups and prepare report.

Flash Cards:

Structure of Atmosphere

- The gaseous composition up to 90km from the surface of earth is almost similar.
- This part of the atmosphere is called homosphere.
- The part of atmosphere above 90km is called heterosphere.

Troposphere

- 13 km just above earth's surface.
- Atmospheric phenomenon like cloud formation, rain, snow, wind etc.
- Tropopause- the transition zone above troposphere.

Stratosphere

- Up to 50km from earth's surface starting from trop-opause.
- The temperature does not change with increasing height in the lower canopies.
- Known as zone of equal heat.
- Ozone layer is situated.
- Enables smooth movement of jets.
- Stratopause- the transition zone above the stratosphere.

Mesosphere

- Up to 50-80 km from earth's surface.
- Temperature decreases with height. (80°C to 100°C)
- The meteorites are ignited by friction.
- Mesopause- the transition zone above mesosphere.

Thermosphere

- Situated at a height of about 80-800km.
- The temperature rises significantly with height.
- The lower part of the thermosphere is known as the Ionosphere.
- Ionosphere enables long distance broadcasting of radio programs.

Students Present the Report
Students research on the topics:

1) What are the characteristics of the ozone layer?
2) Draw the picture of layers of atmosphere.

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

- Characteristics of ozone layer
- Different layers of atmosphere

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

Composition of the Biosphere.
(Elements of Biosphere)

Step 3

Note-taking

Different Layers of Atmosphere

Step 4

Mapping

Diagrammatic Representation of Layers of Atmosphere

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

Discover the causes of ozone depletion.

What is the cause of smooth movement of jets in the stratosphere?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL (10 Minutes)

Step 1

Presentation

Participants present the output of SRL through activity.
Such as:
Discussion on learning points:
Components of Biosphere.
Compositions of Air, Water, Soil.

Parallel Presentation - Quiz about Layers of Atmosphere.

Group A	Group B
• The Atmospheric zone at the height of 50-80 km. • Where is Ozone Layer situated? • Which atmospheric zone does snow and lightning occur?	• Which Atmospheric zone does the jets fly through? • A gas that causes ozone depletion. • Atmospheric zone that enables the broadcasting of radio programs.

Step 2

Peer Assessment
Peer Assessment through Questioning.

Step 3

Conclusion
Teacher concluded the learning points.
Bioshpere
Biotic and Abiotic factors
Different layers of atmosphere

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise
Characteristics of Ozone Layer

Step 2

Reflection on Summary of topic
Biosphere

Step 3

Reflection of the learning process (5 minutes)

a) Summarizing the Ideas: Elements of Biosphere
b) Diagrammatic Representation: Layers of Atmosphere

Overall Reflection of the Topic: Biosphere

Step 4

Review Question (4 Minutes)

1) Which elements are most abundant in the soil?
2) What is the significance of microorganisms in the biosphere?
3) What are the layers of atmosphere?
4) Which atmospheric zone does the jets fly through?

Step 5

Follow-up activities (2 minutes)

1) Prepare a poster on Conservation of Biosphere.
2) Write down the significance of Abiotic components of Biosphere

References

1) VIIIth std Basic science text books
2) VIIth std social science text book
3) Samagra
4) Teachers handbook

Module 7
Biodiversity

Learning Outcomes

- Leaner can understand the concept of biodiversity.
- Leaner can understand the importance of biodiversity.
- Leaner can understand biodiversity deplesion.
- Leaner can understand the importance of biodiversity conservation.
- Leaner can understand 'Reports' and theories related to biodiversity conservation.

CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

Teacher

There are different kinds of living beings on earth. Are all living beings still seen? In ancient times, many crows and storks could be seen behind the buffaloes during plowing fields. Are they still seen? If changes in the climate affect the number of tigers, how does it affect us? Have you ever thought about it?

Participants work in groups to identify the problem

Step 2

Identification of Facts

1. Biodiversity- Biodiversity is the diversity of various plants, animals, and microorganisms on earth.
2. Global warming and climate change are factors that affect biodiversity.
3. Biodiversity deplesion is a challenge we are facing.

Step 3

Generation of Ideas

1. Understand the causes of biodiversity loss.
   - The exploitation of natural resources.
   - Habitat destruction and degradation, drinking, water pollution, population growth, and pesticide application.
2. Understand reports related to Biodiversity conservation.
   e.g.: Gadgil Report

Step 4

Developmental Phase

Activity I Video on Biodiversity

(10 Minutes)

Present a video showing biodiversity. Discuss and write about the importance of biodiversity.

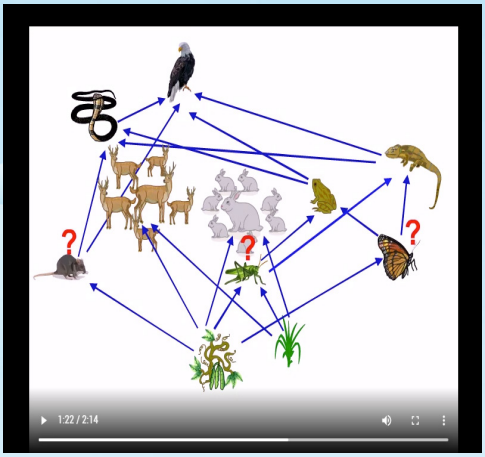
Working Groups

Prepare a report on the importance of biodiversity.

Activity II Biodiversity Depletion

(16 minutes)

Video showing biodiversity dipletion.



Students discuss in Collaborative groups

Hints:

- Natural resource exploitation
- Habitat destruction
- Fragmentation
- Landslides
- Pollution, etc.

Prepare a report on biodiversity destruction
Students research on the topic - report or theories related to environmental protection

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

- Theories related to environmental protection

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas
Importance of biodiversity

Step 3

Note-taking
Reports or theories related to environmental protection

Step 4

Mapping
Diagrammatic representation of the importance of biodiversity

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

Is every habitat similar in terms of Biodiversity?

What is the need to protect the natural habitat?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL

(10 Minutes)

Step 1

Presentation

Participants present the output of SRL such as:
1. Discussion on learning points:
   Biodiversity
2. Parallel presentation
   Loss of biodiversity
   Biodiversity conservation

Step 2

Peer Assessment

Carried Out Through the Activities 1 & 2
   Video showing biodiversity
   Video showing biodiversity dipletion

Step 3

Conclusion

Teacher concluded the learning points.
1. Biodiversity
2. Biodiversity deplesion
3. Biodiversity conservation

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

Report or theories related to environmental protection

Step 2

Reflection on Summary of topic

Biodiversity

Step 3

Reflection of the learning process (5 minutes)

a) Observation of videos
b) Group discussion

Overall Reflection of the Topic: Biodiversity

Step 4

Review Question (4 Minutes)

1) What is biodiversity?
2) What are the importance of biodiversity?
3) What are the causes of biodiversity depletion?

Step 5

Follow-up activities (2 minutes)

1. Poster making on environmental protection
2. Role play showing the importance of biodiversity

References

1) VIIIth std Basic science text books
2) VIIth std social science text book
3) Samagra
4) Teachers handbook

Module 8
Biodiversity: in-situ Conservation

Learning Outcomes

- Able to describe what is biodiversity.
- Engaging in conservation activities by recognizing the need of protecting biodiversity.
- Understanding about environment activists. Developing attitude toward biodiversity protection.
- Able to describe different types of in-situ conservation techniques.

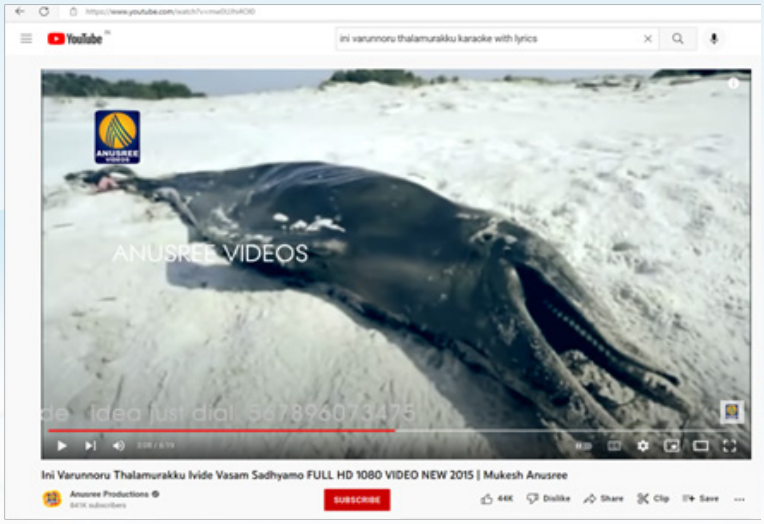
CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

Video of Malayalam poem- 'ini varunnoru thalamurakk ivide vasam sadhyamo....'



https://youtu.be/mw0UJhi4Ol0

Teacher:
What can be interfered from the lines, 'ini varunnoru thala-murakk ivied vasam sadhyamo....?'

Participants work in groups to identify the problem

Step 2

Identification of Facts

1. Biodiversity includes different forms of plants, animals, and microorganisms.
2. Global warming and climate change are factors that affect biodiversity
3. Biodiversity depletion is major challenge humankind facing right now.
4. Biodiversity conservation can be done in in-situ and ex-situ conservation measures

Step 3

Generation of Ideas

1. Biodiversity can be protected through a rational and intelligent approach to the environment.
2. In-situ conservation: method in which organisms are protected in their natural habitats.
3. Examples for in-situ conservation are Wild Life Sanctuary, National Parks, Community Reserves, Biosphere reserves, Sacred groves and Ecological hotspots.
4. Wild Life Sanctuary: These are forest areas declared as protected areas to prevent the extinction of wild lives by protecting the ecosystem. Peppara, Periyar, Wayanad etc., are examples of wild life sanctuaries in Kerala.
5. National Parks: National Parks are designed to protect wild lives along with the protection of historical monuments, natural resources and geographical features of an area. Eravikulam, Silent Valley, Anamudi Shola, Mathikettan Shola and Pambadum Shola are the national parks in Kerala.
6. Community Reserves: Community reserves are areas protected with the participation of the public. These are ecologically important places located in populated areas. The Kadalundi Community Reserve spread over the districts of Malappuram and Kozhikode is an example
7. Biosphere reserves: These are vast regions designed with an aim to protect world's important ecosystems, biodiversity and genetic resources. Biosphere reserves like the Nilgiris and Agasthyarkoodam include areas belonging to Kerala too.
8. Sacred groves: These are small areas of biodiversity protected in regions inhabited by human beings. Due to changes in life style many of these which were highly bio-rich have been destroyed.

Only a few are remaining now. Sacred groves play an important role in the conservation of water in the region too.

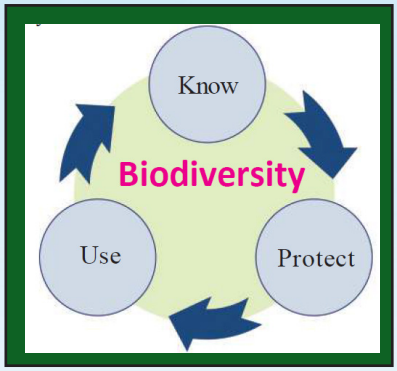
9. Ecological hotspots: Ecological hotspots are areas rich in endemic species but facing the threat of habitat destruction. Each hotspot is ecologically a very important area of biodiversity. Out of the 34 hotspots all over the world, 3 of them are in India. They are the Western Ghats, North-Eastern Himalayas and the Indo-Burma region.

Step 4

Developmental Phase

Activity I Chart on Wise Approach to Biodiversity (10 Minutes)

What should be therational approach towards biodiversity?



Analyze the figure and answer (Jigsaw).
Discuss in the groups and prepare a report.

Activity II In-situ Conservation (16 minutes)

In-situ conservation is a protection technique where species are protected in their natural habitat itself.

Hints:
Wildlife sanctuaries
National Parks
Community Reserves
Biosphere Reserves
Mangroves
Ecological hotspots

Students discuss in Collaborative groups

Asking to write down different in-situ conservation methods using the help of the textbook. Students discuss it among groups and present the report prepared.

Students research on the topic: Prepare biography of two environmental activists

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

Biography of two environmental activists

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

in-situ conservation

Step 3

Note-taking

Two environmentalists

Step 4

Mapping

in-situ conservation

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

What is the importance of protecting mangroves?

What are the reasons for the depletion of natural habitats?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL

(10 Minutes)

Step 1

Presentation

Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points- in-situ conservation
2) Parallel presentation

Group A	Group B
1. National parks, examples 3. Biosphere reserves, importance	2. Wildlife sanctuaries, examples 4. Mangroves

Step 2

Peer Assessment

Carried Out Through the Activities 1 & 2

Chart on wise approach to biodiversity

In-situ conservation

Step 3

Conclusion

Teacher concluded the learning points.
In-situ conservation

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

Describe two environmentalists

Step 2

Reflection on Summary of topic

in-situ conservation

Step 3

Reflection of the learning process (5 minutes)

a) Group discussion
b) Collage observation

Overall Reflection of the Topic: in-situ conservation

Step 4

Review Question (4 Minutes)

1. What is in-situ conservation?
2. Give examples for national parks
3. Which is the animal protected ta Eravikulam national park?

Step 5

Follow-up activities (2 minutes)

Prepare a picture album for differenttypes of in-situconservation methods

References

1) VIIIth std Basic science text books
2) https://youtu.be/mw0UJhi4Ol0
3) Samagra
4) Teachers handbook

Module 9
Biodiversity: ex-situ Conservation

Learning Outcomes

- Able to explain the idea of biodiversity
- Realizing the need to conservating biodiversity and engage in environmental protection activities.
- Generating interest to read literature related to environmentalism.
- Able to explain various ex-situ conservation methods.

CLASS I

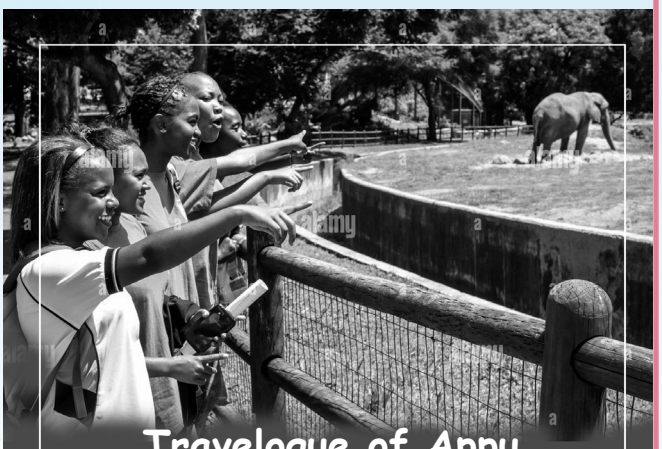
Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

Teacher

Reading Travelogue of Appu



Travelogue of Appu

Me and Ammu were so happy when we started our study tour. On the first day of the trip, we went to Trivandrum Zoo. We saw very different animals there. Lion, tiger, and elephant were there. It was then a question raised in my mind, 'why animals are protected like this?

Teacher:
When you visit a zoo? You may also wonder why these animals are protected in this manner.

Students:
We are protecting these animals to avoid their extinction.

Teacher:
The kind of conservation explained above is different from what we learned last class, it is called ex-situ conservation.

Step 2

Identification of Facts

1. Biodiversity includes different forms of plants, animals, and microorganisms.
2. Biodiversity conservation can be done in in-situ and ex-situ conservation measures

Step 3

Generation of Ideas

1. Sustainable development is possible only through wise approach to biodiversity.
2. ex-situ conservation method in which organisms are protected outside their natural habitats.
3. Zoological gardens: Zoological gardens are conservation centres where different varieties of animals are protected and housed separately and where necessary arrangements are made available for their reproduction. They also function as conservation centres of organisms which have become extinct in wild.
4. There are zoological gardens at Thiruvananthapuram and Thrissur in Kerala.
5. Botanical gardens: These are wide research centres where rare and important plants of diverse species are protected. We can identify many plants and get more information about them by visiting a botanical garden.
6. Jawaharlal Nehru Tropical Botanical Garden and Research Institute (JNTBGRI) at Palode in Thiruvananthapuram and Malabar Botanical Garden (MBG) at Olavanna in Kozhikode are examples.
7. Gene Banks: These are research centres with facilities to collect seeds and gametes to preserve them for a long time. Organisms can be recreated out of them whenever required. Rajiv Gandhi Centre for Biotechnology at Thiruvananthapuram is an example.

Step 4

Developmental Phase

Activity I Photo Collage

(10 Minutes)
Working Groups

Conservation of animals outside their natural habitat is called ex-situ conservation.
Students are asked to analyze the picture in their groups and to present their analysis

Hints:
Zoological gardens
Botanical gardens
Gene Banks

Activity II Group Discussion

(16 minutes)

1) What is the significance of Gene banks?
2) Whether science is for good or bad?

Students are formed into groups to discuss these questions

Students research on the topic
Different zones for environmental protection

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

- Different Zones for environmental protection

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

Zoological Gardens

Step 3

Note-taking

Different poems related to environmental protection

Step 4

Mapping

ex-situ conservation

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

What is the importance ofprotecting every species for the survival of the ecosystem?

Are gene banks for scientific good or bad?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL

(10 Minutes)

Step 1

Presentation

Presentation of the product of self-regulated learning. Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points
   a) Botanical Gardens
   b) Zoological Gardens
2) Single presentation of the ideas:
   a) Ex-situ conservation
   b) Salient features

Step 2

Peer Assessment

Carried out through the above activities

Group Discussion - Gene bank

Single Presentation - Zoological garden and Botanical garden

Step 3

Conclusion

Teacher concluded the learning points.

Ex-situ Conservation

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

Different poems related to environmental protection

Step 2

Reflection on Summary of topic

a. Ex-situ conservation
b. Zoological gardens
c. Botanical gardens
d. Gene banks

Step 3

Reflection of the learning process (5 minutes)

a. Students present the learned ideas
b. Summarizing the ideas: ex-situ conservation
c. Overall reflection on the topic: ex-situ conservation

Step 4

Review Question (4 Minutes)

1) What are the two biodiversity conservation methods?
2) What is the importance of gene banks?
3) Give examples for zoological gardens.

Step 5

Follow-up activities (2 minutes)

Prepare a picture album related to ex-situ conservation.

References

1) VIIIth std Basic science text books
2) Samagra
3) Teachers handbook

Module 10
Disaster Management

Learning Outcomes

- The learner understands the concept of Disaster.
- The learner explains about Natural Disasters and Man-made disasters.
- The learner explains about Disaster Management.
- The learner understands the importance of First-aid, Emergency kit etc.
- The learner understands about various organizations and departments of government for disaster management
- The learner develops an attitude towards the protection of the environment.

CLASS I

Ladder I Presentation of the Problem

Step 1

Video Presentatoin

A video related to the recent Flood in Kerala is presented. Ask to discuss the ways in which these disasters affect our state.

https://www.youtube.com/watch?v=lOlg4dvuc7k

Participants work in collaborative learning groups

Step 2

Identification of Facts

Disaster: A disaster is a devastating event. It happens suddenly and results in loss of life and property.

Disaster Management: are the measures taken to protect and ensure the safety of life and property from effects of natural or man-made disasters.

Natural Disasters- naturally occurring phenomenon that cause severe damages to human Life and properties are called Natural disasters.

First-Aid: the immediate care provided to a person in case of an injury or illness until the complete medical treatment is available.

Step 3

Generation of Ideas

1) There are mainly two types of disasters; Natural Disasters, Man-made disasters.
2) Natural disasters- Earthquakes, Volcanic Eruptions, Tsunami, Flood, Cyclones, Landslides, Avalanches, Drought etc.
3) Man-made disasters- Terrorism, War, Bomb Explosions, Leakage of Toxins, Environmental Pollution, Infectious Diseases, Industrial Accidents.
4) There are four stages of Disaster management- Mitigation, Preparation, Response and Recovery.
5) First-aid and Emergency kits are very important during the time of disasters.
6) There are mainly three goals of first-aid
   1) To save lives
   2) To prevent further damage
   3) To encourage recovery

Schemes/Departments related to Disaster Management

- Kerala Revenue Disaster Management Department
- State Disaster Management Department
- Disaster Risk Analysis Cell
- Land and Disaster Management Institute

Step 4

Developmental Phase

The examples of Natural and Man-made disasters are given in various slips. Students are asked to tabulate the disasters.

Participants work in collaborative learning groups

Hints:

Natural Disasters	Man-made disasters
Earthquakes Volcanic Eruptions Tsunami Flood Cyclones Landslides Avalanches	Terrorism War Bomb explosions Leakage of toxins Environmental Pollution Industrial Accidents Infectious diseases

Students tabulate and present them.

Activity II Chart on Stages of Disaster Management (16 Minutes)

Present a chart showing the stages of disaster management.

https://byjus.com/free-ias-prep/highlights-national-disaster-management-plan/

Students are asked to discuss each stage (Think-pair-share) and prepare a report

Goals

1) Reduce the risks of Disaster Management
2) Provide immediate help to disaster victims
3) Fast and effective recovery

a) Mitigation- to reduce effects of disaster
E.g. Codes, Zoning, Vulnerability Analysis

b) Preparation- planning how to respond
E.g., Preparation Plans, Emergency Exercises, Training, Warning Systems

c) Response- attempts to reduce the risks of a disaster
E.g., Searching, Rescue, Emergency Relief

d) Recovery- to bring the society back to normal
E.g., Temporary Residence, Grants, Medical Care

Students research on the topics by using ICT facilities

1) Importance of First-aid
2) Government Departments and systems for the prevention and risk reduction of natural disasters

Government Departments and systems for the prevention and risk reduction of natural disasters

- Kerala Revenue - Disaster Management Department
- State Disaster Management Authority
- Hazard Vulnerability and Risk Assessment Cell
- Land and Disaster Management Institute

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

Disasters, Natural disasters

Step 3

Note-taking

Disaster Management Cycle, First-aid

Step 4

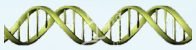
Mapping

Man-made disasters

Step 5

Reflection on the above topics

Ladder III



Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

- What causes the momentum of natural disasters?
- What are the precautions to be taken during a flood?
- What are the causes of floods?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL

(10 Minutes)

Step 1

Presentation

Presentation of the product of self-regulated learning. Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points:
   Disasters
2) Single presentation of the ideas:
   Disaster Management Cycle

Step 2

Peer Assessment

Carried out through the above activities

Step 3

Conclusion

Teacher concluded the learning points.

- Disaster
- Different types of disasters
- Disaster management cycle
- First aid

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

Importance of first aid

Step 2

Reflection on Summary of topic

Man made and Natural Disasters

Step 3

Reflection of the learning process (5 minutes)

a) Summarizing the ideas: Disaster

b) Diagrammatic Representation: Disaster Management Cycle

Overall reflection of the topic: Disaster Management

Step 4

Review Question (4 Minutes)

1) What is a disaster?
2) What are the four stages of the Disaster management cycle?
3) What are the objects in an emergency kit?
4) What is the importance of First-aid?

Step 5

Follow-up activities (2 minutes)

1) Find about the various departments and organizations by the Government for disaster management.
2) Note the precautions required to be taken during floods in the science diary.

References

1) VIIIth std Basic science text books
2) Samagra
3) Teachers handbook
4) https://byjus.com/free-ias-prep/highlights-national-disaster-management-plan/

STD VIII: Basic Science
For the Continuity of Generations

Module 11
Adolescence - Characteristics

Learning Outcomes

- Learner can understand different stages of human development.
- Learner can understand the characteristics of adolescence.
- Learner can understand the physical changes occurring in boys and girls during adolescence.
- Learner can understand the problems of old age.

CLASS I

Ladder I Presentation of the Problem

Step 1

Presentation of the Problem

Chart on Human Developmental Stages

Teacher: Showing a chart on human developmental stages.
Teacher: Where do you place yourself in this?
Students discuss
Teacher: There are different characteristics for each developmental stage. What are the characteristics of your developmental stage?

Step 2

Identification of Facts

1) The various stages of human development are Infancy, Childhood, Adolescence, Adulthood, Old age.
2) Adolescence is a stage of rapid development from childhood to adulthood (11-19 years).
3) Brain development, sudden increase in height and weight, glandular functioning etc. are characteristics of adolescence.
4) Intense mental and emotional changes are also features of adolescence.
5) Physical changes can be seen occurring in boys and girls during adolescence

Step 3

Generation of Ideas

1) Understands the characteristics of adolescence.
2) Physical changes occur to boys and girls during adolescence.
3) Intense mental and emotional changes are features of adolescence.
4) Each developmental stage such as infancy, childhood, adolescence, adulthood, old age has several different characteristics.
5) Understands the characteristic features of old age.

Step 4

Developmental Phase

Activity I Chart on Human Growth - Different Stages (10 Minutes)

Working Groups

Ask to discuss and prepare a report on the characteristics of developmental stages such as Infancy, Childhood, Adolescence, Adulthood and Old age. Students discuss, prepare a report and explain it (by Think-Pair-Share method).

Activity II Flash Card

(16 minutes)

Flash cards on the difference in adolescent boys and girls are given. Students discuss and prepare a report to present it.Students are formed into groups

Physical changes in adolescence

In boys	In girls
Fast growth.	Fast growth.
Growth of sex organs gains momentum.	Growth of sex organs gains momentum.
Hair grows in various parts of the body. (pubic region, armpits, face, chest)	Hair grows in the pubic region and the armpits.
Pitch of the voice deepens.	Pitch of the voice becomes sharp.
Glands in the skin become more active.	Glands in the skin become more active, breast develops.
Shoulder bones expand.	Hip bones widen.
Ejaculation starts.	Menstruation starts.

Students Research on the Topic: Students are asked to enquire about characteristic features of old age.

Hints:

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

- Characteristic features of old age

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

Characteristic features of old age

Step 3

Note-taking

The characteristics of each human developmental stages

Step 4

Mapping

Growth Difference between boys and girls in adolescence

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

Why is the growth in girls higher than boys during adolescence?

Why is adolescence more important than other developmental stages?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL

(10 Minutes)

Step 1

Presentation

Presentation of the product of self-regulated learning. Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points:
   a) Adolescence
   b) Characteristics of adolescence
2) Single presentation of the ideas:
   a) Characteristics of old age
3) Parallel presentation :
   a) Growth differences of boys and girld in adolescence

Step 2

Peer Assessment

Carried out through the above activities
Group Discussion, Single Presentation and Parallel Presentation

Step 3

Conclusion

Teacher concluded the learning points.

Ladder V

Overall Reflection (5 minutes)

Step 1

Reflection on Homework/exercise

- Characteristic features of old age

Step 2

Reflection on Summary of topic

Adolescence- Characteristics

Step 3

Reflection of the learning process (5 minutes)

a. Students present the learned ideas

b. Summarizing the ideas: Characteristics of Adolescence

Overall Reflection of the Topic: Adolescence- Characteristics

Step 4

Review Question (4 Minutes)

1) What are the important characteristics of adolescence?
2) Why is the growth in girls higher than boys during adolescence?
3) What are two features of infancy?

Step 5

Follow-up activities (2 minutes)

1) Prepare importance of an old age home..
2) Prepare a chart of Characteristics of adolescence

References

1) VIIIth std Basic science text books
2) IXth std Basic science text books
3) Samagra
4) Teachers handbook

Module 12
Character Development in Adolescence

Learning Outcomes

- The learner understands different stages of human development.
- The learner explains the characteristics of adolescence.
- The learner explains about the concept of Family.
- The learner understands that there are different types of Families.
- The learner explains the role of family in the character development of adolescents.
- The learner uderstands the importance of school, society, peer groups in the character development.

CLASS I

Ladder I Presentation of the Problem

Step 1

News Report related to Bluewhale Game


പാലക്കാട്ടെ ബിരുദ വിദ്യാർഥിയുടേതും ബ്ലൂവെയ്ൽ ആത്മഹത്യ?; സംശയവുമായി അമ്മ

സ്വന്തം ലേഖകൻ August 20, 2017 08:01 AM IST

Teacher

Recently, some children who played the game called Bluewhale committed suicide. Lack of understanding of the emotional levels of the children and lack of proper guidance are the causes of such issues. Does your family help and guide you with your problems?

Step 2

Identification of Facts

1) Infancy, Childhood, Adolescence, Adulthood and Old age are the various stages of human development.
2) Adolescence is a stage of rapid development from childhood to adulthood (11-19 years).
3) A Family includes the father, mother, children and close relatives.
4) Family is a fundamental unit of society.
5) Universality, Emotional connections, Limited size, Sense of responsibility etc. are the characteristics of a family.

Step 3

Generation of Ideas

1) Understands the characteristics of adolescence.
2) Understands the emotional levels of adolescents.
3) Understands the role of family in the character development of adolescents.
4) There are different types of family: Nuclear family, Extended family, Joint family, etc.
5) Universality, emotional connection, limited size, and sense of responsibility are the hallmarks of a family.
6) Ensuring security, meeting basic needs, providing love and care, and developing good manners etc. are the roles of a family.
7) Family is a fundamental unit of society.
8) Family builds, develops and maintains social relations. Hence it is called the fundamental unit.

Step 4

Developmental Phase

Activity I Story Telling

(10 Minutes)

Collaborative Working Groups

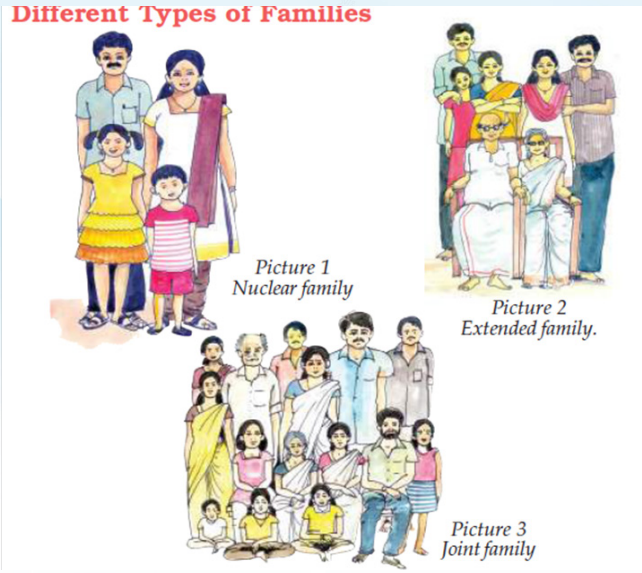
Teacher tells a story.
A story that conveys the importance of family in a child's life.

https://youtu.be/CPm0-edBYnc

The students are asked to tell on what they have learned from this story.

Teacher presents a chart

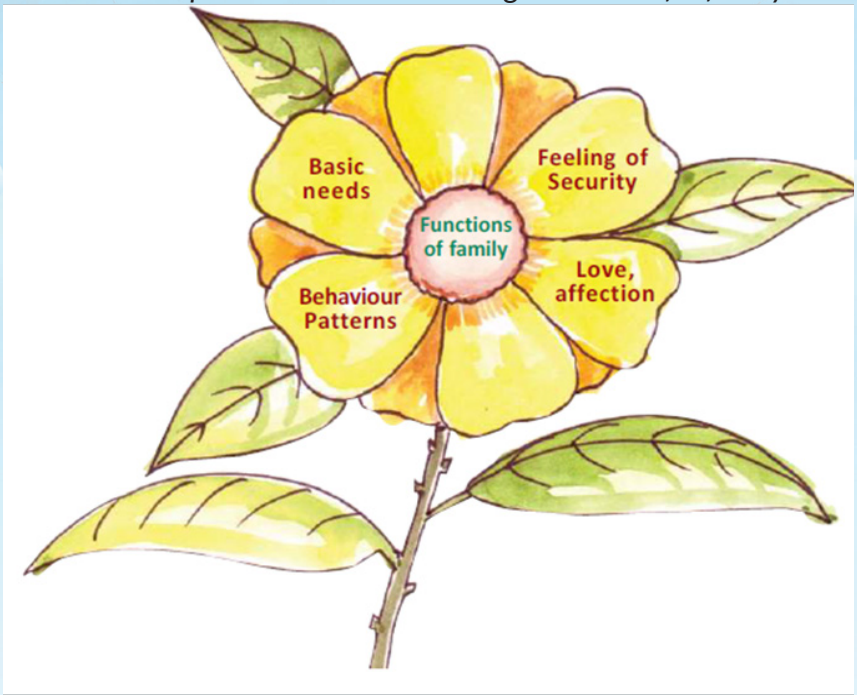
Three main types of families can be seen in the society		
A	B	C
Nuclear Family	Extended Family	Joint Family



Students work in collaborative learning groups (Think, Pair, Share). Students are asked to write down the characteristics of these three types of families.

Activity II Chart on Roles of a Family (16 minutes)

The teacher presents a chart showing the roles of a family.



Students divide in collaborative learning groups. Prepare and present a report on it after discussion.
Ask to find out other factors that helps in the character development of children.
Students Research on the Topic - Other Factors that helps in the character development of children.

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

Role of family in the character development of adolescents

Step 3

Note-taking

Characteristics of Adolescence

Step 4

Mapping

Different Types of Families

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

Family has a major role in the character development of children. Why?

Are there any difference in the character development of boys and girls? Reasons?

What causes the rise in number of nuclear families in the society?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL

(10 Minutes)

Step 1

Presentation

Presentation of the product of self-regulated learning. Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points
   a) Characteristics of adolescence.
   b) Role of family in character development
2) Single presentation of the ideas:
   a) Other factors that helps in character development

Hints:
School
Society
Peer groups

Step 2

Peer Assessment
Carried out through the above activities
Group Discussion and Single Presentation

Step 3

Conclusion
Teacher concluded the learning points.

Ladder V

Overall Reflection (5 minutes)

Step 1

Reflection on Homework/exercise
Other factors that helps in character development

Step 2

Reflection on Summary of topic
Role of family in the character development of adolescents

Step 3

Reflection of the learning process (5 minutes)

a. Students present the learned ideas
b. Summarizing the ideas: Role of family in Adolescence

Overall Reflection of the Topic:
Role of family in the character development of adolescents

Step 4

Review Question

(4 Minutes)

1) Characteristics of adolescence.
2) What is family?
3) What are the roles of a family?
4) How many types of families are there?

Step 5

Follow-up activities

(2 minutes)

1) Prepare a poster depicting the role of family in character development of adolescents.
2) Prepare a description on the role of society in the character development of children.

References

1) VIIIth std Basic science text books
2) IXth std Basic science text books
3) Samagra
4) Teachers handbook
5) https://youtu.be/CPm0-edBYnc

Module 13
Adolescence and Health Problems

Learning Outcomes

- The learner understands the characteristics of adolescence.
- The learner identifies the health problems of adolescents.
- The learner identifies dietary habits required for the growth of adolescents.
- The learner explains about Yoga practices and its importance in adolescence

CLASS I

Ladder I Presentation of the Problem

Step 1

Health Problems in Adolescence

A picture showing the health problems in adolescence is presented.

Teacher:
What are health problems in adolescence?
Do you have any health issues?

Working Groups
(Think, Pair, Share)

Step 2

Identification of Facts

1) Adolescents require nutrition for their physical and mental growth.
2) Lack of proper dietary habits in adolescence can lead to several health problems.
3) Yoga proves to be very important for physical and mental health.
4) Anaemia is caused by the deficiency of Red Blood Cells (RBC) or Haemoglobin.

Step 3

Generation of Ideas

1) Understands about various adolescent health problems such as obesity, cancer, anaemia, mental stress etc.
2) Anaemia is a condition caused by the deficiency in blood or Red Blood Cells or Haemoglobin.
3) Intake of Iron-Folic acid tablets and ensuring nutrients availability can prevent anaemia to some extent.
4) Junk foods, Intoxicants, Chemical drinks etc. results in various health issues in adolescents.
5) Prepares proper guidance for dietary habits that help in adolescent growth.
6) Yoga- is a lifestyle that aims for a healthy mind and body. Yoga helps to promote a balanced physical, mental and spiritual development in humans.
7) Significance of Yoga-
   - Improving the functions of the brain.
   - Decreases mental stress.
   - Lowers blood pressure.
   - Increases Lung capacity.
   - Increases focus and concentration

Step 4

Developmental Phase

Collaborative Working Groups

Activity I

(10 Minutes)

Prepare guidance for the dietary habits to solve the health problems of adolescents.

Hints:
Do not skip Breakfast.
Eat only enough food.
Vitamins, Minerals and Salts that must be included in the diet

Students discuss and prepare a report in collaborative groups. (Jig Saw)

Activity II Video on Yoga Practice (16 Minutes)

A video showing proper dietary habits and the importance of yoga is presented.

https://www.youtube.com/watch?v=k1CZ_np3jjM

Drugs, Pan masala, Marijuana, Internet addiction etc results in various physical and mental health issues. Hence, students are asked to discuss and prepare a report on the importance of Yoga in daily life.

Students Research on the Topic: What foods can be taken in order to solve adolescent health problems? Find out the types of these foods.

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas

Importance of Yoga in adolescents

Step 3

Note-taking

Proper dietary habits in adolescents

Step 4

Mapping

Health problems of adolescents

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

Find out the causes of adolescent health problems

Find out the causes of anaemia in adolescents

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL

(10 Minutes)

Step 1

Presentation

Presentation of the product of self-regulated learning. Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points
   Importance of Yoga in adolescents
2) Parallel presentation of the ideas:
   Guidance for proper dietary habits

Group A	Group B
a) Breakfast is very important. Never skip it in any rush. b) Include fruits, vegetables and pulses in the diet. c) Use sugar and salts in moderate amounts. d) Have home-made drinks such as tender coconut water, porridge, lemonade etc. e) Excessive appetite for foods, restrictions on food etc. affects the health.	a) Right amount at the right time. b) Cut down on fried foods. c) Avoid Fast foods, Junk foods, Bottled drinks etc. d) Cut down on sweets, chocolate, ice cream etc. e) Increase organic farming and its use.

Step 2

Peer Assessment

Carried out through the above activities

Group Discussion and Parallel Presentation

Step 3

Conclusion

Teacher concluded the learning points.

Dietary habits and Health problems in adolescents

Importance of Yoga in adolescents

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

Good food habits

Step 2

Reflection on Summary of topic

Dietary habits and Health problems in adolescents

Step 3

Reflection of the learning process (5 minutes)

a. Students present the learned ideas:
   Adolescence and Health Problems
b. Summarizing the ideas:
   Dietary habits of Adolescence

   Overall Reflection of the Topic:
   Dietary habits and Health problems in adolescents

Step 4

Review Question (4 Minutes)

1) Name any two health problems that affect adolescents.
2) Why is it necessary to include Iron-Folic acid tablets in the diet?
3) Which foods contain Vitamin C?
4) What are the two benefits of Yoga?

Step 5

Follow-up activities (2 minutes)

1) Draw a cartoon based on 'Proper Dietary habit for health'.
2) Visit the nearest Anganvadi and find out about the food items provided by them for the adolescents.

References

1) VIIIth std Basic science text books
2) IXth std Basic science text books
3) Samagra
4) Teachers handbook
5) https://www.youtube.com/watch?v=k1CZ_np3jjM

Module 14
Adolescence- Use of Intoxicants Juvenile Crimes

Learning Outcomes

- Learner can understand different stages of human development.
- Learner can understand the characteristics of adolescence.
- Learner can understand about Internet Addiction and Cyber Crime in the modern world.
- Learner can understand how drug addiction affects the adolescents.
- Learner can understand the role of Counselling centers, Child Help line and Juvenile courts etc. in preventing Juvenile Crimes.

CLASS I

Ladder I Presentation of the Problem

Step 1

Audio (Recording)

Those who initially hope to control their usage when they start to use intoxicants such as tobacco, alcohols, drugs etc. soon succumb to it and gradually become addicted to them. Drug and alcohol abuse also results in family breakdown and social isolation along with the physical harm caused to the individuals. Drug addiction is a disease.

Teacher:
How does this affect adolescents?

Collaborative Working Groups
(Think, Pair, Share)

Step 2

Identification of Facts

1) Infancy, Childhood, Adolescence, Adulthood and Old age are the various stages of human development.
2) Adolescence is a stage of rapid development from childhood to adulthood (11-19 years).
3) Use of intoxicants causes health problems.

Step 3

Generation of Ideas

1) Understands the characteristics of Adolescence.
2) Understands the problems caused by intoxicants such as tobacco, alcohol, drugs etc. in adolescence.
3) Understands that Juvenile crimes are a social issue.
4) Understand about the Juvenile Crimes.

Step 4

Developmental Phase

Activity I (10 Minutes)

Teacher presents a chart in the class.

Problems caused by the use of intoxicants

Items	Problems
Tobacco Alcohol Drugs	Physical and Psychological issues .... Increase in Crimes

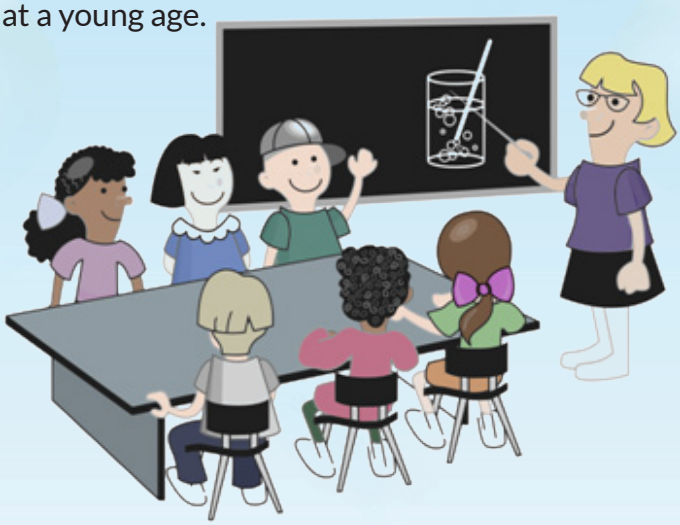
Ask to discuss the health and social issues caused by the use of intoxicants and present them in groups.

Divide the students into Collaborative Learning groups for it.

Activity II Audio- Presentation (16 Minutes)

Juvenile crimes have become a major social issue these days. Crimes committed by children under the age of 18 are known as Juvenile Crimes. Those who commit them are called Juvenile Delinquents.

Find out and write down the various reasons why children become delinquents at a young age.



Collaborative Working Groups
(Think, Pair, Share)

Hints:
Breakdown in family relationships.
Use of intoxicants.
Misuse of visual media.
Collapse of social values.

Children discuss and prepare a report in Collaborative Learning Groups (Jig Saw)

Students research on the Topic:
The schemes in schools to create awareness about Juvenile crimes in adolescents

Hints:
Counseling centers
Juvenile Court
Childline schemes

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas
Adverse effects of intoxicants

Step 3

Note-taking
Counseling centers, Juvenile courts, Child Line

Step 4

Mapping
Problems of toxicants

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

- Find out the reasons why children become delinquents at an early age?
- What are the reasons for the collapse in social values?
- What are the reasons for the addiction of intoxicants in children?

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL (10 Minutes)

Step 1

Presentation

Presentation of the product of self-regulated learning. Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points:
   The role of Counseling centers in preventing Juvenile crimes
2) Single presentation of the ideas:
   The adverse effects of the use of intoxicants in children

Step 2

Peer Assessment

Carried out through Question Answering

Group A	Group B
a) The toxic substance in tobacco? Answering c) The disease caused by Internet addiction?	Answering b) The disease caused by Alcohol Consumption Answering

Peer Assessment is carried out through the above activities.

Step 3

Conclusion

Teacher concluded the learning points.

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise

Projects for Awareness about Juvanile Crimes

Step 2

Reflection on Summary of topic

Juvanile Crimes

Step 3

Reflection of the learning process (5 minutes)

a. Students present the learned ideas

b. Summarizing the ideas: The health and social issues caused by the use of intoxicants

Overall Reflection of the Topic:
Counseling centers, Juvenile Courts, Child Guidance etc.
Causes for the rise in juvenile crimes.

Step 4

Review Question (4 Minutes)

1) World Anti-Drug Day.
2) Name any two Adverse effects of intoxicants.
3) The role of counseling centers in schools.
4) Name any two schemes for Adolescents.

Step 5

Follow-up activities (2 minutes)

1) Prepare Anti-Drug Posters.
2) Prepare a note on Cyber Crime.

References

1) VIIIth std Basic science text books
2) IXth std Basic science text books
3) Samagra
4) Teachers handbook

Module 15
IVF- In Vitro Fertilisation

Learning Outcomes

- The learner understands the concept of reproduction.
- The learner explains about the male and female reproductive organs.
- The learner understands about 'infertility'.
- The learner understands the causes of infertility in males and females.
- The learner understands about IVF- In Vitro Fertilisation.

CLASS I

Ladder I Presentation of the Problem

Step 1

Illustration

Display illustration. A couple is about to get divorced. Before the divorce, they consult a gynecologist. What do you understand from this illustration?

Their inability to have children due to infertility is the cause of their divorce. How can we suggest a solution to this problem?

Participants work in collaborative learning groups to identify the problem

Step 2

Identification of Facts

Reproduction: The process of production of offspring that are biologically and genetically similar to the parent is called reproduction.

Infertility: The inability of a couple to conceive after regular unprotected sex is called infertility.

IVF: IVF is a complex procedure used to prevent genetic disorders or aid with pregnancy to aid reproduction.

Step 3

Generation of Ideas

1. Female Reproductive Organs: Ovary, Fallopian tube, Uterus, Endometrium, Vagina.
2. Male Reproductive Organs: Vas deferens, Prostate gland, Penis, Testis.
3. Causes of infertility in males and females.
   - Damages to Fallopian tubes.
   - Disorders in Ovulation.
   - Endometriosis.
   - Uterine tumors.
   - Disorders in production or function of sperms.
   - Genetic Disorders.

During IVF, the full-grown ovum is collected from the ovary and is fertilized with the sperm in the laboratory. The embryo formed after fertilization is transferred to the uterus.

Step 4

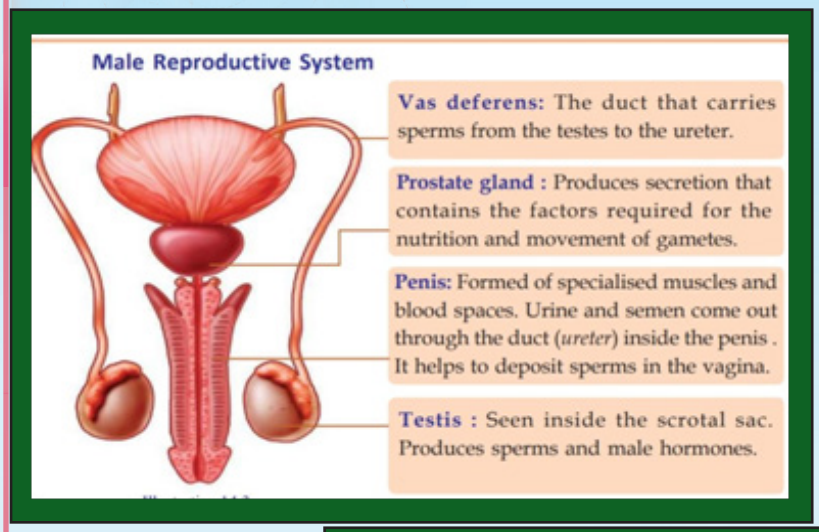
Developmental Phase

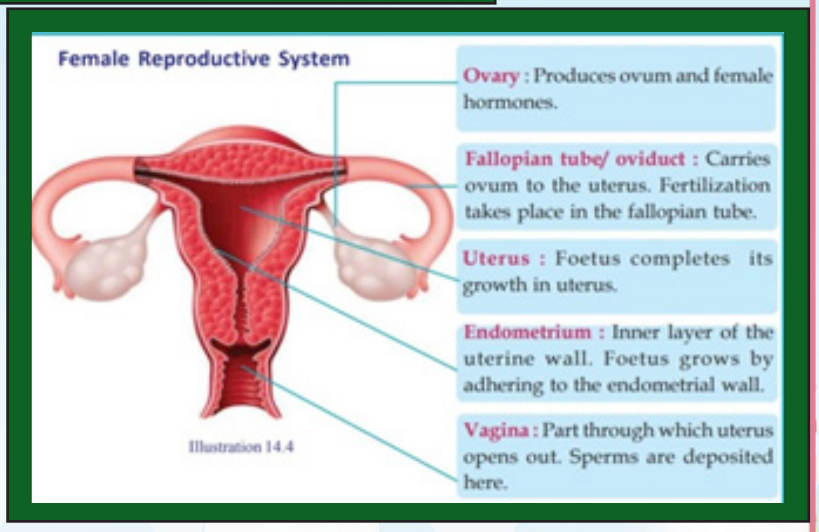
Collaborative Working Groups

Activity I Picture

(10 Minutes)

Display a Picture showing Male and Female Reproductive System.





Hints:
Reproduction
Human reproduction
(Video Link-Samagra)

Discuss about the Male and Female reproductive organs in collaborative groups and prepare a report. (Jig saw)

Activity II Video related to IVF

(16 Minutes)

https://www.youtube.com/watch?v=JYYEtp0MxKs

Students are asked to discuss and prepare a report on a video related to IVF in collaborative groups.

Students research on the Topic:
IVF (Invitro Fertilization)

CLASS II

Step 5

Reflection: Students reflect on perceived ideas (3 minutes)

Ladder II

Empowering Self-Regulated Learning (SRL)

Step 1

Self Directed Learning

SRL activities (10 minutes)

Step 2

Summarizing the ideas
Human Reproduction

Step 3

Note-taking
Infertility and IVF

Step 4

Mapping
Invitro Fertilization

Step 5

Reflection on the above topics

Ladder III

Group Discussion Phase (10 minutes)

Preparation stage for Ladder IV

Step 1

Participants meeting

Step 2

Reasoning about the topic

- Find the causes of Female infertility
- Find the causes of Male infertility

Step 3

Preparation of Report

Ladder IV

Presentation of product of the SRL (10 Minutes)

Step 1

Presentation

Presentation of the product of self-regulated learning. Participants are expected to present the products of self-regulated learning activities such as;

1) Discussion of learning points:
   Female Reproductive system
   Male Reproductive system
2) Parallel presentation of the ideas:
   Infertility and IVF

Step 2

Peer Assessment
Carried out through a Quiz Programme

Group A	Group B
1) The first child born in India through IVF 2) Vitamins related to Reproduction	1) The year of first Childbirth through IVF 2) A cause for Infertility

Peer Assessment is carried out through the above activities.

Step 3

Conclusion
Teacher concluded the learning points.

Ladder V

Overall Reflection

(5 minutes)

Step 1

Reflection on Homework/exercise
IVF

Step 2

Reflection on Summary of topic
Human Reproduction

Step 3

Reflection of the learning process (5 minutes)

Infertility, IVF

Step 4

Review Question (4 Minutes)

1) What is Reproduction?
2) What is Infertility?
3) The causes of Infertility.
4) Vitamins related to reproduction.

Step 5

Follow-up activities (2 minutes)

1) Find out major stages of IVF
2) Find out health reports related to IVF

References

1) VIIIth std Basic science text books
2) IXth std Basic science text books
3) Samagra
4) Teachers handbook
5) https://www.youtube.com/watch?v=JYYEtp0MxKs

SPACE FOR ROUGH WORKS

SPACE FOR ROUGH WORKS

Appendix IV

FAROOK TRAINING COLLEGE

Affiliated to University of Calicut

RATING SCALE FOR EVALUATING CPBL MODULES

No.	Dimensions	Low	Medium	High
1	Appropriate content			
2	Inter-disciplinary in nature			
3	Starts from problems /issues			
4	presentations is simple			
5	Activity based learning			
6	It is comprehensive			
7	students works in collaborative learning groups			
8	Content presentations is sequential			
9	Students research, reason and reflects on contents			
10	It facilitates Problem solving			
11	It facilitates Critical thinking			
12	Possibilities for Emotion regulation			
13	I t has the ability to create motivation and sustain interest			
14	follows principles of Problem Based Learning			

Appendix V

FAROOK TRAINING COLLEGE

Affiliated to University of Calicut

Lesson Transcript of Existing Method of Teaching (Malayalam)

Linisha C.K
Research Scholar
Research Centre in Education
Farook Training College

Dr. Fathima Jaseena M.P.M
(*Supervising Teacher*)
Assistant Professor
Farook Training College

Name of Teacher	: Linisha C.K	Name of School	: GVHSS Madappally
Subject	: Biology	Std	: VIII
Unit	: Let's Regain Our Fields	Date	:
Topic	: Food Security	Time	:

Lesson Plan

പഠന നേട്ടങ്ങൾ

1. ഭക്ഷ്യ ദൗർലഭ്യം, ഭക്ഷ്യസുരക്ഷ എന്നീ ആശയങ്ങൾ വിശദീകരിക്കാൻ സാധിക്കുന്നു.
2. ഭക്ഷ്യ ദൗർലഭ്യത്തിന്റെ കാരണങ്ങൾ വിശദീകരിക്കാൻ കഴിയുന്നു.

ആശയങ്ങൾ

1. എല്ലാവർക്കും ആരോഗ്യകരമായ ജീവിതം നയിക്കുന്നതിനു വേണ്ട ഭക്ഷണം ആവശ്യാനുസരണം ലഭ്യമാകുന്ന സാഹചര്യമാണ് ഭക്ഷ്യ സുരക്ഷ. ദാരിദ്ര്യ ഭീതിയോ പോഷകക്കുറവു കൊണ്ടുള്ള ആരോഗ്യ പ്രശ്നങ്ങളോ ഇല്ലാത്ത ഒരു സമൂഹ സൃഷ്ടിക്ക് ഭക്ഷ്യ സുരക്ഷ ഉറപ്പു വരുത്തേണ്ടത് അനിവാര്യമാണ്.
2. ഭക്ഷ്യ സുരക്ഷയുടെ പ്രധാനപ്പെട്ട ഘടകങ്ങൾ ലഭ്യത, ഉപയോഗം എന്നിവയാണ്.
3. ദാരിദ്ര്യം, ആരോഗ്യ പ്രശ്നങ്ങൾ എന്നിവയില്ലാതെ ഒരു ആരോഗ്യമുള്ള സമൂഹത്തെ വാർത്തെടുക്കാൻ ഭക്ഷ്യസുരക്ഷ നേടിയെടുക്കേണ്ടത് അത്യാവശ്യമാണ്.
4. കൃഷിഭൂമി നികത്തപ്പെടുന്ന ഈ കാലഘട്ടത്തിൽ ഭക്ഷ്യസുരക്ഷ നേടിയെടുക്കുക എന്നത് വളരെ പ്രയാസമേറിയതാണ്.
5. കൃഷിയെ സ്നേഹിക്കുകയും, കൃഷിയെന്ന സംസ്കാരം രൂപപ്പെടേണ്ടതും വളരെ അത്യാവശ്യമാണ്.

6. നികത്തപ്പെട്ട കൃഷിഭൂമികൾ വീണ്ടെടുക്കേണ്ടത് വളരെ പ്രധാനമാണ്.
7. വളരെ സമഗ്രമായ സമീപനം കൃഷിയോടുണ്ടെങ്കിൽ മാത്രമേ ഭക്ഷണത്തിന് വേണ്ടി അന്യസംസ്ഥാനങ്ങളെ ആശ്രയിക്കുന്നത് നമുക്ക് കുറയ്ക്കാനാവുകയുള്ളൂ.

Process Skills

1. നിരീക്ഷണം
2. തരംതിരിക്കൽ
3. ആശയ വിനിമയം
4. നിഗമനം

മൂല്യങ്ങളും മനോഭാവങ്ങളും

1. കൃഷി ചെയ്യുന്നതിനുള്ള മനോഭാവം രൂപപ്പെടുന്നു
2. കർഷകനെ കൃഷിയിൽ സഹായിക്കാനും കർഷകരെ ആദരിക്കുന്നതിനുമുള്ള മനോഭാവം ഉണ്ടാകുന്നു.

പഠന തന്ത്രങ്ങൾ

1. ഗ്രൂപ്പ് ചർച്ച
2. നിരീക്ഷണക്കുറിപ്പ് തയ്യാറാക്കൽ
3. വിവരണം തയ്യാറാക്കൽ
4. പോസ്റ്റർ നിർമ്മാണം
5. ചോദ്യാവലി തയ്യാറാക്കൽ

മുന്നറിവ്

- ഭൂമിയിലെ ഉൽപാദകർ സസ്യങ്ങളാണ്.
- കൃഷി ചെയ്യുന്നതിലൂടെ ഉൽപ്പാദനം വർദ്ധിക്കുന്നു.

പ്രതീക്ഷിക്കുന്ന ഉൽപ്പന്നങ്ങൾ

1. ബംഗാളിലെ ക്ഷാമത്തിന്റെ വീഡിയോ - നിരീക്ഷണക്കുറിപ്പ്
2. പോസ്റ്റർ - ഭക്ഷ്യ സുരക്ഷയുടെ പ്രാധാന്യം കാണിക്കുന്ന പോസ്റ്റർ
3. കർഷകരെ അഭിമുഖം നടത്തുന്നതിനുള്ള ചോദ്യാവലി

പഠന പ്രവർത്തനങ്ങൾ

Introductory Activities	Assessment
കുട്ടികളുടെ ശ്രദ്ധ നേടിയെടുക്കുന്നതിനായി ടെക്സ്റ്റ് ബുക്കിലെ പേപ്പർ റിപ്പോർട്ട് വായിക്കുന്നു. ചർച്ചയ്ക്കു ശേഷം കുട്ടികൾ ഭക്ഷ്യ സുരക്ഷ എന്ന ആശയത്തിലേക്കെത്തുന്നു. ഭക്ഷ്യസുരക്ഷ (BB)	ഈ പേപ്പർ റിപ്പോർട്ട് എന്തിനെക്കുറിച്ചാണ്? ഭക്ഷ്യസുരക്ഷാ ബില്ലിനെക്കുറിച്ചാണ് പേപ്പർ റിപ്പോർട്ട് പ്രതിപാദിക്കുന്നതെന്ന് കുട്ടികൾ ഉത്തരം നൽകുന്നു.

Developmental Activity

Activity I	Assessment
ടീച്ചർ ടെക്സ്റ്റ് ബുക്കിലെ പട്ടിക (8.1) കാണിക്കുന്ന ചാർട്ട് പ്രദർശിപ്പിക്കുന്നു. പട്ടിക വിശകലനം ചെയ്ത് വിവരണം തയ്യാറാക്കുന്നതിനുള്ള പ്രവർത്തനം നൽകുന്നു.	കുട്ടികൾ പട്ടിക വിശകലനം ചെയ്ത് വിവരണം തയ്യാറാക്കുന്നു.
Activity II	
ടീച്ചർ ബംഗാളിൽ ഉണ്ടായ ക്ഷാമത്തെക്കുറിച്ച് വിശദീകരിക്കുന്നു. (Video Presentation) [Samagra - Bangal Famine] ഇങ്ങനെ ഭക്ഷ്യ ദൗർലഭ്യം ഉണ്ടാകാനുള്ള കാരണങ്ങൾ എന്തെല്ലാമാകാം?	കുട്ടികൾ കുറിപ്പ് തയ്യാറാക്കുന്നു.

Codification

ടീച്ചർ ടെക്സ്റ്റ് ബുക്കിന്റെ സഹായത്തോടെ ക്രോഡീകരിക്കുന്നു.

- ഭക്ഷ്യ ദൗർലഭ്യത്തിന്റെ കാരണങ്ങൾ
- ഭക്ഷ്യ സുരക്ഷയുടെ പ്രാധാന്യം

Concluding Activity

ടീച്ചർ കുട്ടികളോട് ഭക്ഷ്യ സുരക്ഷയുടെ പ്രാധാന്യം കാണിക്കുന്ന പോസ്റ്റർ തയ്യാറാക്കാൻ പറയുന്നു.

തുടർ പ്രവർത്തനങ്ങൾ

1. നിങ്ങളുടെ പഞ്ചായത്തിലെ ഏറ്റവും നല്ല കർഷകനെ ആദരിക്കുക.
2. കൃഷിഭൂമി നികത്തുന്നതിനെക്കുറിച്ചും, ഭക്ഷ്യ സുരക്ഷയുടെ പ്രാധാന്യത്തെക്കുറിച്ചും കർഷകരുമായി അഭിമുഖം നടത്തുന്നതിനാവശ്യമായ ചോദ്യാവലി തയ്യാറാക്കുക?

Appendix VI

FAROOK TRAINING COLLEGE

Affiliated to University of Calicut

Lesson Transcript of Existing Method of Teaching (Malayalam)

Linisha C.K
Research Scholar
Research Centre in Education
Farook Training College

Dr. Fathima Jaseena M.P.M
(*Supervising Teacher*)
Assistant Professor
Farook Training College

Name of Teacher	: Linisha C.K	Name of School	: GVHSS Madappally
Subject	: Biology	Std	: VIII
Unit	: Let's Regain Our Fields	Date	:
Topic	: Food Security	Time	:

Lesson Plan

Learning Objectives

1. Explain concepts like Food scarcity and food security
2. Describe the reasons for food scarcity

Concepts

1. Food security is the condition where everyone gets adequate food to lead a healthy life. To ensure a society without poverty fear and malnutrition it is important to guarantee food security to the population.
2. Availability and use are the important components of food security
3. In order to develop a society without poverty and health issues attaining food security is essential
4. In a time in which agricultural and are getting destroyed achieving food security is a difficult task
5. It is very important to love agriculture and to develop agricultural culture.
6. We need to regain destroyed agricultural lands
7. We can decrease the dependence on other states only by undertaking a comprehensive attitude towards agriculture

Process Skills

1. Observation
2. Differentiating
3. Communication
4. Conclusion

Values and Attitudes

1. Develop an attitude to do farming
2. Nurture value to respect and help farmers

Learning Techniques

1. Group discussion
2. Prepare observation notes
3. Prepare a description note
4. Poster making
5. Create questionnaire

Previous Knowledge

- Plants are the producers in earth
- Production increases through agriculture

Expected Products

1. Video of Bengal famine- observation note
2. Poster- indicating the importance of food security
3. Questionnaire to conduct interviews with farmers

Learning Activities

Introductory Activities	**Assessment**
Reading the paper report in the textbook to gather the attention of students. After discussion students reaching to the idea of food security 'Food security' (BB)	what is the theme of this news report? Students answers that, the news report is about the food security Bill.

Developmental Activity

Activity I	Assessment
Teacher shows table 8.1 from the text book and gives exercise to prepare report after analysing eth table	Students give reports on the table after analysis
Activity II	
Teacher explains about Benga famine (Video presentation), (Samagra- Bengal famine) What will be the reason for such famines?	Students prepare notes

Codification

Teacher codifies with the help of textbook.

- Reasons for food scarcity
- Importance of food security

Concluding Activity

Teacher instructs students to prepare a poster showing eth importance of attaining food security

Follow-up Activities

1. Honour a farmer in your panchayat
2. Prepare a questionnaire to conduct interviews with farmers on destroying agricultural lands and on the importance of food security

Appendix VII

FAROOK TRAINING COLLEGE

Affiliated to University of Calicut

ACADEMIC MOTIVATION SCALE

(MALAYALAM- DRAFT)

Linisha C.K
Research Scholar
Research Centre in Education
Farook Training College

Dr. Fathima Jaseena M.P.M
(*Supervising Teacher*)
Assistant Professor
Farook Training College

പേര്:.....ആൺ/പെൺ:.....

സ്കൂളിന്റെ പേര്:.....ക്ലാസ്സ്&ഡിവിഷൻ:.....

നിർദ്ദേശങ്ങൾ

നിങ്ങളുടെ അക്കാദമിക അഭിപ്രേരണയുമായി ബന്ധപ്പെട്ട ചില പ്രസ്താവന കളാണ് താഴെ കൊടുത്തിരിക്കുന്നത്. പ്രസ്താവനകൾ സസൂക്ഷ്മം വായിച്ച് അവയ്ക്ക് ഓരോന്നിനുമുള്ള പ്രതികരണം രേഖപ്പെടുത്തുക. ഗവേഷണ ആവശ്യ ത്തിന് മാത്രമേ ഈ വിവരങ്ങൾ ഉപയോഗിക്കുകയുള്ളൂ. ഓരോ പ്രസ്താവനക്കും ശരിയായ പ്രതികരണം രേഖപ്പെടുത്തുക.

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
1.	പഠന വിഷയങ്ങളുമായി ബന്ധപ്പെട്ട കാര്യങ്ങൾ മനസ്സി ലാക്കുന്നതിന് ഇന്റർനെറ്റ്, വർത്തമാനപത്രങ്ങൾ എന്നിവ ഉപയോഗപ്പെടുത്താറുണ്ട്.					
2.	പഠനത്തിൽ മികവുപുലർത്തുന്നതിന് ട്യൂഷൻ, ഓൺലൈൻ ട്യൂഷൻ, ലേണിംഗ് ആപ്പുകൾ എന്നിവ ഉപ യോഗപ്പെടുത്താറില്ല.					
3.	ലോകകാര്യങ്ങൾ, വികസനം, നേട്ടങ്ങൾ എന്നിവയു മായി ബന്ധപ്പെട്ട പുതിയകാര്യങ്ങൾ സ്വയം കണ്ടെത്തു ന്നതിൽ താൽപര്യം തോന്നാറുണ്ട്.					
4.	പാഠഭാഗങ്ങളിൽ സംശയമുള്ള കാര്യങ്ങൾ അധ്യാപക രോട് ചോദിച്ച് ആഴത്തിൽ പഠിക്കാൻ ശ്രമിക്കാറില്ല.					
5.	അധിക വായനയ്ക്ക് സ്കൂൾ ലൈബ്രറി ഉപയോഗപ്പെടു ത്താറുണ്ട്.					
6.	പരീക്ഷകളിൽ ഉയർന്ന മാർക്ക്/ഗ്രേഡ് വാങ്ങാൻ ശ്രമി ക്കാറില്ല.					

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
7.	വളരെ വിഷമം പിടിച്ച ഹോംവർക്കുകൾ സ്വയം ചെയ്തുതീർക്കാൻ ശ്രമിക്കാറുണ്ട്.					
8.	പല നവീന വിഷയങ്ങളുമായി ബന്ധപ്പെട്ട ലേഖനങ്ങളും, മാഗസിനുകളും വായിച്ച് മത്സരപരീക്ഷകളിൽ വിജയിക്കാൻ ശ്രമിക്കാറില്ല.					
9.	അധ്യാപകർ പഠിപ്പിച്ച കാര്യങ്ങൾ മനസ്സിലാവാതിരുന്നാൽ അത് എന്റെ മാർക്കിനെ ബാധിക്കുമെന്നതിനാൽ ചോദിച്ചുമനസ്സിലാക്കാറുണ്ട്.					
10.	ഓരോ പരീക്ഷയിലും ഗ്രേഡുകൾ മെച്ചപ്പെടുത്താൻ ക്രമിക്കാറില്ല.					
11.	സ്കൂളിൽ പൂന്തോട്ടം, പച്ചക്കറിതോട്ടം മുതലായവ നിർമ്മിക്കുന്നതിനും അവ പരിപാലിക്കുന്നതിനും താൽപര്യം പ്രകടിപ്പിക്കാറുണ്ട്.					
12.	രക്തദാന ക്യാമ്പ്, നേത്രരോഗനിർണയ ക്യാമ്പ്, കൊതുകുനിവാരണവുമായി ബന്ധപ്പെട്ട ക്യാമ്പ് തുടങ്ങിയ പ്രവർത്തനങ്ങളിൽ പങ്കെടുക്കാറില്ല.					
13.	ശാസ്ത്രപ്രദർശനങ്ങൾ, ക്വിസ്, വിവിധ മത്സരങ്ങൾ എന്നിവ സംഘടിപ്പിക്കുന്നതിനും അതിൽ പങ്കുചേരുന്നതിനും താൽപ്പര്യപ്പെടാറില്ല.					
14.	പഠനയാത്രകൾ സംഘടിപ്പിക്കുന്നതിനും ഫീൽഡ് വിസിറ്റ്, ഹൗസ് വിസിറ്റ് തുടങ്ങിയ നടത്താനും ശ്രമിക്കാറില്ല.					
15.	സ്കൂളിലെ കലാ കായിക പ്രവർത്തനങ്ങളിൽ പങ്കുചേരാൻ ഇഷ്ടമാണ്.					
16.	അധ്യാപകരിൽ നിന്നും സമ്മാനങ്ങൾ നേടാൻ വേണ്ടി നല്ല വണ്ണം പഠിക്കാൻ ശ്രമിക്കാറില്ല.					
17.	സമൂഹ ശ്രദ്ധപിടിച്ചുപറ്റുന്നതിന് വേണ്ടി പല നല്ല പൊതുപ്രവർത്തനങ്ങളിലും പങ്കുചേരാറുണ്ട്.					
18.	സമൂഹത്തിലെ മാറ്റങ്ങൾക്കനുസരിച്ച് തൊഴിൽ മേഖലകൾ തെരഞ്ഞെടുക്കാൻ താൽപ്പര്യം പ്രകടിപ്പിക്കാറില്ല.					
19.	നിരന്തര മൂല്യനിർണയമുള്ളതിനാൽ പഠിച്ചില്ലെങ്കിലും പരീക്ഷ എഴുതാറുണ്ട്.					
20.	അധ്യാപകരുടെ ശ്രദ്ധയും പരിഗണനയും നേടിയെടുക്കാൻ വേണ്ടി പല പാഠ്യേതര പ്രവർത്തനങ്ങളിലും പങ്കെടുക്കാൻ ശ്രമിക്കാറില്ല.					
21.	ഉയർന്ന പദവിയിലിരിക്കുന്ന ആളുകളെ കാണുമ്പോൾ അവരെപ്പോലെയാകണമെന്ന് ചിന്തിക്കാറുണ്ട്.					

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
22.	മികച്ച വിജയം നേടുന്നതിനായി പരീക്ഷാസമയങ്ങളിൽ പഠനക്രമം ചിട്ടപ്പെടുത്താൻ ശ്രമിക്കാറില്ല.					
23.	മഹാന്മാരുടെ ജീവിതകഥകൾ വായിക്കുമ്പോൾ അതിൽനിന്നും പ്രചോദനം ഉൾക്കൊള്ളാറുണ്ട്.					
24.	ക്ലാസിൽ മറ്റു കുട്ടികൾക്ക് മാതൃകയാവാൻ ശ്രമിക്കാറില്ല.					
25.	സ്കൂളിലെ ഏറ്റവും നല്ല വിദ്യാർത്ഥികൾക്കുള്ള അവാർഡ് വാങ്ങാൻ വേണ്ട പ്രവർത്തനങ്ങൾ ചെയ്യാറുണ്ട്.					
26.	രക്ഷിതാക്കളുടെ നിർബന്ധപ്രകാരം മിടുക്കരായ കുട്ടികളെപ്പോലെ പഠിക്കാൻ ശ്രമിക്കാറില്ല.					
27.	മറ്റുള്ളവരുടെ അംഗീകാരം ലഭിക്കുന്നതിനുവേണ്ടി ക്ലാസ്സിലെ ചീത്ത കൂട്ടുകെട്ടുകളിൽ നിന്നും ഒഴിഞ്ഞുമാറാൻ ശ്രമിക്കാറുണ്ട്.					
28.	അംഗീകാരം കിട്ടാൻ വേണ്ടി സമർത്ഥരായ കുട്ടികളുടെ കൂടെ ചങ്ങാത്തം കൂടാൻ ശ്രമിക്കാറുണ്ട്.					
29.	നല്ല വ്യക്തിത്വത്തിന് ഉടമയാകണമെന്ന് തോന്നാറില്ല.					
30.	ഒഴിവുസമയം പോലും പഠനപ്രവർത്തനങ്ങൾക്കായി ഉപയോഗിക്കാൻ ശ്രമിക്കാറുണ്ട്.					
31.	വിദ്യാഭ്യാസത്തേക്കാൾ കൂടുതൽ ഭാഗ്യത്തിനാണ് ഞാൻ പ്രാധാന്യം നൽകുന്നത്.					
32.	ജീവിതത്തിലെ വിലപ്പെട്ട സമയം വിദ്യാഭ്യാസത്തിലൂടെ നഷ്ടപ്പെടുമെന്ന തോന്നലുണ്ട്.					
33.	ഭാവിജീവിതം സുരക്ഷിതമാക്കാനുള്ള അടിത്തറ സ്കൂൾ വിദ്യാഭ്യാസത്തിലൂടെ നേടാമെന്ന് കരുതുന്നു.					
34.	നല്ല വ്യക്തിക്കുമാത്രമേ ഉയരാൻ കഴിയൂവെന്ന് വിശ്വസിക്കുന്നു.					
35.	പഠനപ്രവർത്തനങ്ങളിൽ എന്റെ അഭിപ്രായങ്ങൾക്ക് അംഗീകാരം കിട്ടാതിരുന്നാൽ വിഷമിക്കാറുണ്ട്.					
36.	ഐ.സി.ടി ഉപയോഗിച്ച് ക്ലാസെടുക്കുന്നതുകൊണ്ട് പാഠഭാഗങ്ങൾ നല്ലവണ്ണം മനസ്സിലാക്കാൻ കഴിയാറുണ്ട്.					
37.	മത്സരപരീക്ഷകളിൽ വിജയം നേടുന്നതിന് കൂടുതൽ സമയമിരുന്ന് പഠിക്കാറില്ല.					
38.	പാഠഭാഗങ്ങൾ ഓർമ്മിച്ചെടുക്കാൻ വേണ്ടി പല പഠനതന്ത്രങ്ങളും ഉപയോഗിക്കാറുണ്ട്.					

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
39.	എന്റെ സുഹൃത്തുക്കളേക്കാൾ കൂടുതൽ എല്ലാ കാര്യങ്ങളും എനിക്കറിയാം എന്ന ധാരണയുണ്ട്.					
40.	ജീവിതത്തിൽ നേടിയെടുക്കാൻ കഴിയാത്തതായി ഒന്നും തന്നെയില്ലെന്നാണ് എന്റെ വിശ്വാസം.					
41.	പരിശ്രമത്തിലൂടെ എല്ലാ പ്രശ്നങ്ങളും പരിഹരിക്കാൻ കഴിയുമെന്ന ധാരണയില്ല.					
42.	വീട്ടിൽ സാമ്പത്തിക ബുദ്ധിമുട്ടുണ്ടെങ്കിലും പഠനത്തിൽ പിന്നോക്കമാവാതിരിക്കാൻ ശ്രമിക്കാറുണ്ട്.					
43.	സിനിമയിൽ കാണുന്ന ഉയർന്ന വ്യക്തിത്വങ്ങളെ അനുകരിക്കാൻ ശ്രമിക്കാറുണ്ട്.					
44.	ചില വിഷയങ്ങൾ പഠിക്കുന്നത് മനസ്സിലായില്ലെങ്കിലും, സ്വയം പഠിക്കാൻ ശ്രമിക്കാറുണ്ട്.					
45.	ഐ.എ.എസ്, ഐ.പി.എസ് ഉദ്യോഗസ്ഥരെ പ്പോലെ സമൂഹത്തിന് പ്രാധാന്യം നൽകുന്ന ജോലി നേടിയെടുക്കണമെന്ന് ചിന്തിക്കാറില്ല.					
46.	ഓരോ പ്രവർത്തനങ്ങളും ഉത്സാഹത്തോടെയാണ് ചെയ്ത് തീർക്കുന്നത്.					
47.	മറ്റുള്ളവരിൽ നിന്ന് പ്രോത്സാഹനം ലഭിക്കുമ്പോൾ കൂടുതൽ പഠിക്കാൻ ശ്രമിക്കാറില്ല.					
48.	പുസ്തകങ്ങൾ, നോട്ടുബുക്കുകൾ എന്നിവ വൃത്തിയായി സൂക്ഷിക്കാറില്ല.					
49.	വീട്ടിലെ അന്തരീക്ഷത്തേക്കാൾ സ്കൂളിലെ ഓരോ നിമിഷവും എനിക്ക് സന്തോഷം നൽകാറുണ്ട്.					
50.	സ്കൂളിലെ ഓരോ നിയമവും പാലിക്കുന്നതിൽ ഞാൻ ശ്രദ്ധിക്കാറില്ല.					

Appendix VIII

FAROOK TRAINING COLLEGE

Affiliated to University of Calicut

ACADEMIC MOTIVATION SCALE

(ENGLISH- DRAFT)

Linisha C.K
Research Scholar
Research Centre in Education
Farook Training College

Dr. Fathima Jaseena M.P.M
(*Supervising Teacher*)
Assistant Professor
Farook Training College

Name of Student:..... Gender:.....

Name of School:..... Class & Div:.....

Instructions

The objective of this scale is to measure your academic motivation. Read the statements given below carefully and mark your response. It is assured that the data collected shall be used only for research purposes. Please indicate your level of agreement or disagreement with each of these statements.

Sl No.	Statements	Strongly Agree	Agree	Neutral	Strongly Disagree	Disagree
1	I make use of internet and newspapers for academic purposes.					
2	I do not prefer private tuitions or online tuitions or learning apps to improve studies.					
3	I am always interested to know the new things related to world affairs, progress and developments by myself.					
4	I hardly approach my teachers for doubt-clearance and for having a deep understanding of subject.					
5	I usually utilize my school library for extra reading.					
6	I do not aim to achieve good marks or grades in examination.					
7	I usually try to solve a difficult homework by myself.					
8	I rarely read articles and magazines on advanced topics with the aim of getting qualified in competitive exams.					

Sl No.	Statements	Strongly Agree	Agree	Neutral	Strongly Disagree	Disagree
9	If I don't understand what the teachers have taught me, I ask questions because it affects my marks.					
10	I don't try to score better grades in examination.					
11	I am interested in making and maintaining flower and vegetable gardens in school compound.					
12	I do not actively become a part of collective activities such as blood donation camps, eye camps, activities organised as a movement toward mosquito control.					
13	I am not keen-on either conducting or participating in various events like science exhibitions, quiz competitions.					
14	I do not make an extra effort to conduct study tours, field visits, house visits, etc.					
15	I like being a part of extra-curricular activities held in schools.					
16	I don't try to study well to get incentive gifts from teachers.					
17	I usually engage in various social activities so as to have a good name in society.					
18	I do not choose my career path based on current social trends.					
19	I think I can attend my exams even without preparation as continuous assessments are frequent these days.					
20	I do not make it a point to take part in co-curricular activities just for gaining the attention and appreciation of my teachers.					
21	Whenever I come across someone of high rank and eminence, I normally think I should be like them.					

Sl No.	Statements	Strongly Agree	Agree	Neutral	Strongly Disagree	Disagree
22	I do not attempt to be systematic in studies even when exams are around the corner.					
23	It inspires me a lot whenever I look through the life of great personalities of the world.					
24	I will never try to be a role model for my classmates.					
25	I generally try to do things that help me to get the best student award in school.					
26	I have never tried to compete with the other bright students of my classroom even if my parents compel me to do so.					
27	I always try to avoid toxic friendships fearing bad reputation.					
28	I always ensure that I surround myself with good students for good reputation.					
29	I do not find it necessary to have a good character and persona all the time.					
30	I usually spend even my free time for academic activities.					
31	I give much importance to good fortune rather than good education.					
32	I have this firm belief that spending a major part of one's life for education is needless.					
33	I do not think that the education we get from schools will make our future secure.					
34	I do not believe that only a good person can succeed in life.					
35	I feel bad when others do not approve my suggestions regarding academic activities.					
36	I understand my lessons in a much better way with help of ICT in teaching.					
37	I don't spend extra time for reading so as to appear in competitive exams.					

Sl No.	Statements	Strongly Agree	Agree	Neutral	Strongly Disagree	Disagree
38	I often use various techniques that help me memorize what I learn.					
39	I always assume that I know things better than my friends no matter what.					
40	I firmly believe that it is not impossible to achieve whatever we want in life.					
41	I do not really think that we must face the hurdles in our path and work on it with determination so as to move forward.					
42	I try hard not to go backward in my studies even when I face financial problems at home.					
43	I like imitating some legendary movie stars.					
44	Even though I find it hard to understand certain subjects, I attempt to learn it by myself.					
45	I have never thought I should aim for a career like IAS, IPS, etc. which help me to serve the society well.					
46	I try doing all good things with much enthusiasm and vigour.					
47	The appreciation I get from others does not boost my instinct to be brighter even more in studies.					
48	I am not good at keeping my textbooks and notebooks neat and clean.					
49	I am much happier at school than at home.					
50	I don’t care about following every rule in school.					

Appendix IX

FAROOK TRAINING COLLEGE

Affiliated to University of Calicut

ACADEMIC MOTIVATION SCALE

(MALAYALAM- FINAL)

Linisha C.K
Research Scholar
Research Centre in Education
Farook Training College

Dr. Fathima Jaseena M.P.M
(*Supervising Teacher*)
Assistant Professor
Farook Training College

പേര്:.....ആൺ/പെൺ:.....

സ്കൂളിന്റെ പേര്:.....ക്ലാസ്സ്&ഡിവിഷൻ:.....

നിർദ്ദേശങ്ങൾ

നിങ്ങളുടെ അക്കാദമിക അഭിപ്രേരണയുമായി ബന്ധപ്പെട്ട ചില പ്രസ്താവന കളാണ് താഴെ കൊടുത്തിരിക്കുന്നത്. പ്രസ്താവനകൾ സസൂക്ഷ്മം വായിച്ച് അവയ്ക്ക് ഓരോന്നിനുമുള്ള പ്രതികരണം രേഖപ്പെടുത്തുക. ഗവേഷണ ആവശ്യ ത്തിന് മാത്രമേ ഈ വിവരങ്ങൾ ഉപയോഗിക്കുകയുള്ളൂ. ഓരോ പ്രസ്താവനക്കും ശരിയായ പ്രതികരണം രേഖപ്പെടുത്തുക.

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
1.	ലോകകാര്യങ്ങൾ, വികസനം, നേട്ടങ്ങൾ എന്നിവയു മായി ബന്ധപ്പെട്ട പുതിയകാര്യങ്ങൾ സ്വയം കണ്ടെത്തു ന്നതിൽ താൽപര്യം തോന്നാറുണ്ട്.					
2.	പാഠഭാഗങ്ങളിൽ സംശയമുള്ള കാര്യങ്ങൾ അധ്യാപക രോട് ചോദിച്ച് ആഴത്തിൽ പഠിക്കാൻ ശ്രമിക്കാറില്ല.					
3.	അധിക വായനയ്ക്ക് സ്കൂൾ ലൈബ്രറി ഉപയോഗപ്പെടു ത്താറുണ്ട്.					
4.	പരീക്ഷകളിൽ ഉയർന്ന മാർക്ക്/ഗ്രേഡ് വാങ്ങാൻ ശ്രമി ക്കാറില്ല.					
5.	വളരെ വിഷമം പിടിച്ച ഹോംവർക്കുകൾ സ്വയം ചെയ്തുതീർക്കാൻ ശ്രമിക്കാറുണ്ട്.					
6.	പല നവീന വിഷയങ്ങളുമായി ബന്ധപ്പെട്ട ലേഖനങ്ങ ളും, മാഗസിനുകളും വായിച്ച് മത്സരപരീക്ഷകളിൽ വിജ യിക്കാൻ ശ്രമിക്കാറില്ല.					

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
7.	അധ്യാപകർ പഠിപ്പിച്ച കാര്യങ്ങൾ മനസ്സിലാവാതിരുന്നാൽ അത് എന്റെ മാർക്കിനെ ബാധിക്കുമെന്നതിനാൽ ചോദിച്ചുമനസ്സിലാക്കാറുണ്ട്.					
8.	ഓരോ പരീക്ഷയിലും ഗ്രേഡുകൾ മെച്ചപ്പെടുത്താൻ ക്രമിക്കാറില്ല.					
9.	സ്കൂളിൽ പൂന്തോട്ടം, പച്ചക്കറിതോട്ടം മുതലായവ നിർമ്മിക്കുന്നതിനും അവ പരിപാലിക്കുന്നതിനും താൽപര്യം പ്രകടിപ്പിക്കാറുണ്ട്.					
10.	രക്തദാന ക്യാമ്പ്, നേത്രരോഗനിർണയ ക്യാമ്പ്, കൊതുകുനിവാരണവുമായി ബന്ധപ്പെട്ട ക്യാമ്പ് തുടങ്ങിയ പ്രവർത്തനങ്ങളിൽ പങ്കെടുക്കാറില്ല.					
11.	ശാസ്ത്രപ്രദർശനങ്ങൾ, ക്വിസ്, വിവിധ മത്സരങ്ങൾ എന്നിവ സംഘടിപ്പിക്കുന്നതിനും അതിൽ പങ്കുചേരുന്നതിനും താൽപ്പര്യപ്പെടാറില്ല.					
12.	പഠനയാത്രകൾ സംഘടിപ്പിക്കുന്നതിനും ഫീൽഡ് വിസിറ്റ്, ഹൗസ് വിസിറ്റ് തുടങ്ങിയ നടത്താനും ശ്രമിക്കാറില്ല.					
13.	സ്കൂളിലെ കലാ കായിക പ്രവർത്തനങ്ങളിൽ പങ്കുചേരാൻ ഇഷ്ടമാണ്.					
14.	അധ്യാപകരിൽ നിന്നും സമ്മാനങ്ങൾ നേടാൻ വേണ്ടി നല്ല വണ്ണം പഠിക്കാൻ ശ്രമിക്കാറില്ല.					
15.	സമൂഹ ശ്രദ്ധപിടിച്ചുപറ്റുന്നതിന് വേണ്ടി പല നല്ല പൊതുപ്രവർത്തനങ്ങളിലും പങ്കുചേരാറുണ്ട്.					
16.	സമൂഹത്തിലെ മാറ്റങ്ങൾക്കനുസരിച്ച് തൊഴിൽ മേഖലകൾ തെരഞ്ഞെടുക്കാൻ താൽപ്പര്യം പ്രകടിപ്പിക്കാറില്ല.					
17.	നിരന്തര മൂല്യനിർണയമുള്ളതിനാൽ പഠിച്ചില്ലെങ്കിലും പരീക്ഷ എഴുതാറുണ്ട്.					
18.	അധ്യാപകരുടെ ശ്രദ്ധയും പരിഗണനയും നേടിയെടുക്കാൻ വേണ്ടി പല പാഠ്യേതര പ്രവർത്തനങ്ങളിലും പങ്കെടുക്കാൻ ശ്രമിക്കാറില്ല.					
19.	ഉയർന്ന പദവിയിലിരിക്കുന്ന ആളുകളെ കാണുമ്പോൾ അവരെപ്പോലെയാകണമെന്ന് ചിന്തിക്കാറുണ്ട്.					
20.	മികച്ച വിജയം നേടുന്നതിനായി പരീക്ഷാസമയങ്ങളിൽ പഠനക്രമം ചിട്ടപ്പെടുത്താൻ ശ്രമിക്കാറില്ല.					
21.	മഹാന്മാരുടെ ജീവിതകഥകൾ വായിക്കുമ്പോൾ അതിൽനിന്നും പ്രചോദനം ഉൾക്കൊള്ളാറുണ്ട്.					

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
22.	ക്ലാസിൽ മറ്റു കുട്ടികൾക്ക് മാതൃകയാവാൻ ശ്രമിക്കാറില്ല.					
23.	സ്കൂളിലെ ഏറ്റവും നല്ല വിദ്യാർത്ഥികൾക്കുള്ള അവാർഡ് വാങ്ങാൻ വേണ്ട പ്രവർത്തനങ്ങൾ ചെയ്യാറുണ്ട്.					
24.	രക്ഷിതാക്കളുടെ നിർബന്ധപ്രകാരം മിടുക്കരായ കുട്ടികളെപ്പോലെ പഠിക്കാൻ ശ്രമിക്കാറില്ല.					
25.	മറ്റുള്ളവരുടെ അംഗീകാരം ലഭിക്കുന്നതിനുവേണ്ടി ക്ലാസ്സിലെ ചീത്ത കൂട്ടുകെട്ടുകളിൽ നിന്നും ഒഴിഞ്ഞുമാറാൻ ശ്രമിക്കാറുണ്ട്.					
26.	അംഗീകാരം കിട്ടാൻ വേണ്ടി സമർത്ഥരായ കുട്ടികളുടെ കൂടെ ചങ്ങാത്തം കൂടാൻ ശ്രമിക്കാറുണ്ട്.					
27.	നല്ല വ്യക്തിത്വത്തിന് ഉടമയാകണമെന്ന് തോന്നാറില്ല.					
28.	ഒഴിവുസമയം പോലും പഠനപ്രവർത്തനങ്ങൾക്കായി ഉപയോഗിക്കാൻ ശ്രമിക്കാറുണ്ട്.					
29.	വിദ്യാഭ്യാസത്തേക്കാൾ കൂടുതൽ ഭാഗ്യത്തിനാണ് ഞാൻ പ്രാധാന്യം നൽകുന്നത്.					
30.	ജീവിതത്തിലെ വിലപ്പെട്ട സമയം വിദ്യാഭ്യാസത്തിലൂടെ നഷ്ടപ്പെടുമെന്ന തോന്നലുണ്ട്.					
31.	ഭാവിജീവിതം സുരക്ഷിതമാക്കാനുള്ള അടിത്തറ സ്കൂൾ വിദ്യാഭ്യാസത്തിലൂടെ നേടാമെന്ന് കരുതുന്നു.					
32.	നല്ല വ്യക്തിക്കുമാത്രമേ ഉയരാൻ കഴിയൂവെന്ന് വിശ്വസിക്കുന്നു.					
33.	ഐ.സി.ടി ഉപയോഗിച്ച് ക്ലാസെടുക്കുന്നതുകൊണ്ട് പാഠഭാഗങ്ങൾ നല്ലവണ്ണം മനസ്സിലാക്കാൻ കഴിയാറുണ്ട്.					
34.	മത്സരപരീക്ഷകളിൽ വിജയം നേടുന്നതിന് കൂടുതൽ സമയമിരുന്ന് പഠിക്കാറില്ല.					
35.	പാഠഭാഗങ്ങൾ ഓർമ്മിച്ചെടുക്കാൻ വേണ്ടി പല പഠനതന്ത്രങ്ങളും ഉപയോഗിക്കാറുണ്ട്.					
36.	എന്റെ സുഹൃത്തുക്കളേക്കാൾ കൂടുതൽ എല്ലാ കാര്യങ്ങളും എനിക്കറിയാം എന്ന ധാരണയുണ്ട്.					
37.	ജീവിതത്തിൽ നേടിയെടുക്കാൻ കഴിയാത്തതായി ഒന്നും തന്നെയില്ലെന്നാണ് എന്റെ വിശ്വാസം.					
38.	പരിശ്രമത്തിലൂടെ എല്ലാ പ്രശ്നങ്ങളും പരിഹരിക്കാൻ കഴിയുമെന്ന ധാരണയില്ല.					

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
39.	വീട്ടിൽ സാമ്പത്തിക ബുദ്ധിമുട്ടുണ്ടെങ്കിലും പഠനത്തിൽ പിന്നോക്കമാവാതിരിക്കാൻ ശ്രമിക്കാറുണ്ട്.					
40.	സിനിമയിൽ കാണുന്ന ഉയർന്ന വ്യക്തിത്വങ്ങളെ അനുകരിക്കാൻ ശ്രമിക്കാറുണ്ട്.					
41.	ചില വിഷയങ്ങൾ പഠിക്കുന്നത് മനസ്സിലായില്ലെങ്കിലും, സ്വയം പഠിക്കാൻ ശ്രമിക്കാറുണ്ട്.					
42.	ഐ.എ.എസ്, ഐ.പി.എസ് ഉദ്യോഗസ്ഥരെ പ്പോലെ സമൂഹത്തിന് പ്രാധാന്യം നൽകുന്ന ജോലി നേടിയെടുക്കണമെന്ന് ചിന്തിക്കാറില്ല.					
43.	ഓരോ പ്രവർത്തനങ്ങളും ഉത്സാഹത്തോടെയാണ് ചെയ്ത് തീർക്കുന്നത്.					
44.	മറ്റുള്ളവരിൽ നിന്ന് പ്രോത്സാഹനം ലഭിക്കുമ്പോൾ കൂടുതൽ പഠിക്കാൻ ശ്രമിക്കാറില്ല.					
45.	പുസ്തകങ്ങൾ, നോട്ടുബുക്കുകൾ എന്നിവ വൃത്തിയായി സൂക്ഷിക്കാറില്ല.					
46.	വീട്ടിലെ അന്തരീക്ഷത്തേക്കാൾ സ്കൂളിലെ ഓരോ നിമിഷവും എനിക്ക് സന്തോഷം നൽകാറുണ്ട്.					
47.	സ്കൂളിലെ ഓരോ നിയമവും പാലിക്കുന്നതിൽ ഞാൻ ശ്രദ്ധിക്കാറില്ല.					

Appendix X

FAROOK TRAINING COLLEGE

Affiliated to University of Calicut

ACADEMIC MOTIVATION SCALE

(ENGLISH- FINAL)

Linisha C.K
Research Scholar
Research Centre in Education
Farook Training College

Dr. Fathima Jaseena M.P.M
(*Supervising Teacher*)
Assistant Professor
Farook Training College

Name of Student:..... Gender:.....

Name of School:..... Class & Div:.....

Instructions

The objective of this scale is to measure your academic motivation. Read the statements given below carefully and mark your response. It is assured that the data collected shall be used only for research purposes. Please indicate your level of agreement or disagreement with each of these statements.

Sl No.	Statements	Strongly Agree	Agree	Neutral	Strongly Disagree	Disagree
1	I am always interested to know the new things related to world affairs, progress and developments by myself.					
2	I hardly approach my teachers for doubt-clearance and for having a deep understanding of subject.					
3	I usually utilize my school library for extra reading.					
4	I do not aim to achieve good marks or grades in examination.					
5	I usually try to solve a difficult homework by myself.					
6	I rarely read articles and magazines on advanced topics with the aim of getting qualified in competitive exams.					
7	If I don't understand what the teachers have taught me, I ask questions because it affects my marks.					

Sl No.	Statements	Strongly Agree	Agree	Neutral	Strongly Disagree	Disagree
8	I don't try to score better grades in examination.					
9	I am interested in making and maintaining flower and vegetable gardens in school compound.					
10	I do not actively become a part of collective activities such as blood donation camps, eye camps, activities organised as a movement toward mosquito control.					
11	I am not keen-on either conducting or participating in various events like science exhibitions, quiz competitions.					
12	I do not make an extra effort to conduct study tours, field visits, house visits, etc.					
13	I like being a part of extra-curricular activities held in schools.					
14	I don't try to study well to get incentive gifts from teachers.					
15	I usually engage in various social activities so as to have a good name in society.					
16	I do not choose my career path based on current social trends.					
17	I think I can attend my exams even without preparation as continuous assessments are frequent these days.					
18	I do not make it a point to take part in co-curricular activities just for gaining the attention and appreciation of my teachers.					
19	Whenever I come across someone of high rank and eminence, I normally think I should be like them.					
20	I do not attempt to be systematic in studies even when exams are around the corner.					
21	It inspires me a lot whenever I look through the life of great personalities of the world.					

Sl No.	Statements	Strongly Agree	Agree	Neutral	Strongly Disagree	Disagree
22	I will never try to be a role model for my classmates.					
23	I generally try to do things that help me to get the best student award in school.					
24	I have never tried to compete with the other bright students of my classroom even if my parents compel me to do so.					
25	I always try to avoid toxic friendships fearing bad reputation.					
26	I always ensure that I surround myself with good students for good reputation.					
27	I do not find it necessary to have a good character and persona all the time.					
28	I usually spend even my free time for academic activities.					
29	I give much importance to good fortune rather than good education.					
30	I have this firm belief that spending a major part of one's life for education is needless.					
31	I do not think that the education we get from schools will make our future secure.					
32	I do not believe that only a good person can succeed in life.					
33	I understand my lessons in a much better way with help of ICT in teaching.					
34	I don't spend extra time for reading so as to appear in competitive exams.					
35	I often use various techniques that help me memorize what I learn.					
36	I always assume that I know things better than my friends no matter what.					
37	I firmly believe that it is not impossible to achieve whatever we want in life.					

Sl No.	Statements	Strongly Agree	Agree	Neutral	Strongly Disagree	Disagree
38	I do not really think that we must face the hurdles in our path and work on it with determination so as to move forward.					
39	I try hard not to go backward in my studies even when I face financial problems at home.					
40	I like imitating some legendary movie stars.					
41	Even though I find it hard to understand certain subjects, I attempt to learn it by myself.					
42	I have never thought I should aim for a career like IAS, IPS, etc. which help me to serve the society well.					
43	I try doing all good things with much enthusiasm and vigour.					
44	The appreciation I get from others does not boost my instinct to be brighter even more in studies.					
45	I am not good at keeping my textbooks and notebooks neat and clean.					
46	I am much happier at school than at home.					
47	I don't care about following every rule in school.					

Appendix XI

FAROOK TRAINING COLLEGE

Affiliated to University of Calicut

EMOTION REGULATION SCALE

(MALAYALAM- DRAFT)

Linisha C.K
Research Scholar
Research Centre in Education
Farook Training College

Dr. Fathima Jaseena M.P.M
(*Supervising Teacher*)
Assistant Professor
Farook Training College

പേര്:..... ആൺ/പെൺ:.....

സ്കൂളിന്റെ പേര്:..... ക്ലാസ്സ്&ഡിവിഷൻ:.....

നിർദ്ദേശങ്ങൾ

നിങ്ങളുടെ വികാരനിയന്ത്രണവുമായി ബന്ധപ്പെട്ട ചില പ്രസ്താവനകളാണ് താഴെ കൊടുത്തിരിക്കുന്നത്. പ്രസ്താവനകൾ സസൂക്ഷ്മം വായിച്ച് അവയ്ക്ക് ഓരോന്നിനുമുള്ള പ്രതികരണം രേഖപ്പെടുത്തുക. ഗവേഷണ ആവശ്യത്തിന് മാത്രമേ ഈ വിവരങ്ങൾ ഉപയോഗിക്കുകയുള്ളൂ. ഓരോ പ്രസ്താവനക്കും ശരിയായ പ്രതികരണം രേഖപ്പെടുത്തുക.

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
1.	ആവശ്യമുള്ള സമയത്ത് ചിന്തകളെ നിയന്ത്രിക്കാൻ ശ്രമിക്കാറുണ്ട്.					
2.	അനുഭവങ്ങളിൽ നിന്നും കിട്ടിയ നല്ല അറിവുകൾ ജീവിതത്തിൽ പകർത്താൻ ശ്രമിക്കാറില്ല.					
3.	എനിക്ക് വിഷമം തോന്നുന്ന സന്ദർഭങ്ങളിൽ പെരുമാറ്റം നിയന്ത്രിക്കാൻ ശ്രമിക്കാറുണ്ട്.					
4.	പഠനപ്രവർത്തനങ്ങളിൽ എനിക്കുണ്ടാകുന്ന പല പ്രശ്നങ്ങളും എന്നെ സാരമായി ബാധിക്കാറില്ല.					
5.	പരീക്ഷ സമയങ്ങളിൽ ചെറിയ കാര്യങ്ങളിൽ പോലും വിഷമം തോന്നാറുണ്ട്.					
6.	എന്റെ ജീവിതത്തിൽ വല്ല തെറ്റുകളും സംഭവിച്ചുകഴിഞ്ഞാൽ അതിന്റെ ഉത്തരവാദിത്വം ഏറ്റെടുക്കാൻ തയ്യാറാവാറുണ്ട്.					
7.	പരീക്ഷകളിൽ നല്ല മാർക്ക് കിട്ടാത്തത് എന്റെ കഴിവുകേട് കൊണ്ടാണെന്ന് സമ്മതിക്കാറില്ല.					

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
8.	അധ്യാപകരുടെയും രക്ഷിതാക്കളുടെയും ഉപദേശം ഉൾക്കൊള്ളാറുണ്ട്.					
9.	ജീവിതത്തിൽ എനിക്കുണ്ടാകുന്ന പിഴവുകളെക്കുറിച്ച് ചിന്തിച്ച് വിഷമിക്കാറില്ല.					
10.	സാമൂഹ്യ മാധ്യമങ്ങളുടെ അമിത ഉപയോഗം നിയന്ത്രിക്കാൻ കഴിയാറുണ്ട്.					
11.	എന്റെ ജീവിതത്തിൽ ഉണ്ടാകുന്ന വീഴ്ചകളുടെ പൂർണ്ണ ഉത്തരവാദിത്വം എനിക്ക് തന്നെയാണെന്ന ബോധ്യമുണ്ട്.					
12.	സ്കൂൾ ജീവിതത്തിൽ ഉണ്ടാകുന്ന ഓരോ പ്രതിബന്ധങ്ങളെയും അഭിമുഖീകരിച്ചേ മതിയാവൂ എന്ന് വിശ്വസിക്കുന്നില്ല.					
13.	സാമ്പത്തിക ബുദ്ധിമുട്ടുകാരണം രക്ഷിതാക്കൾ വിനോദയാത്രക്ക് സമ്മതിക്കാത്തതിൽ വിഷമം തോന്നാറുണ്ട്.					
14.	അസുഖം കാരണം ക്ലാസ്സിൽ വരാതിരുന്നാൽ നഷ്ടപ്പെട്ട പാഠഭാഗങ്ങൾ മനസ്സിലാക്കാൻ ശ്രമിക്കാറില്ല.					
15.	പ്രതിസന്ധികളിൽ സഹായിക്കുന്ന സുഹൃത്തുക്കളെ അംഗീകരിക്കാൻ ശ്രമിക്കാറുണ്ട്.					
16.	പരീക്ഷകളിൽ മാർക്ക് കുറഞ്ഞാൽ നന്നായി ശ്രമിച്ച് പഠിച്ചിരുന്നെങ്കിൽ നല്ല മാർക്ക് വാങ്ങാമായിരുന്നു എന്ന് ചിന്തിക്കാറില്ല.					
17.	സുഹൃത്തുക്കളുമായി വല്ല പ്രശ്നങ്ങളുമുണ്ടായാൽ പിന്നീടാലോചിച്ച് പരിഹാരം കണ്ടെത്താറുണ്ട്.					
18.	വിഷമങ്ങളേക്കാൾ കൂടുതൽ സന്തോഷകരമായ അനുഭവങ്ങൾക്ക് ഞാൻ പ്രാധാന്യം നൽകാറില്ല.					
19.	വിഷമഘട്ടങ്ങളെ തരണം ചെയ്ത് ലക്ഷ്യസ്ഥാനത്തെത്താൻ ശ്രമിക്കാറുണ്ട്.					
20.	ക്ലാസിൽ നേരം വൈകിവന്നതിന് ടീച്ചർ വഴക്കുപറഞ്ഞാൽ പിന്നീട് കൃത്യസമയം പാലിക്കാൻ ശ്രമിക്കാറില്ല.					
21.	സഹപാഠികളുമായി ചീത്ത കൂട്ടുകെട്ടുകളിൽ ഏർപ്പെടുമ്പോൾ വിഷമം തോന്നാറുണ്ട്.					
22.	ഓരോ പ്രവർത്തനങ്ങളിലേർപ്പെടുമ്പോഴും അതിന്റെ അനന്തരഫലത്തെക്കുറിച്ച് ചിന്തിക്കാറുണ്ട്.					
23.	തകർന്ന പ്രണയബന്ധത്തെക്കുറിച്ച് ഓർത്തിരിക്കാൻ ഇഷ്ടമില്ല.					

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
24.	പ്രയാസങ്ങൾ ഉണ്ടാകുമ്പോൾ പരിഹാരമായി മറ്റുള്ളവരുടെ ഉപദേശങ്ങൾ സ്വീകരിക്കാറുണ്ട്.					
25.	എന്റെ ഭാഗത്തുണ്ടാവുന്ന പല തെറ്റായ തീരുമാനങ്ങളെക്കുറിച്ചും ചിന്തിക്കാറില്ല.					
26.	പഠനപ്രവർത്തനങ്ങളുമായി ബന്ധപ്പെട്ട കാര്യങ്ങൾ നല്ല രീതിയിൽ ചെയ്തുതീർക്കാൻ ശ്രമിക്കാറുണ്ട്.					
27.	ഓരോ പരീക്ഷകളിലും ഉന്നതവിജയം നേടുന്നതിനാവശ്യമായ പഠന പ്രവർത്തനങ്ങൾ മുൻകൂട്ടി ആസൂത്രണം ചെയ്യാറുണ്ട്.					
28..	സമൂഹത്തിൽ നല്ല രീതിയിൽ ജീവിക്കാനാവശ്യമായ വ്യക്തിത്വം ഉണ്ടാക്കിയെടുക്കാൻ ശ്രമിക്കാറില്ല.					
29.	ദിനചര്യകളെ ചിട്ടപ്പെടുത്തി കൂടുതൽ മാനസികോല്ലാസം നേടുന്നതിനാവശ്യമായ പ്രവർത്തനങ്ങളിലേർപ്പെടാറുണ്ട്.					
30.	ഭാവിയിലെ ജോലി സാധ്യതയ്ക്കനുസരിച്ച് കോഴ്സുകൾ തിരഞ്ഞെടുക്കാറില്ല.					
31.	പരീക്ഷയിൽ മാർക്ക് കുറയുമ്പോൾ ആ വിഷമം പഠിപ്പിക്കുന്ന അധ്യാപകരെ പഴിക്കാറുണ്ട്.					
32.	രക്ഷിതാക്കളുടെ ശ്രദ്ധക്കുറവ് എന്റെ പഠനത്തെ ബാധിക്കാറുണ്ട്.					
33.	വീട്ടിലെ പ്രശ്നങ്ങൾ നിറഞ്ഞ അന്തരീക്ഷം കാരണം ഞാൻ പഠനത്തിൽ പിന്നിലാണ്.					
34.	സാമ്പത്തികബുദ്ധിമുട്ട് എന്റെ പഠനത്തെ ബാധിക്കാറുണ്ട്.					
35.	അധ്യാപകർ പലകാര്യങ്ങളിലും പ്രോത്സാഹനം നൽകാത്തത് ജീവിതവിജയത്തെ ബാധിക്കുമെന്ന് തോന്നാറില്ല.					
36.	ചില സമയങ്ങളിൽ കൂട്ടുകാർ ഒറ്റപ്പെടുത്തുമ്പോൾ സങ്കടം തോന്നാറുണ്ട്.					
37.	കൂട്ടുകാർ പല ചീത്ത കാര്യങ്ങളും ചെയ്യുമ്പോൾ അതിൽ നിന്നും മാറിനിൽക്കാൻ ശ്രമിക്കാറില്ല.					
38.	രക്ഷിതാക്കൾ ചീത്ത പറയുമ്പോൾ അതിനെതിരെ പ്രതികരിക്കാറുണ്ട്.					
39.	പഠനസമയത്ത് മനസ്സിലേക്ക് വരുന്ന പല ചിന്തകളേയും നിയന്ത്രിക്കാൻ പറ്റാറുണ്ട്.					
40.	കൂട്ടുകാർക്കിടയിലെ പ്രശ്നങ്ങൾ പരിഹരിച്ച് നല്ല തീരുമാനങ്ങളെടുക്കാൻ കഴിയാറില്ല.					

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
41.	ലഹരി പദാർത്ഥങ്ങളുടെ ഉപയോഗം മാനസികവും സാമൂഹികവുമായ പ്രശ്നങ്ങൾ ഉണ്ടാക്കുമെന്ന ധാരണയുണ്ട്.					
42.	സമൂഹത്തിൽ നടക്കുന്ന പല കാര്യങ്ങളിലും ശ്രദ്ധ ചെലുത്താൻ ശ്രദ്ധിക്കാറില്ല.					
43.	റോഡുസുരക്ഷയുമായി ബന്ധപ്പെട്ട കാര്യങ്ങൾ പഠിക്കാനും മറ്റുള്ളവരിലേക്ക് പകർന്നുകൊടുക്കാനും ശ്രമിക്കാറുണ്ട്.					
44.	സ്ത്രീസമത്വം, ജീവകാരുണ്യ പ്രവർത്തനങ്ങൾ, സാമൂഹ്യസുരക്ഷ എന്നിവയുമായി ബന്ധപ്പെട്ട പ്രവർത്തനങ്ങളിൽ പങ്കെടുക്കാറില്ല.					
45.	ജീവിതത്തിലെ ഓരോ കാര്യത്തിനും നല്ലതും, ചീത്തയുമായ വശങ്ങളുണ്ടെന്ന ബോധമുണ്ട്.					
46.	ജീവിതത്തിലെ ഓരോ അനുഭവങ്ങളിൽ നിന്നും ഊർജ്ജം ഉൾക്കൊണ്ട് മുന്നോട്ട് പോവാൻ ശ്രമിക്കാറില്ല.					
47.	സുഖവും, ദുഃഖവും ജീവിതത്തിന്റെ ഭാഗമാണെന്ന് ചിന്തിക്കാറുണ്ട്.					
48.	എന്റെ സ്വഭാവദൂഷ്യം കാരണം അമ്മ വഴക്ക് പറഞ്ഞാൽ ഞാൻ പ്രതികരിക്കാറുണ്ട്.					
49.	ചെറിയ വിഷമങ്ങൾ പോലും പഠനത്തിൽ നിന്ന് എന്നെ പിന്തിരിപ്പിക്കാറില്ല.					
50.	അപകടങ്ങൾ, ദുരന്തങ്ങൾ എന്നിവ കാണുമ്പോൾ അവയെ തരണം ചെയ്യാൻ മനസ്സ് സജ്ജമാക്കാറുണ്ട്.					
51.	അസുഖം ഉള്ളവരെ കാണുമ്പോൾ കരുണ, ദയ എന്നിവ തോന്നാറില്ല.					
52.	പ്രകൃതി ദുരന്തങ്ങൾ ബാധിച്ചവരെ കാണുമ്പോൾ സഹായിക്കാറുണ്ട്.					
53.	പരീക്ഷ സമയം പാഠപുസ്തകത്തിനു പുറത്തുനിന്നും ചോദ്യങ്ങൾ വന്നാൽ ടെൻഷൻ തോന്നാറില്ല.					
54.	പരീക്ഷക്ക് കോപ്പി അടിക്കുന്നത് കണ്ടാൽ പ്രതികരിക്കാറുണ്ട്.					
55.	ഹോംവർക്ക് ചെയ്യാത്തതിന് സുഹൃത്തിനെ അധ്യാപകർ മർദ്ദിക്കുന്നത് കാണ്ടാൽ സങ്കടം തോന്നാറില്ല.					

Appendix XII

FAROOK TRAINING COLLEGE

Affiliated to University of Calicut

EMOTION REGULATION SCALE

(ENGLISH- DRAFT)

Linisha C.K
Research Scholar
Research Centre in Education
Farook Training College

Dr. Fathima Jaseena M.P.M
(*Supervising Teacher*)
Assistant Professor
Farook Training College

Name of Student:..... Gender:.....

Name of School:..... Class & Div:.....

Instructions

The aim of this tool is to measure your emotional regulation. Read the following statements carefully and record the responses by a (✓) against each of them. This information will be used for research purposes only. Record the correct responses to each statement.

No.	Statements	Strongly Agree	Agree	Not Certain	Disagree	Strongly Disagree
1.	I can adjust my mental state according to the situation					
2.	In cases where I feel uncomfortable, I do not try to control my behaviour					
3.	Problems associated with my studies also hurt my mind.					
4.	I don't feel intimidated during exams.					
5.	During exams, even small things disturbs my mind.					
6.	If I make a mistake, I do not attempt to correct myself.					
7.	I tend to think and regret about problems with my friends.					
8.	I do not accept any advice from parents and teachers.					
9.	I am often interested in engaging in bad relations with classmates.					
10.	I do not try to understand the pros and cons of any activity before engaging in it.					
11.	Overuse of social media affects my emotional state.					

No.	Statements	Strongly Agree	Agree	Not Certain	Disagree	Strongly Disagree
12.	I do not believe that every problem faced during school life must be addressed.					
13.	I understand that I am completely responsible for any failure in my life.					
14.	When I take a leave of absence due to any illness, I do not try to figure out the missing lessons.					
15.	I try to appreciate my friends that helps me during my problems.					
16.	I do not feel any regret when my parents disagree to excursions due to financial problems.					
17.	I try to overcome my difficulties to attain the goal.					
18.	I do not value happy experiences more than difficulties.					
19.	I try to reach my goal by overcoming my difficulties.					
20.	I do not try to be punctual even after I am scolded by the teacher for being late.					
21.	I tend to show excitement in learning activities.					
22.	I do not tend to live without a bad name in the society.					
23.	I think and worry about the mistakes I make in my life.					
24.	When a problem arises, I take other's advice as a solution.					
25.	I do not tell my emotional difficulties to anyone else.					
26.	I try to complete learning activities properly.					
27.	I do not plan necessary learning activities to achieve high marks in each exam.					
28..	I think lack of concentration in learning is the reason for lower marks in examinations.					
29.	I do not try to mindfully organise day to day activities and engage in refreshing activities.					
30.	I often select the courses according to the future job opportunities.					
31.	I do not blame my teachers for my lower marks in examinations.					
32.	My parents' lack of attention affects my studies.					
33.	I am backward in my studies because of the problematic atmosphere in my home.					

No.	Statements	Strongly Agree	Agree	Not Certain	Disagree	Strongly Disagree
34.	My family's financial crisis affects my learning.					
35.	I don't believe that lack of teachers' encouragement and support affects success in life.					
36.	I feel sad sometimes when my friends isolate me.					
37.	I do not try to stay away from various bad activities that my friends engage in.					
38.	I responds whenever I get scolded by my parents.					
39.	I cannot control the distracting thoughts that comes to my minds while studying.					
40.	I am able to solve problems between my friends and take good decisions.					
41.	I do not have any idea about the social and emotional problems caused by drugs and drug abuse.					
42.	I try to pay attention to things that happening in the society.					
43.	I do not try to learn the matters related to road safety and to pass it to others.					
44.	I participate in activities associated with feminism, social security and charitable activities.					
45.	I do not sense that everything in life has both good and bad sides.					
46.	I try to gain knowledge from every experience and move forward.					
47.	I think that both joy and sorrows are parts of life.					
48.	I do not respond when my mother scold me due to my misbehaviour.					
49.	Even smaller sorrows distract me from my studies.					
50.	I set my mind to overcome any accidents and disasters ahead.					
51.	I do not feel empathy and kindness towards the sick.					
52.	I try and help people affected by natural calamities.					
53.	I do not feel tension during exam, if the questions come from outside the textbook.					
54.	I respond when I see someone cheating in exams.					
55.	I do not feel sad when the teacher punishes my friend for not doing the homework.					

Appendix XIII

FAROOK TRAINING COLLEGE

Affiliated to University of Calicut

EMOTION REGULATION SCALE

(MALAYALAM- FINAL)

Linisha C.K
Research Scholar
Research Centre in Education
Farook Training College

Dr. Fathima Jaseena M.P.M
(*Supervising Teacher*)
Assistant Professor
Farook Training College

പേര്:..... ആൺ/പെൺ:.....

സ്കൂളിന്റെ പേര്:..... ക്ലാസ്സ്&ഡിവിഷൻ:.....

നിർദ്ദേശങ്ങൾ

നിങ്ങളുടെ വികാരനിയന്ത്രണവുമായി ബന്ധപ്പെട്ട ചില പ്രസ്താവനകളാണ് താഴെ കൊടുത്തിരിക്കുന്നത്. പ്രസ്താവനകൾ സസൂക്ഷ്മം വായിച്ച് അവയ്ക്ക് ഓരോന്നിനുമുള്ള പ്രതികരണം രേഖപ്പെടുത്തുക. ഗവേഷണ ആവശ്യത്തിന് മാത്രമേ ഈ വിവരങ്ങൾ ഉപയോഗിക്കുകയുള്ളൂ. ഓരോ പ്രസ്താവനക്കും ശരിയായ പ്രതികരണം രേഖപ്പെടുത്തുക.

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
1.	ആവശ്യമുള്ള സമയത്ത് ചിന്തകളെ നിയന്ത്രിക്കാൻ ശ്രമിക്കാറുണ്ട്.					
2.	അനുഭവങ്ങളിൽ നിന്നും കിട്ടിയ നല്ല അറിവുകൾ ജീവിതത്തിൽ പകർത്താൻ ശ്രമിക്കാറില്ല.					
3.	പരീക്ഷ സമയങ്ങളിൽ ചെറിയ കാര്യങ്ങളിൽ പോലും വിഷമം തോന്നാറുണ്ട്.					
4.	എന്റെ ജീവിതത്തിൽ വല്ല തെറ്റുകളും സംഭവിച്ചുകഴിഞ്ഞാൽ അതിന്റെ ഉത്തരവാദിത്വം ഏറ്റെടുക്കാൻ തയ്യാറാവാറുണ്ട്.					
5.	പരീക്ഷകളിൽ നല്ല മാർക്ക് കിട്ടാത്തത് എന്റെ കഴിവുകേട് കൊണ്ടാണെന്ന് സമ്മതിക്കാറില്ല.					
6.	അധ്യാപകരുടെയും രക്ഷിതാക്കളുടെയും ഉപദേശം ഉൾക്കൊള്ളാറുണ്ട്.					
7.	ജീവിതത്തിൽ എനിക്കുണ്ടാകുന്ന പിഴവുകളെക്കുറിച്ച് ചിന്തിച്ച് വിഷമിക്കാറില്ല.					

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
8.	സാമൂഹ്യ മാധ്യമങ്ങളുടെ അമിത ഉപയോഗം നിയന്ത്രിക്കാൻ കഴിയാറുണ്ട്.					
9.	എന്റെ ജീവിതത്തിൽ ഉണ്ടാകുന്ന വീഴ്ചകളുടെ പൂർണ്ണ ഉത്തരവാദിത്വം എനിക്ക് തന്നെയാണെന്ന ബോധ്യമുണ്ട്.					
10.	സ്കൂൾ ജീവിതത്തിൽ ഉണ്ടാകുന്ന ഓരോ പ്രതിബന്ധങ്ങളെയും അഭിമുഖീകരിച്ചേ മതിയാവൂ എന്ന് വിശ്വസിക്കുന്നില്ല.					
11.	സാമ്പത്തിക ബുദ്ധിമുട്ടുകാരണം രക്ഷിതാക്കൾ വിനോദയാത്രക്ക് സമ്മതിക്കാത്തതിൽ വിഷമം തോന്നാറുണ്ട്.					
12.	അസുഖം കാരണം ക്ലാസ്സിൽ വരാതിരുന്നാൽ നഷ്ടപ്പെട്ട പാഠഭാഗങ്ങൾ മനസ്സിലാക്കാൻ ശ്രമിക്കാറില്ല.					
13.	പ്രതിസന്ധികളിൽ സഹായിക്കുന്ന സുഹൃത്തുക്കളെ അംഗീകരിക്കാൻ ശ്രമിക്കാറുണ്ട്.					
14.	പരീക്ഷകളിൽ മാർക്ക് കുറഞ്ഞാൽ നന്നായി ശ്രമിച്ച് പഠിച്ചിരുന്നെങ്കിൽ നല്ല മാർക്ക് വാങ്ങാമായിരുന്നു എന്ന് ചിന്തിക്കാറില്ല.					
15.	സുഹൃത്തുക്കളുമായി വല്ല പ്രശ്നങ്ങളുമുണ്ടായാൽ പിന്നീടാലോചിച്ച് പരിഹാരം കണ്ടെത്താറുണ്ട്.					
16.	വിഷമങ്ങളേക്കാൾ കൂടുതൽ സന്തോഷകരമായ അനുഭവങ്ങൾക്ക് ഞാൻ പ്രാധാന്യം നൽകാറില്ല.					
17.	വിഷമഘട്ടങ്ങളെ തരണം ചെയ്ത് ലക്ഷ്യസ്ഥാനത്തെത്താൻ ശ്രമിക്കാറുണ്ട്.					
18.	ക്ലാസിൽ നേരം വൈകിവന്നതിന് ടീച്ചർ വഴക്കുപറഞ്ഞാൽ പിന്നീട് കൃത്യസമയം പാലിക്കാൻ ശ്രമിക്കാറില്ല.					
19.	സഹപാഠികളുമായി ചീത്ത കൂട്ടുകെട്ടുകളിൽ ഏർപ്പെടുമ്പോൾ വിഷമം തോന്നാറുണ്ട്.					
20.	ഓരോ പ്രവർത്തനങ്ങളിലേർപ്പെടുമ്പോഴും അതിന്റെ അനന്തരഫലത്തെക്കുറിച്ച് ചിന്തിക്കാറുണ്ട്.					
21.	തകർന്ന പ്രണയബന്ധത്തെക്കുറിച്ച് ഓർത്തിരിക്കാൻ ഇഷ്ടമില്ല.					
22.	പ്രയാസങ്ങൾ ഉണ്ടാകുമ്പോൾ പരിഹാരമായി മറ്റുള്ളവരുടെ ഉപദേശങ്ങൾ സ്വീകരിക്കാറുണ്ട്.					
23.	എന്റെ ഭാഗത്തുണ്ടാവുന്ന പല തെറ്റായ തീരുമാനങ്ങളെക്കുറിച്ചും ചിന്തിക്കാറില്ല.					

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
24.	പഠനപ്രവർത്തനങ്ങളുമായി ബന്ധപ്പെട്ട കാര്യങ്ങൾ നല്ല രീതിയിൽ ചെയ്തുതീർക്കാൻ ശ്രമിക്കാറുണ്ട്.					
25.	ഓരോ പരീക്ഷകളിലും ഉന്നതവിജയം നേടുന്നതിനാവശ്യമായ പഠന പ്രവർത്തനങ്ങൾ മുൻകൂട്ടി ആസൂത്രണം ചെയ്യാറുണ്ട്.					
26.	സമൂഹത്തിൽ നല്ല രീതിയിൽ ജീവിക്കാനാവശ്യമായ വ്യക്തിത്വം ഉണ്ടാക്കിയെടുക്കാൻ ശ്രമിക്കാറില്ല.					
27.	ദിനചര്യകളെ ചിട്ടപ്പെടുത്തി കൂടുതൽ മാനസികോല്ലാസം നേടുന്നതിനാവശ്യമായ പ്രവർത്തനങ്ങളിലേർപ്പെടാറുണ്ട്.					
28..	ഭാവിയിലെ ജോലി സാധ്യതയ്ക്കനുസരിച്ച് കോഴ്സുകൾ തിരഞ്ഞെടുക്കാറില്ല.					
29.	രക്ഷിതാക്കളുടെ ശ്രദ്ധക്കുറവ് എന്റെ പഠനത്തെ ബാധിക്കാറുണ്ട്.					
30.	വീട്ടിലെ പ്രശ്നങ്ങൾ നിറഞ്ഞ അന്തരീക്ഷം കാരണം ഞാൻ പഠനത്തിൽ പിന്നിലാണ്.					
31.	സാമ്പത്തികബുദ്ധിമുട്ട് എന്റെ പഠനത്തെ ബാധിക്കാറുണ്ട്.					
32.	അധ്യാപകർ പലകാര്യങ്ങളിലും പ്രോത്സാഹനം നൽകാത്തത് ജീവിതവിജയത്തെ ബാധിക്കുമെന്ന് തോന്നാറില്ല.					
33.	കൂട്ടുകാർ പല ചീത്ത കാര്യങ്ങളും ചെയ്യുമ്പോൾ അതിൽ നിന്നും മാറിനിൽക്കാൻ ശ്രമിക്കാറില്ല.					
34.	രക്ഷിതാക്കൾ ചീത്ത പറയുമ്പോൾ അതിനെതിരെ പ്രതികരിക്കാറുണ്ട്.					
35.	പഠനസമയത്ത് മനസ്സിലേക്ക് വരുന്ന പല ചിന്തകളേയും നിയന്ത്രിക്കാൻ പറ്റാറുണ്ട്.					
36.	ലഹരി പദാർത്ഥങ്ങളുടെ ഉപയോഗം മാനസികവും സാമൂഹികവുമായ പ്രശ്നങ്ങൾ ഉണ്ടാക്കുമെന്ന ധാരണയുണ്ട്.					
37.	സമൂഹത്തിൽ നടക്കുന്ന പല കാര്യങ്ങളിലും ശ്രദ്ധ ചെലുത്താൻ ശ്രദ്ധിക്കാറില്ല.					
38.	റോഡുസുരക്ഷയുമായി ബന്ധപ്പെട്ട കാര്യങ്ങൾ പഠിക്കാനും മറ്റുള്ളവരിലേക്ക് പകർന്നുകൊടുക്കാനും ശ്രമിക്കാറുണ്ട്.					

നമ്പർ	പ്രസ്താവന	പൂർണ്ണമായും യോജിക്കുന്നു	യോജിക്കുന്നു	അഭിപ്രായമില്ല	വിയോജിക്കുന്നു	പൂർണ്ണമായും വിയോജിക്കുന്നു
39.	സ്ത്രീസമത്വം, ജീവകാരുണ്യ പ്രവർത്തനങ്ങൾ, സാമൂഹ്യസുരക്ഷ എന്നിവയുമായി ബന്ധപ്പെട്ട പ്രവർത്തനങ്ങളിൽ പങ്കെടുക്കാറില്ല.					
40.	ജീവിതത്തിലെ ഓരോ കാര്യത്തിനും നല്ലതും, ചീത്തയുമായ വശങ്ങളുണ്ടെന്ന ബോധമുണ്ട്.					
41.	സുഖവും, ദുഃഖവും ജീവിതത്തിന്റെ ഭാഗമാണെന്ന് ചിന്തിക്കാറുണ്ട്.					
42.	എന്റെ സ്വഭാവദൂഷ്യം കാരണം അമ്മ വഴക്ക് പറഞ്ഞാൽ ഞാൻ പ്രതികരിക്കാറുണ്ട്.					
43.	ചെറിയ വിഷമങ്ങൾ പോലും പഠനത്തിൽ നിന്ന് എന്നെ പിന്തിരിപ്പിക്കാറില്ല.					
44.	അപകടങ്ങൾ, ദുരന്തങ്ങൾ എന്നിവ കാണുമ്പോൾ അവയെ തരണം ചെയ്യാൻ മനസ്സ് സജ്ജമാക്കാറുണ്ട്.					
45.	അസുഖം ഉള്ളവരെ കാണുമ്പോൾ കരുണ, ദയ എന്നിവ തോന്നാറില്ല.					
46.	പ്രകൃതി ദുരന്തങ്ങൾ ബാധിച്ചവരെ കാണുമ്പോൾ സഹായിക്കാറുണ്ട്.					
47.	പരീക്ഷ സമയം പാഠപുസ്തകത്തിനു പുറത്തുനിന്നും ചോദ്യങ്ങൾ വന്നാൽ ടെൻഷൻ തോന്നാറില്ല.					
48.	പരീക്ഷക്ക് കോപ്പി അടിക്കുന്നത് കണ്ടാൽ പ്രതികരിക്കാറുണ്ട്.					

Appendix XIV

FAROOK TRAINING COLLEGE

Affiliated to University of Calicut

EMOTION REGULATION SCALE

(ENGLISH- FINAL)

Linisha C.K
Research Scholar
Research Centre in Education
Farook Training College

Dr. Fathima Jaseena M.P.M
(*Supervising Teacher*)
Assistant Professor
Farook Training College

Name of Student:..... Gender:.....

Name of School:..... Class & Div:.....

Instructions

The aim of this tool is to measure your emotional regulation. Read the following statements carefully and record the responses by a (✓) against each of them. This information will be used for research purposes only. Record the correct responses to each statement.

No.	Statements	Strongly Agree	Agree	Not Certain	Disagree	Strongly Disagree
1.	I can adjust my mental state according to the situation					
2.	In cases where I feel uncomfortable, I do not try to control my behaviour					
3.	During exams, even small things disturbs my mind.					
4.	If I make a mistake, I do not attempt to correct myself.					
5.	I tend to think and regret about problems with my friends.					
6.	I do not accept any advice from parents and teachers.					
7.	I am often interested in engaging in bad relations with classmates.					
8.	I do not try to understand the pros and cons of any activity before engaging in it.					
9.	Overuse of social media affects my emotional state.					
10.	I do not believe that every problem faced during school life must be addressed.					

No.	Statements	Strongly Agree	Agree	Not Certain	Disagree	Strongly Disagree
11.	I understand that I am completely responsible for any failure in my life.					
12.	When I take a leave of absence due to any illness, I do not try to figure out the missing lessons.					
13.	I try to appreciate my friends that helps me during my problems.					
14.	I do not feel any regret when my parents disagree to excursions due to financial problems.					
15.	I try to overcome my difficulties to attain the goal.					
16.	I do not value happy experiences more than difficulties.					
17.	I try to reach my goal by overcoming my difficulties.					
18.	I do not try to be punctual even after I am scolded by the teacher for being late.					
19.	I tend to show excitement in learning activities.					
20.	I do not tend to live without a bad name in the society.					
21.	I think and worry about the mistakes I make in my life.					
22.	When a problem arises, I take other's advice as a solution.					
23.	I do not tell my emotional difficulties to anyone else.					
24.	I try to complete learning activities properly.					
25.	I do not plan necessary learning activities to achieve high marks in each exam.					
26.	I think lack of concentration in learning is the reason for lower marks in examinations.					
27.	I do not try to mindfully organise day to day activities and engage in refreshing activities.					
28..	I often select the courses according to the future job opportunities.					
29.	My parents' lack of attention affects my studies.					

No.	Statements	Strongly Agree	Agree	Not Certain	Disagree	Strongly Disagree
30.	I am backward in my studies because of the problematic atmosphere in my home.					
31.	My family's financial crisis affects my learning.					
32.	I don't believe that lack of teachers' encouragement and support affects success in life.					
33.	I do not try to stay away from various bad activities that my friends engage in.					
34.	I responds whenever I get scolded by my parents.					
35.	I cannot control the distracting thoughts that comes to my minds while studying.					
36.	I do not have any idea about the social and emotional problems caused by drugs and drug abuse.					
37.	I try to pay attention to things that happening in the society.					
38.	I do not try to learn the matters related to road safety and to pass it to others.					
39.	I participate in activities associated with feminism, social security and charitable activities.					
40.	I do not sense that everything in life has both good and bad sides.					
41.	I think that both joy and sorrows are parts of life.					
42.	I do not respond when my mother scold me due to my misbehaviour.					
43.	Even smaller sorrows distract me from my studies.					
44.	I set my mind to overcome any accidents and disasters ahead.					
45.	I do not feel empathy and kindness towards the sick.					
46.	I try and help people affected by natural calamities.					
47.	I do not feel tension during exam, if the questions come from outside the textbook.					
48.	I respond when I see someone cheating in exams.					

Appendix -XV

CRITICAL THINKING TEST
FOR HIGHER SECONDARY SCHOOL STUDENTS

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ടെസ്റ്റ് 1 : അനുമാനം

നിർദ്ദേശങ്ങൾ

സൂക്ഷ്മ നിരീക്ഷണങ്ങളിലൂടെയും ചിലപ്പോൾ സങ്കല്പത്തിലൂടെയും ആർജ്ജിച്ചെടുക്കുന്ന വസ്തുതകളിൽ നിന്ന് ഒരു വ്യക്തി ചില തീരുമാനങ്ങളിലെത്തിച്ചേരുന്നതിനെയാണ് അനുമാനമെന്നതു കൊണ്ട് ഉദ്ദേശിക്കുന്നത്. ഉദാഹരണമായി, ഒരു വീട്ടിൽ നിന്നു റേഡിയോയിലൂടെ സംഗീതം കേൾക്കുകയും ആ വീട്ടിൽ വെളിച്ചം ഉണ്ടായിരിക്കുകയും ചെയ്താൽ ആ വീട്ടിലാരെങ്കിലും ഉണ്ടാകുമെന്ന് നാം ഊഹിക്കുന്നു; അല്ലെങ്കിൽ ഒരു നിഗമനത്തിലെത്തിച്ചേരുന്നു. നമ്മുടെ നിഗമനം ചിലപ്പോൾ ശരിയൊ തെറ്റൊ ആയിരിക്കാം. ഒരു പക്ഷെ, ആ വീട്ടുക്കാർ പുറത്തുപോകുമ്പോൾ റേഡിയോ ഓഫ് ചെയ്യാതെയും ലൈറ്റ് അണക്കാതേയും പോയതാകാം.

ഈ പരീക്ഷണസമ്പ്രദായത്തിൽ ഓരോ പ്രവർത്തനവും തുടങ്ങുന്നത്; നിങ്ങൾക്കു ശരിയെന്നു തോന്നുന്ന വസ്തുതകളെ പ്രസ്താവിച്ചു കൊണ്ടാണ്. ഓരോ പ്രസ്താവനകൾക്കു ശേഷവും സാദ്ധ്യമായ വിവിധ അനുമാനങ്ങൾ കണ്ടെത്താം. എന്നു വെച്ചാൽ ചില വ്യക്തികൾ തന്നിരിക്കുന്ന വസ്തുതകളിൽ നിന്നും ചില നിഗമനങ്ങളിൽ എത്തിച്ചേരാം. ഓരോ അനുമാനങ്ങളെയും തരം തിരിച്ച് അതിൽ ശരിയും തെറ്റും എത്ര മാത്രമുണ്ടെന്നു ഒരു തിരുമാനത്തിലെത്തിച്ചേരുക.

തന്നിരിക്കുന്ന ഉത്തരക്കടലാസ്സിൽ ഓരോ അനുമാനങ്ങളെക്കുറിച്ചും T, PT,ID, PF, F എന്നതിൽ ഏതാണെന്ന് രേഖപ്പെടുത്തുവാൻ സ്ഥലമുണ്ട്. ഓരോന്നിനും ഏതാണോ ശരിയുത്തരം അതിൽ 'x' എന്ന് അതിനു താഴെ കൊടുത്തിരിക്കുന്ന സ്ഥലത്ത് അടയാളപ്പെടുത്തുക.

തന്നിരിക്കുന്ന വസ്തുതകളിൽ നിന്നും ഈ ഒരു അനുമാനം തീർച്ചയായും ശരിയാണെങ്കിൽ 'T' എന്നു രേഖപ്പെടുത്തുക.

ശരിയാവാനാണ് കൂടുതൽ സാധ്യത എന്നു തോന്നുന്നുവെങ്കിൽ 'PT' എന്നു രേഖപ്പെടുത്തുക.

തന്നിരിക്കുന്ന വസ്തുതകളിൽ നിന്നും ശരിയൊ തെറ്റൊ എന്നൊരു നിഗമനത്തിലെത്തിച്ചേരുവാൻ പ്രയാസമെങ്കിൽ '1D' എന്നു രേഖപ്പെടുത്തുക.

തെറ്റാകുവാനാണ് കൂടുതൽ സാധ്യതയെങ്കിൽ 'PF' എന്നു രേഖപ്പെടുത്തുക.

തന്നിരിക്കുന്ന വസ്തുതകളിൽ നിന്നും ഈ ഒരു അനുമാനം തെറ്റെന്നു ഉറപ്പിക്കുന്നുവെങ്കിൽ 'F' എന്നു രേഖപ്പെടുത്തുക.

പലപ്പോഴും ഒരു അനുമാനം തെറ്റാവാനുള്ള സാധ്യതയെക്കുറിച്ചും നമ്മൾ തീരുമാനിക്കുന്നത് പൊതുവിൽ ഓരോ വ്യക്തിയും സ്വീകരിച്ചു പോരുന്ന ചില പൊതു തത്വങ്ങളെയും വിവരങ്ങളെയും അടിസ്ഥാനമാക്കിയാണ്. ഇത് താഴെ വിവരിച്ച ഉദാഹരണങ്ങളിലൂടെ വ്യക്തമാവും.

ഉദാഹരണം

പ്രസ്താവന :

കൗമാരത്തിലേക്ക് കാലൂന്നുന്ന ഇരുന്നൂറോളം വിദ്യാർത്ഥികൾ ആഴ്ചയുടെ അവസാനദിനങ്ങളിൽ ലീഡ്സിൽ സംഘടിപ്പിക്കുന്ന സമ്മേളനത്തിൽ പങ്കെടുക്കുകയുണ്ടായി. ഈ സമ്മേളനത്തിൽ വംശസംബന്ധിയും ലോക സമാധാനം നിലനിർത്തേണ്ടതിന്റെ പ്രാധാന്യത്തെയുംക്കുറിച്ചാണ് ചർച്ച ചെയ്യപ്പെട്ടത്. ഇക്കാലത്ത് ചർച്ച ചെയ്യപ്പെടേണ്ട ആനുകാലിക പ്രശ്നങ്ങൾ ഇവയെന്ന് അവർ തീരുമാനിച്ചു.

നിർദ്ദേശിക്കുന്ന അനുമാനങ്ങൾ :

1. ഒരു ഗ്രൂപ്പെന്ന നിലയിൽ ഈ സമ്മേളനത്തിൽ പങ്കെടുത്ത വിദ്യാർത്ഥികൾ വളരെ പ്രാധാന്യം അർഹിക്കുന്ന വിഷയങ്ങളിൽ അതീവ താല്പര്യം കാണിച്ചയിവർ സമപ്രായക്കാരായ വിദ്യാർത്ഥികളെക്കാൾ മേന്മയർഹിക്കുന്നവരാണ്.

   ('PT' കാരണം, പൊതുവെ കൗമാരത്തിന്റെ ആദ്യ കാലഘട്ടങ്ങളിൽ ഭൂരിഭാഗവും ഇതുപോലെ വളരെ പ്രാധാന്യമർഹിക്കുന്ന വിഷയങ്ങളിൽ പൊതുവെ തല്പരരല്ല. അതുപോലെ തന്നിരിക്കുന്ന വസ്തുതകളിൽ നിന്ന് മറ്റു സമപ്രായക്കാർ എത്രത്തോളം തല്പരരാണെന്നു വ്യക്തമല്ല. അതുകൊണ്ട് ഈ പ്രസ്താവന മുഴുവനായും ശരിയെന്നു പറയാൻ സാധിക്കുകയില്ല. ഈ സമ്മേളനത്തിൽ പങ്കെടുത്ത യെല്ലാവരും ഒരുപോലെ തല്പരരാണെന്നു സങ്കല്പിക്കാൻ കഴിയുകയില്ല.)

2. ഭൂരിഭാഗം വിദ്യാർത്ഥികളും സമ്മേളനത്തിനു മുമ്പ് ഈ വിഷയത്തെക്കുറിച്ച് വിദ്യാലയത്തിൽ വെച്ചു ചർച്ചചെയ്യപ്പെട്ടിട്ടില്ല.

   ('PF' കാരണം ഈ വിഷയത്തിൽ അറിവു പ്രകടിപ്പിക്കുന്ന വിദ്യാർത്ഥികൾ അധ്യാപകരും സഹവിദ്യാർത്ഥികളുമായി മിക്കവാറും ഈ വിഷയങ്ങളെക്കുറിച്ചു ചർച്ച ചെയ്യപ്പെട്ടേക്കാം.)

3. രാജ്യത്തിന്റെ വിവിധഭാഗങ്ങളിൽ നിന്നുള്ള വിദ്യാർത്ഥികൾ ഈ സമ്മേളനത്തിൽ പങ്കെടുത്തിട്ടുണ്ടായിരുന്നു.

   ('ID' കാരണം ഈ ഒരു അനുമാനത്തിലെത്തിച്ചേരാനുള്ള വസ്തുതകളൊന്നും തന്നെ കാണുന്നില്ല.)

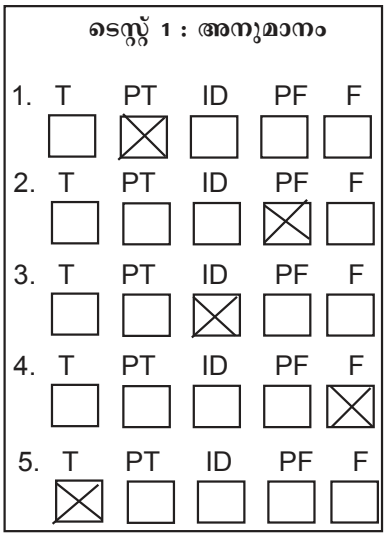
4. വ്യാവസായികമായ പ്രശ്നങ്ങളെക്കുറിച്ചാണ് വിദ്യാർത്ഥികൾ പ്രധാനമായും ചർച്ച ചെയ്തത്.

   ('F' വംശസംബന്ധിയും ലോകസമാധാനം ആർജിച്ചെടുക്കേണ്ടതുമായ സംഗതികളെക്കുറിച്ചാണ് ചർച്ച ചെയ്തിട്ടുള്ളതെന്ന് തന്നിരിക്കുന്ന വസ്തുതകളിൽ നിന്നും വ്യക്തമാണ്.)

5. വംശസംബന്ധിയായക്കാര്യങ്ങളെക്കുറിച്ചും ലോകസമാധാനം എങ്ങനെ ആർജിച്ചെടുക്കാമെന്നുള്ള ഗുണകരമായ കാര്യങ്ങളെക്കുറിച്ചാണ് കൗമാരക്കാരായ ഏതാനും വിദ്യാർത്ഥികൾ

ചർച്ച ചെയ്തത്.

('T' കാരണം, ഈ ഒരു അനുമാനം തന്നിരിക്കുന്ന വസ്തുതകളെ പൂർണ്ണമായും അടിസ്ഥാനപ്പെടുത്തിയാണ്.)



പരിശീലന പ്രവർത്തനങ്ങൾ

പ്രസ്താവന :

പഠനങ്ങളിൽ തെളിയുന്നത് ഇംഗ്ലണ്ടിന്റെ വടക്കുഭാഗത്തുള്ള ജനങ്ങൾക്ക് തെക്ക് ഭാഗത്തുള്ള ജനങ്ങളേക്കാൾ, ഹൃദയ സംബന്ധിയായ അസുഖങ്ങൾ കൂടുതലാണെന്നു കാണുന്നു. ഒരേ വരുമാന നിലവാരമുള്ള വടക്കു, തെക്കു ഭാഗങ്ങളിലെ ജനങ്ങളുടെ ഹൃദയസംബന്ധിയായ അസുഖങ്ങളുടെ കണക്കാണിത്. ഇതിലെന്തെങ്കിലും ഏറ്റക്കുറച്ചിലുകൾ കണ്ടേക്കാം. ഇംഗ്ലണ്ടിന്റെ തെക്കു ഭാഗത്തുള്ള ജനങ്ങളുടെ ശരാശരി വരുമാനം, വടക്കുഭാഗത്തുള്ള ജനങ്ങളെക്കാൾ തുലോം കൂടുതലാണ് എന്നാണ് അനുമാനിക്കുന്നത്.

നിർദ്ദേശിക്കപ്പെടുന്ന ധാരണകൾ :

1. ജീവിതനിലവാരം ഉയർത്തുന്നതിലൂടെ ഇംഗ്ലണ്ടിലെ ഹൃദയ സംബന്ധിയായ രോഗങ്ങളെ എളുപ്പത്തിൽ ദൂരീകരിക്കാം.

2 ഉയർന്ന വരുമാനക്കാരിൽ ഹൃദയസംബന്ധിയായ രോഗങ്ങൾ രൂപാന്തരപ്പെടുന്നതിനേക്കാൾ സാധ്യത താഴ്ന്ന വരുമാനക്കാരിലാണ്.

3. ഹൃദയ സംബന്ധിയായ അസുഖങ്ങളുടെ നിരക്ക് വടക്കുഭാഗത്തുള്ള ഉയർന്ന വരുമാനക്കാരും താഴ്ന്ന വരുമാനക്കാരും തമ്മിൽ തുലനം ചെയ്യുമ്പോൾ ഉയർന്ന വരുമാനക്കാരിൽ അത് കുറവാണെന്നു കാണാം.

4. വടക്കുഭാഗത്തുള്ള ജനങ്ങളിൽ ഉയർന്ന വരുമാനക്കാരോ താഴ്ന്ന വരുമാനക്കാരോയെന്ന വ്യത്യാസമില്ലാതെ അവർക്ക് ഹൃദയ സംബന്ധിയായ രോഗം പിടിപ്പെടാൻ സാധ്യതയുണ്ട്.

ടെസ്റ്റ് 2 : ധാരണകളെ വിവേചിച്ചറിയൽ

നിർദ്ദേശങ്ങൾ

ചില കാര്യങ്ങൾ മുൻകൂട്ടി തീരുമാനിക്കുകയോ അഥവാ ഉറപ്പായും സംഭവിക്കുമെന്നു കരുതുന്നതിനെയാണ് ധാരണയെന്നു പറയുന്നത്. നിങ്ങളിപ്പോൾ പറയുകയാണ് ''രണ്ട് മാസത്തിനകം ഞാനൊരു സോളിസ്സിറ്റർ ആകുമെന്ന്''. അതിന് ഈ രണ്ടുമാസം നിങ്ങൾ ജീവിച്ചിരിക്കുകയും; അതിനുള്ള യോഗ്യതാ പരീക്ഷയും മറ്റ് അനുബന്ധ കാര്യങ്ങളും നിങ്ങൾ വിജയിക്കുകയും വേണം.

താഴെ നിരവധി പ്രസ്താവനകളും, ഓരോ പ്രസ്താവനകൾക്കും നിർദ്ദേശിക്കപ്പെടുന്ന നിരവധി ധാരണകളും കാണാം. ഒരു വ്യക്തിയെന്ന നിലയിൽ ഓരോ ധാരണയും അംഗീകരിക്കപ്പെടേണ്ടതും ന്യായീകരിക്കപ്പെടേണ്ടതും ആണോ, അതൊ അതിനു കഴിയാത്തതാണോ എന്ന് നിങ്ങൾ വിലയിരുത്തുക.

തന്നിരിക്കുന്ന ധാരണ അംഗീകരിക്കുന്നെങ്കിൽ ശരിയെന്നും ഇല്ലെങ്കിൽ തെറ്റെന്നും ഉത്തരക്കടലാസ്സിൽ രേഖപ്പെടുത്തുക. ഓരോ ധാരണകളും സ്വതന്ത്രമായി വിലയിരുത്തേണ്ടതാണ്. താഴെ ഉദാഹരണം കൊടുത്തിട്ടുണ്ട്. വലതുവശത്തുള്ള ബോക്സിൽ അവയുടെ ഉത്തരം എങ്ങനെ രേഖപ്പെടുത്തണമെന്നും കാണിച്ചിരിക്കുന്നു.

ഉദാഹരണം

പ്രസ്താവന :

സമയം നഷ്ടപ്പെടുത്താതെ നിർദ്ദേശിക്കപ്പെടുന്ന സ്ഥലത്തെത്തുവാൻ വിമാനയാത്ര ആവശ്യമാണ്.

നിർദ്ദേശിക്കപ്പെടുന്ന ധാരണകൾ :

1. വിമാന മാർഗ്ഗമാണ് പോകുന്നതെങ്കിൽ മറ്റു യാത്രാ മാർഗ്ഗങ്ങളേക്കാൾ കുറഞ്ഞ സമയം മതി.

(ശരി, എത്തിച്ചേരേണ്ട സ്ഥലത്തേയ്ക്ക് വിമാന മാർഗ്ഗമാണ് പോകുന്നതെങ്കിൽ യാത്രക്കു വേണ്ടി ഉപയോഗിക്കാവുന്ന മറ്റു മാർഗ്ഗങ്ങളേക്കാൾ വളരെ വേഗത്തിലെത്തിച്ചേരാമെന്നു പ്രസ്താവനയിൽ ചൂണ്ടികാണിക്കുന്നുണ്ട്.)

2. എത്തിച്ചേരേണ്ട സ്ഥലത്തിന്റെ കുറച്ചു ദൂരമെങ്കിലും സഞ്ചരിക്കുവാൻ നമുക്ക് വിമാനത്തിന്റെ സേവനം ലഭ്യമാണ്.

(ശരി, ഇത് പ്രസ്താവനയിൽ സൂചിപ്പിക്കുന്നുണ്ട്. വിമാന മാർഗ്ഗം സമയം ലാഭിക്കാമെന്നുണ്ടെങ്കിൽ വിമാനം വഴി അവിടെ എത്തിച്ചേരാനുള്ള സാധ്യതയും വേണം.)

3. വിമാനയാത്രയാണ് തീവണ്ടിയാത്രയേക്കാൾ സുഖപ്രദം.

(തെറ്റ്, ഈ ഒരു കാര്യം പ്രസ്താവനയിൽ കാണുന്നില്ല. സമയ ലാഭത്തെക്കുറിച്ചല്ലാതെ മറ്റു യാത്രാ രീതികളെക്കുറിച്ചോ സൗകര്യങ്ങളെക്കുറിച്ചോ പ്രതിപാദിക്കുന്നില്ല.)

ടെസ്റ്റ് 2 : ധാരണകളെ വിവേചിച്ചറിയൽ

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പരിശീലന പ്രവർത്തനങ്ങൾ

പ്രസ്താവന :

ഒരു സ്വതന്ത്ര സമൂഹത്തിൽ വ്യക്തികളെ ബുദ്ധിപൂർവ്വമായ തീരുമാനങ്ങളെടുക്കാൻ പ്രാപ്തരാക്കുകയെന്നുള്ളതാണ് വിദ്യാഭ്യാസത്തിന്റെ കാതലായ ലക്ഷ്യം.

നിർദ്ദേശിക്കപ്പെടുന്ന ധാരണകൾ :

5. സ്വതന്ത്രമായ ഒരു സമൂഹത്തിൽ വിദ്യാഭ്യാസം നേടിയ വ്യക്തികൾ ഒരിക്കലും ബുദ്ധിപൂർവ്വമല്ലാത്ത തീരുമാനങ്ങൾ എടുക്കുകയില്ല.

6. വ്യക്തമായ കാഴ്ചപ്പാടില്ലാത്ത ചില വിദ്യാഭ്യാസരീതികൾ നമ്മുടെ സമൂഹത്തിൽ ഉണ്ട്.

7. ചില വിദ്യാഭ്യാസ സമ്പ്രദായങ്ങൾ വ്യക്തികളെ ബുദ്ധിപരമായ തീരുമാനങ്ങളിലെത്തിച്ചേരാൻ പ്രാപ്തരാക്കുന്നു.

8. സ്വതന്ത്രമല്ലാത്ത ഒരു സമൂഹത്തിൽ വ്യക്തികളെ ഏതെങ്കിലും തീരുമാനങ്ങളിൽ എത്തിച്ചേരാൻ അനുവദിക്കുന്നില്ല.

ടെസ്റ്റ് 3 : വ്യവകലനം

നിർദ്ദേശങ്ങൾ

ഈ ടെസ്റ്റിലെ ഓരോ പരിശീലന പ്രവർത്തനത്തിലും നിരവധി പ്രസ്താവനകളും തുടർന്ന നിരവധി നിഗമനങ്ങളും നിർദ്ദേശിക്കപ്പെടുന്നു. തന്നിരിക്കുന്ന പ്രസ്താവനകളെ പൂർണ്ണമായും മുഖവിലയ്ക്കെടുത്തെങ്കിലേ ഈ ടെസ്റ്റിന്റെ ഉദ്ദേശ്യ ലക്ഷ്യം നടപ്പിലാവൂ. പ്രസ്താവനയ്ക്കു താഴെയുള്ള നിഗമനം ആദ്യം വായിക്കുക. തന്നിരിക്കുന്ന പ്രസ്താവനയെ സാധൂകരിക്കുന്നവയാണ്

എന്നു നിങ്ങൾ ചിന്തിക്കുന്നുവെങ്കിൽ ഉത്തര കടലാസ്സിൽ ശരിയെന്നു രേഖപ്പെടുത്തുക. മറിച്ചു ചിന്തിക്കുന്നെങ്കിൽ തെറ്റെന്നു രേഖപ്പെടുത്തുക. തന്നിരിക്കുന്ന പ്രസ്താവനകളെ മാത്രം അടിസ്ഥാനമാക്കിയാവണം നിങ്ങളുടെ ഉത്തരങ്ങൾ, മറിച്ച് നിങ്ങളുടെ മുൻധാരണകൾ വെച്ചുകൊണ്ടുള്ള വിലയിരുത്തലുകളാകരുതെ.

ഉദാഹരണം

പ്രസ്താവന :

ചില അവധി ദിവസങ്ങളിൽ മഴയുണ്ടാകാറുണ്ട്. എല്ലാ മഴ ദിവസങ്ങളും മോശമാണ്. അതുകൊണ്ട്:

നിർദ്ദേശിക്കപ്പെടുന്ന നിഗമനങ്ങൾ :

1. പ്രകാശം കുറഞ്ഞ ദിവസങ്ങൾ മോശമാണ്.

   (തെറ്റ്, ഇത് പ്രസ്താവനയെ സാധൂകരിക്കുന്നില്ല. പ്രസ്താവനയെ അടിസ്ഥാനപ്പെടുത്തി പ്രകാശ കുറവുള്ള ദിവസങ്ങളെല്ലാം മോശമാണെന്ന പ്രസ്താവിച്ചു കൂടാ, ചിലത് അങ്ങനെയായിരിക്കാം.)

2. ചില ഒഴിവു ദിനങ്ങൾ മോശമാവാറുണ്ട്.

   (ശരി, ഈ നിഗമനം ശരിയാണ്. എല്ലാ മഴ ദിവസങ്ങളും മോശമാണെന്നു പ്രസ്താവനയിൽ പറഞ്ഞിട്ടുണ്ട്.)

3. ചില ഒഴിവുദിനങ്ങൾ അത്ര മോശമാകാറില്ല.

   (തെറ്റ്, ഇത് പ്രസ്താവനയെ സാധൂകരിക്കുന്നില്ല. ചില ഒഴിവു ദിനങ്ങൾ രസകരമാണെന്നു നിങ്ങൾക്കറിയാമായിരുന്നെങ്കിലും.)

ടെസ്റ്റ് 3 : വ്യവകലനം

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പരിശീലന പ്രവർത്തനങ്ങൾ

പ്രസ്താവന :

ഉത്തരവാദിത്തമുള്ള ഒരു നേതാവും ബുദ്ധിമുട്ടേറിയ തീരുമാനങ്ങൾ എടുക്കുവാൻ മടികാണിക്കാറില്ല. എന്നാലിക്കാര്യത്തിൽ ഉത്തരവാദിത്ത്വമുള്ള ചില നേതാക്കൾ മറിച്ചുമാണ്. അതുകൊണ്ട് :

നിർദ്ദേശിക്കപ്പെടുന്ന നിഗമനങ്ങൾ :

9. വിഷമകരമായ ചില തീരുമാനങ്ങൾ ചില ആളുകളിൽ അസ്വാരസ്യമുണ്ടാക്കാറുണ്ട്.
10. ഉത്തരവാദിത്തമില്ലാത്ത നേതാക്കൾ തങ്ങൾക്ക് ഇഷ്ടമില്ലാത്ത കാര്യങ്ങൾ ഒഴിവാക്കാറുണ്ട്.
11. ഉത്തരവാദിത്തമുള്ള ചില നേതാക്കളെങ്കിലും തങ്ങൾക്ക് ചെയ്യാൻ ഇഷ്ടമില്ലാത്ത കാര്യങ്ങളും ചെയ്യാറുണ്ട്.

ടെസ്റ്റ് 4 : വ്യാഖ്യാനം

നിർദ്ദേശങ്ങൾ

ഓരോ പരിശീലന പ്രവർത്തനത്തിലും ഒരു ചെറിയ ഖണ്ഡികയും തുടർന്ന് നിരവധി നിഗമനങ്ങളും നിർദ്ദേശിക്കുന്നു. തന്നിരിക്കുന്ന ഖണ്ഡികയിൽ പറഞ്ഞിരിക്കുന്ന കാര്യങ്ങളെല്ലാം ശരിയാണെന്നു ധരിക്കേണ്ടത് ഈ ടെസ്റ്റിന്റെ ഉദ്ദേശ്യലക്ഷ്യങ്ങൾ നേടിയെടുക്കുവാൻ അത്യന്താപേക്ഷിതമാണ്. ഖണ്ഡികയിൽ പറഞ്ഞിരിക്കുന്ന വിവരങ്ങൾ അടിസ്ഥാനപ്പെടുത്തിയാണോ നിഗമനങ്ങൾ നിർദ്ദേശിച്ചിരിക്കുന്നതെന്ന് പരിശോധിച്ചു വിലയിരുത്തുകയാണ് ഇവിടെ ചെയ്യേണ്ടത്. നിർദ്ദേശിച്ചിരിക്കുന്ന നിഗമനങ്ങൾ പറഞ്ഞിരിക്കുന്ന വസ്തുതകൾക്ക് അനുസരിച്ചാണെങ്കിൽ 'ശരി' എന്നും മറിച്ചാണെങ്കിൽ "തെറ്റ്" എന്നും രേഖപ്പെടുത്തുക.

നിഗമനങ്ങളെ സ്വതന്ത്രമായി വിലയിരുത്തുവാൻ ശ്രദ്ധിക്കുക.

ഉദാഹരണം

പ്രസ്താവന :

എട്ടുമാസം മുതൽ ആറു വയസ്സുവരെയുള്ള കുട്ടികളിൽ പദ സമ്പത്തെത്രത്തോളമുണ്ടെന്ന അറിയുവാൻ വേണ്ടി നടത്തിയ പഠനത്തിൽ കാണാൻ കഴിഞ്ഞത് ഒരു പദംപ്പോലും പറയുവാൻ കഴിയാത്ത എട്ടുമാസം പ്രായമുള്ള ഒരു കുഞ്ഞ് ആറുവയസ്സാകുമ്പോഴേക്കും രണ്ടായിരത്തി അഞ്ഞൂറ്റി അറുപത്തി രണ്ട് (2562) വാക്കുകൾ പറയുവാൻ പഠിക്കും.

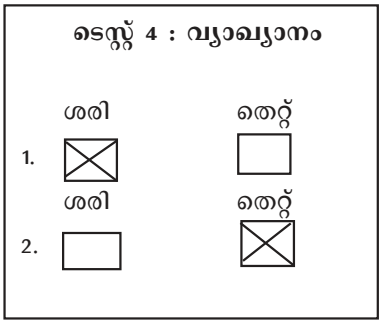
നിർദ്ദേശിക്കപ്പെടുന്ന നിഗമനങ്ങൾ :

1. ആറുമാസം പ്രായമുള്ള ഒരു കുട്ടിയും സംസാരിക്കാൻ പഠിച്ചിട്ടില്ലെന്ന് ഈ പഠനം വഴി തെളിഞ്ഞു.

(ശരി, കാരണം ഈ നിഗമനം പ്രസ്താവനയെ ശരിവെയ്ക്കുന്നു. എട്ടു മാസം പ്രായമുള്ള ഒരു കുട്ടിക്ക് ഒരു വാക്കുപോലും സംസാരിക്കാൻ കഴിയില്ലെന്നു പ്രസ്താവനയിൽ പറഞ്ഞിരിക്കുന്നു.)

2. കുട്ടികൾ നടക്കാൻ പഠിക്കുന്ന അവസരത്തിൽ അവരിൽ പദ സമ്പത്തിന്റെ വളർച്ച മന്ദഗതിയിലായിരിക്കും.

(തെറ്റ്, ഈ നിഗമനം തെറ്റാണ്. കാരണം പ്രസ്താവനയിൽ ഒരിടത്തും പദസമ്പത്തിന്റെ വളർച്ചയും നടക്കുവാൻ പഠിക്കുന്നതും തമ്മിൽ ബന്ധപ്പെടുത്തി പറഞ്ഞിട്ടില്ല.)



പരിശീലന പ്രവർത്തനങ്ങൾ

പ്രസ്താവന :

1970 ൽ 25 വയസ്സും അതിനുമുകളിലുമുള്ള ആളുകളിൽ 60.4% പേരും 11 വർഷമോ, അതിനു താഴെയോ സ്കൂൾ വിദ്യാഭ്യാസം നേടിയവരും, 4.6% ആളുകൾ മൂന്നോ അതിലധികമോ, വർഷത്തെ കോളേജു വിദ്യാഭ്യാസം നേടിയവരുമായിരുന്നു. 1990ൽ 40% വും പതിനൊന്നോ അതിൽ കുറവോ വർഷത്തെ സ്കൂൾ വിദ്യാഭ്യാസം നേടിയവരും 7.1% ആളുകൾ മൂന്നോ അതിലധികമോ വർഷത്തെ കോളേജു വിദ്യാഭ്യാസം നേടിയവരുമായിരുന്നു.

നിർദ്ദേശിക്കപ്പെടുന്ന നിഗമനങ്ങൾ :

12. 1970 ൽ പ്രായപൂർത്തിയായവരിൽ ഭൂരിഭാഗം പേരും 6-ാം തരത്തിലെത്തിയിട്ടില്ല,.

13. മുകളിൽ പ്രസ്താവിച്ചിരിക്കുന്നതുപോലെ വിദ്യാഭ്യാസത്തിനോടുള്ള ഈ അഭിനിവേശം തുടരുകയാണെങ്കിൽ, രണ്ടായിരം ആകുമ്പോഴേക്കും മൂന്നോ അതിലധികമോ വർഷത്തെ കോളേജു വിദ്യാഭ്യാസം നേടിയവർ 25% ലും കൂടും.

14. 1990 ൽ പ്രായപൂർത്തിയായവരിൽ ഓരോരുത്തരം മൂന്നോ അതിലധികമോ വർഷത്തെ കോളേജു വിദ്യാഭ്യാസം പൂർത്തിയാക്കിയിരുന്നു. പ്രായപൂർത്തിയായവരിൽ അഞ്ചി ലധികം പേരും 11 വർഷത്തിൽ കൂടുതൽ വിദ്യാഭ്യാസം പൂർത്തിയാക്കാ ത്തവരായിരുന്നു.

ടെസ്റ്റ് 5 : വിവാദ വിഷയങ്ങളുടെ വിലയിരുത്തൽ

നിർദ്ദേശങ്ങൾ

പ്രാധാന്യമർഹിക്കുന്ന പ്രധാനപ്പെട്ട ചോദ്യങ്ങളിൽ തീരുമാനമെടുക്കേണ്ടി വരുമ്പോൾ ഉന്നയിക്കപ്പെടുന്ന വാദങ്ങൾ ഉറപ്പുള്ളതാണോ അല്ലയോയെന്ന് വേർതിരിച്ചറിയുന്നത് അഭികാമ്യമാണ്. ഒരു വാദം ഉറപ്പുള്ളതാണെങ്കിൽ അത് പ്രാധാന്യം അർഹിക്കുന്നതും ഉന്നയിക്കപ്പെടുന്ന ചോദ്യത്തോട് നേരിട്ട് ബന്ധമുള്ളതുമായിരിക്കും. ഒരു വാദം ഉറപ്പുള്ളതല്ലെങ്കിൽ നേരെ വിപരീതമായിരിക്കും. താഴെ ചോദ്യങ്ങളുടെ ഒരു ശ്രേണിയും അതിനു തുടർച്ചയായി പലവിധ വാദമുഖങ്ങളും നിരത്തിയിട്ടുണ്ട്. തന്നിരിക്കുന്ന വാദമുഖങ്ങളെല്ലാം ശരിയാണെന്നു ധരിക്കേണ്ടത് ഈ ടെസ്റ്റിന്റെ ഉദ്ദേശ്യലക്ഷ്യങ്ങൾ നേടുന്നതിന് അത്യന്താപേക്ഷിതമാണ്. ആ വാദമുഖങ്ങൾ ഉറപ്പുള്ളതോ അല്ലയൊയെന്ന് പരിശോധിക്കുകയാണ് ഇവിടെ ചെയ്യേണ്ടത്.

വാദമുഖങ്ങൾ ഉറപ്പുള്ളതാണെന്നു ചിന്തിക്കുന്നുവെങ്കിൽ ഉത്തരക്കടലാസ്സിൽ ഉറപ്പുള്ളതെന്നും, അല്ലെങ്കിൽ ഉറപ്പില്ലാത്തതെന്നും രേഖപ്പെടുത്തുക. ഓരോ വാദമുഖങ്ങളേയും വേർതിരിച്ച് അവയുടെ പ്രാധാന്യമനുസരിച്ച് വിലയിരുത്തുക. ഓരോ ചോദ്യങ്ങളെയും പൂർണ്ണമായ വിശ്വാസത്തിലെടുത്തു കഴിഞ്ഞാൽ, വാദവിഷയങ്ങളെ വിലയിരുത്തുമ്പോൾ നിങ്ങളുടെ മനോഭാവം ഒരിക്കലും അതിന് സ്വാധീനിക്കാതേ നോക്കണം.

ഉദാഹരണം

പ്രസ്താവന :

ഇംഗ്ലണ്ടിലെ എല്ലാ യുവജനങ്ങളും ഉന്നത വിദ്യാഭ്യാസം നേടേണ്ടതുണ്ടോ ?

നിർദ്ദേശിക്കപ്പെടുന്ന വാദമുഖങ്ങൾ :

1. വേണം, കോളേജിലേക്ക് സ്കാഫ് കെട്ടി പോകുവാനുള്ള അവസരം അത് നമുക്ക് പ്രദാനം ചെയ്യുന്നു.

   (ഉറപ്പില്ലാത്തത്, ഈ ഒരു നിസ്സാരക്കാര്യത്തിനു വേണ്ടി വർഷങ്ങളോളം കോളേജിൽ ചെലവഴിക്കേണ്ടതില്ല.)

2. വേണ്ട, വലിയൊരു വിഭാഗം യുവജനങ്ങൾക്കും കോളേജു വിദ്യാഭ്യാസം നേടുന്നതിനാവശ്യമായ കഴിവോ താല്പര്യമോ ഇല്ലയെന്നുള്ളതാണ് സത്യം.

   (ഉറപ്പുള്ളത്, എല്ലാ യുവജനങ്ങളും കോളേജിലേക്ക് പോകുന്നതിനെതിരെ നിരത്തുന്നൊരു വാദഗതിയാണിത്.)

3. വേണ്ട, ആവശ്യത്തിലധികമായ പഠനം വ്യക്തിത്വത്തെ സങ്കുചിതമാക്കുന്നു.

(ഉറപ്പില്ലാത്തത്, വാദഗതി വളരെ പ്രാധാന്യമർഹിക്കുന്നതാണെങ്കിലും ഇവിടെ അത് ചോദ്യവുമായി നേരിട്ട് ബന്ധമില്ലാത്തതാണ്. അധിക പഠനത്തിന് ഒരിക്കലും കോളേജിൽ പോയി പഠിക്കണമെന്നില്ല.)

ടെസ്റ്റ് 5 : വിവാദവിഷയങ്ങളുടെ വിലയിരുത്തൽ

	ഉറപ്പുള്ളത്	ഉറപ്പില്ലാത്തത്
1	☐	☒
	ഉറപ്പുള്ളത്	ഉറപ്പില്ലാത്തത്
2.	☒	☐
	ഉറപ്പുള്ളത്	ഉറപ്പില്ലാത്തത്
3.	☐	☒

പരിശീലന പ്രവർത്തനങ്ങൾ

പ്രസ്താവന :

കുട്ടികൾ ഉള്ളതുകൊണ്ട് കുടുംബത്തിന്റെ ജീവിത നിലവാരം താഴാതെ നോക്കുന്നതിനു വേണ്ടി കുടുംബത്തിന്റെ സംരക്ഷണത്തിൽ കഴിയുന്ന ഓരോ കുട്ടിക്കും സർക്കാർ സഹായധനം കൊടുക്കുന്നുണ്ട്.

നിർദ്ദേശിക്കപ്പെടുന്ന വാദമുഖങ്ങൾ :

15. വേണ്ടതാണ്; ഒരുപാട് കുടുംബാംഗങ്ങൾക്ക് തങ്ങളുടെ കുട്ടികളെ അർഹിക്കുന്ന രീതിയിൽ പരിചരിക്കാൻ കഴിയുന്നില്ല. മാത്രമല്ല ഇതു വഴി രാജ്യത്തിന്റെ പൊതുജനാരോഗ്യം ഉയർത്തുവാനും കഴിയും.

16 ആവശ്യമില്ല, ഇതു പോലുള്ള ധനസഹായങ്ങൾ രക്ഷിതാക്കളെ സ്വന്തം കുടുംബത്തേക്കുറിച്ചുള്ള ഉത്തരവാദിത്തമില്ലായ്മയിലേക്കു നയിക്കും.

17 ആവശ്യമില്ല, സർക്കാർ അനുവദിക്കുന്ന ഇതു പോലുള്ള ധനസഹായങ്ങൾ സർക്കാരിന്റെ പൊതു ഖജനാവിനു കൂടുതൽ നഷ്ടം വരുത്തിവെയ്ക്കും.

CRITICAL THINKING TEST

RESPONSE SHEET

Name of the Student : .....
Name of the School : .....

Class & Division : .....
Sex : .....

ടെസ്റ്റ് 1 : അനുമാനം

	T	PT	ID	PF	F
1.	☐	☐	☐	☐	☐
2.	☐	☐	☐	☐	☐
3.	☐	☐	☐	☐	☐
4.	☐	☐	☐	☐	☐

ടെസ്റ്റ് 2 : ധാരണകളെ വിവേചിച്ചറിയൽ

	ശരി	തെറ്റ്
5.	☐	☐
6.	☐	☐
7.	☐	☐
8.	☐	☐

ടെസ്റ്റ് 3 : വ്യവകലനം

	ശരി	തെറ്റ്
9.	☐	☐
10.	☐	☐
11.	☐	☐

ടെസ്റ്റ് 4 : വ്യാഖ്യാനം

	ശരി	തെറ്റ്
12.	☐	☐
13.	☐	☐
14.	☐	☐

ടെസ്റ്റ് 5 : വിവാദവിഷയങ്ങളുടെ വിലയിരുത്തൽ

	ഉറപ്പുള്ളത്	ഉറപ്പില്ലാത്തത്
15.	☐	☐
16.	☐	☐
17.	☐	☐

Appendix -XVI

CRITICAL THINKING TEST

Dr. Mohamedunni Alias Mustafa
Assistant Professor, Dept. of Education
(Reader UGC ASC,on Deputation)
University of Calicut, Kerala, India

Franco T. Francis
Research Scholar,
Bharathiar University, Tamilnadu

Test 1: Inference

DIRECTIONS

An inference is a conclusion that a person can draw from certain observed or supposed facts. For example, if the lights are on in a house and music can be heard coming from the house, a person might infer that someone is at home. But this inference may or may not be correct. It is possible that the people of the house did not turn the lights and the radio off when they left the house.

In this test, each exercise begins with a statement of facts that you are to regard as true. After each statement of facts you will find several possible inferences i.e., conclusions that some persons might draw from the stated facts. Examine each inference separately, and make to decisions as to its degree of truth or falsity.

For each inference you will find spaces in the answer sheet labeled T, PT< ID, PF and F. For each inference put a cross on the answer sheet under the appropriate heading as follows:

T if you think the inference is definitely TRUE; that it properly follows beyond a reasonable doubt from the statement of facts given.

PT if, in the light of the facts given, you think the inference is PROBABLY TRUE; that it is more likely to be true than false.

ID if you decide that there are INSUFFICIENT DATA; that you cannot tell from the facts given whether the inference is likely to be true or false; if the facts provide no basis for judging one way or the other.

PF if, in the light of the facts given, you think the inference is PROBABLY FALSE; that it is more likely to be false than true.

F if you believe the inference is definitely FALSE; that it is wrong, either because it misinterprets the facts given, or because it contradicts the facts or necessary inferences from those facts.

Sometimes, in deciding whether an inference is probably true or probably false, you will have to use certain commonly accepted knowledge or information that practically every person has. This will be illustrated in the example that follows.

Now look at the example below; the correct answers are indicated in the box at the right.

In the exercises that follow, more than one of the inference from a given statement of facts may be true (T), or false (F), or probably true (PT), or probably false (PF), or have insufficient data (ID) to warrant any conclusion. Thus you are to judge each inference independently.

EXAMPLE

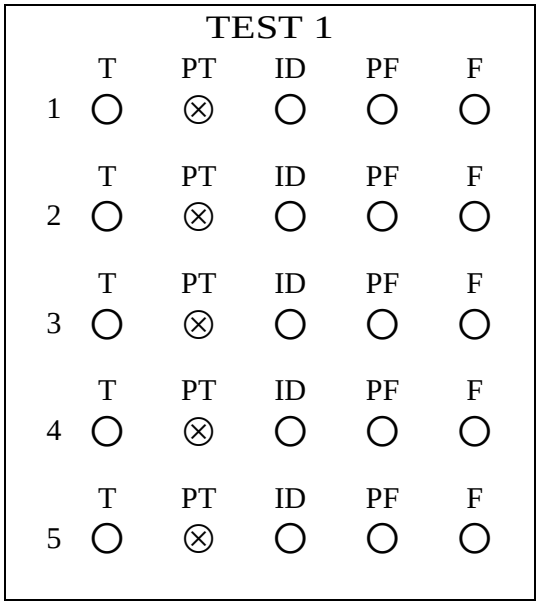
Statement

Two hundred school students in their early teens voluntarily attended a recent weekend student conference in Leeds. At this conference, the topics of race relations and means of achieving lasting world peace were discussed, since these were problems that the students selected as being most vital in today's world.

Proposed Inferences:

1. As a group, the students who attended this conference showed a keener in broad social problems than do most other people in their early teens. (PT because, as is common knowledge, most people in their early teens do not show so much serious concern with road social problems. It cannot be considered definitely true from the facts given because these facts given because these facts do not tell how much concern other young teenagers may have. It is also possible that some of the students volunteered to attend mainly because they wanted a weekend outing).

2. The majority of the students had not previously discussed the conference topics in the schools. (PF, because the students' growing awareness of these topics probably stemmed at least in part from discussions with teachers and classmates).
3. The students came from all parts of the country. (ID, because there is no evidence for this inference).
4. The students discussed mainly industrial relations problems. (F, because it is given in the statement of facts that the topics of race relations and means of achieving world peace were the problems chosen for discussion).
5. Some teenage students felt it worthwhile to discuss problems of race relations and ways of achieving world peace. (T, because this inference follows from the given facts; therefore it is true)



EXERCISES

Statements

Studies have shown that there is relatively much more heart disease among people living in the north of England than people living in the south of England. There is little if any difference, however, in rate of heart disease between northerners and southerners who have the same level of income. The average income of southerners in England is considerably higher than the average income of northerners.

Proposed Inferences:

1. The easiest way to eliminate heart disease in England would be to raise the general standard of living.
2. People in high income brackets are in a better position to avoid developing heart disease than people in low income brackets.
3. There is a lower rate of heart disease among northerners with relatively high incomes than among northerners with much lower incomes.
4. Whether northerners have high incomes or low incomes makes no difference to the likelihood of their developing heart disease.

Test 2: Recognition of Assumptions

DIRECTIONS

An assumption is something presupposed or taken for granted. When you say, 'I'll be a qualified solicitor in two months', you take it for granted that you will be alive in two months, that you will pass the relevant examinations, and similar things.

Below are a number of statements. Each statements is followed by several proposed assumptions. You are to decide for each assumption whether a person, in making the given statement, is really making that assumption, i.e., taking it for granted, justifiably or not.

If you think that the given assumption is taken for granted in the statement, mark 'YES' under 'Assumption made' in the proper place on the answer sheet. If you think the assumption is not necessarily taken for granted in the statement, mark 'NO' in the space under 'Assumption made'. Remember to judge each assumption independently. Below is an example. The box at the right shows how these items should be marked on the answer sheet.

EXAMPLE

Statement

'We need to save time in getting there so we'd better go by plane'.

Proposed assumptions

1. Going by plane will take less time than going by some other means of transportation. (YES, it is assumed in the statement that the greater speed of a plane over the speeds of other means of transportation will enable the group to reach its destination in less time).
2. There is a plane service available to us for at least part of the distance to the destination. (YES, this is necessarily assumed in the statement as, in order to save time by plane, it must be possible to go by plane).
3. Travel by plane is more convenient than travel by train. (NO, this assumption is not made in the statement-the statement has to do with saving time, and says nothing about convenience or about any other specific mode of travel)

TEST 2

Assumption made

	Yes	No
1	◯	⊗

Assumption made

	Yes	No
2	◯	⊗

Assumption made

	Yes	No
3	◯	⊗

Statement:

The proper aim of education in a free society is to prepare the individual to make wise decisions'.

Proposed assumptions:

5. People who have been educated in a free society will not make unwise decisions.
6. Some education systems in our society do not have the proper aim
7. Some kinds of education can help individuals make wise decisions.
8. In a society that is not free, the individual cannot make any decisions.

Test 3: Deduction

DIRECTIONS

In this test, each exercise consists of several statements (premises) followed by several suggested conclusions. *For the purpose of this test, consider the statements in teach exercise as true without exception*. Read the first conclusion beneath the statements. If you think it *necessarily* follows from the statements given, mark 'YES' under 'Conclusion follows' in the proper place on the Answer Sheet. If you think it is *not a necessary conclusion* from the statements given mark 'NO' under 'Conclusion follows', even though you may believe it to be true from you general knowledge. Similarly, read and judge each of the other conclusions. Try not to let your prejudices influence your judgement-just stick to the given statements (premises) and judge whether each conclusion *necessarily* follows:

The word 'some' in any of these statements means an indefinite part of quantity of a class of things. 'Some' means *at least* a portion, and perhaps *all* of the class. Thus, 'Some holidays are rainy' means *at least* one, possibly more than one, and perhaps even *all* holidays are rainy.

Study the example carefully before starting the test.

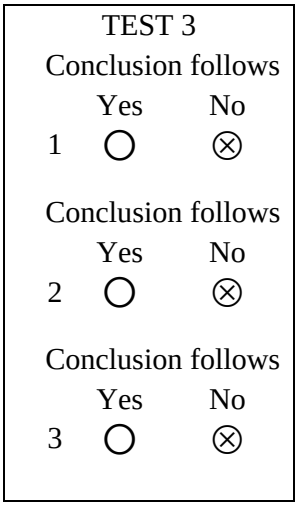
EXAMPLE

Statement

Some holidays are rainy. All rainy days are boring. Therefore:

Proposed Conclusions:

1. No clear days are boring, (NO, the conclusion does not follow. You cannot tell from the statements whether or not clear days are boring. Some may be)
2. Some holidays are boring (YES, the conclusion necessarily follows from the statements as, according to them, the rainy holidays must be boring)
3. Some holidays are not boring (NO, the conclusion does not follow, even though you may know that some holidays are very pleasant)



EXERCISES

Statement

No responsible leader can avoid making difficult decisions. Some responsible leaders dislike making difficult decisions. Therefore:

Proposed Conclusions:

9. Some difficult decisions are distasteful to some people.
10. Irresponsible leaders avoid things they dislike.
11. Some responsible leaders do things they dislike doing.

Test 4: Interpretation

DIRECTIONS

Each of the following exercises consists of a short paragraph followed by several suggested conclusion. *For the purpose of this test, assume that everything in the short paragraph is true.* The problem is to judge whether or not each of the proposed conclusions logically follows beyond a reasonable doubt *from the information given in the paragraph*. If you think that the proposed conclusion follows beyond a reasonable doubt (even though it may not follow absolutely and necessarily), mark ‘YES’ under ‘Conclusion Follows’ in the proper place on the

answer sheet. If you think that the conclusion does *not* follow beyond a reasonable doubt from the facts given, mark ‘No’ under ‘Conclusion Follows’.

Remember to judge each conclusion independently.

Look at the example below; the block at the right shows how the answers should be marked on the record form.

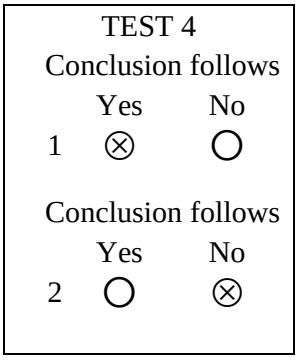
EXAMPLE

Statement

A study of vocabulary growth in children from eight months to six years old shows that the size of spoken vocabulary increase from 0 words at age eight months to 2,562 words at age six years.

Proposed Conclusions:

1. None of the children in this study had learned to learned to talk by the age of six months (YES, the conclusion follows beyond a reasonable doubt since, according to the statement, the size of the spoken vocabulary at eight months was 0 words)
2. Vocabulary growth is slowest during the period when children are learning to walk (NO, the conclusion does not follow as there is no information given that relates growth of vocabulary to walking).



EXERCISES

Statement:

In 1970, 60.4% of adults (people 25 years of age and older) had completed 11 years or less of schooling, while 4.6% had completed three or more years of university. In 1990, 40.0% of adults had completed 11 years or less of schooling, while 7.1% had completed three or more years of university.

Proposed Conclusions:

12. In 1970, most adults had not entered the sixth form.
13. If the trend toward more education continue at the rate indicated by the above figures, then by 2000 more than 25% of adults will have completed three or more years of university.
14. In 1990, for every adult who had completed three or more years of University, there were more than five adults who had completed not more than 11 years of schooling.

Test 5: Evaluation of Arguments

DIRECTIONS

In making decisions about important questions, it is desirable to be able to distinguish between arguments that are strong and arguments that are weak, as fat as the question at issue is concerned. *For an argument to be strong, it must be both important and directly related to the question.*

An argument is weak if it is not directly related to the question (even though it may be of great general importance), or if it is of minor importance, or if it is related only to trivial aspects of the question.

Below is a series of questions. Each question is followed by several arguments. *For the purpose of this test, you are to regard each argument as true*. The problem then is to decide whether it is a *strong* or a *weak* argument.

Mark ‘STRONG’ on the answer sheet under ‘Argument’ if you think the argument is strong, or ‘WEAK’ if you think the argument is weak. Judge each argument separately on its own merit. *Try not to let your personal attitude toward the question influence your evaluation of the argument, since each argument is to be regarded as true.*

In the example, note that the argument is evaluated as to how well it supports the side of the question indicated.

When the word ‘should’ is used as the first word in any of the following questions, its meaning is, ‘Would the proposed action promote the general welfare of the people in the United Kingdom?’.

EXAMPLE

Statement:

Should all young people in the United Kingdom go on to higher education?

Proposed Arguments:

1. Yes, college provides an opportunity for them to wear college scarves. (WEAK, this would be a silly reason for spending years in college)
2. No; a large percentage of young people do not have enough ability or interest to derive any benefit from college training. (STRONG. If it is true, as the direction require us to assume, it is a weighty argument against all young people going to college).
3. No; excessive studying permanently warps an individual’s personality. (WEAK, this argument, although of great general importance when accepted as true, is not directly related to the question, because attendance at college does not necessarily require excessive studying).

EXERCISES

Statement

Should the government provide ‘baby grants’ to help support each dependent child in a family so that the family standard of living is not lowered by having children?

Proposed arguments:

15. Yes; many families who cannot now afford it would then provide better childcare, and this would greatly improve the general health of the nation.
16. No; such grants would seriously undermine parents’ sense of personal responsibility for their own families.
17. No; government provision of ‘baby grants’ would involve additional public expenditure of money.

Appendix XVII

LIST OF EXPERTS

1. Prof (Dr) P. Kelu
   Former Professor
   Department of Education,
   University of Calicut
2. Dr. Manoj Praveen G.,
   Associate Professor,
   Department of Education,
   University of Calicut
3. Dr. Noushad P P,
   Associate Professor,
   School of Gandhian Thought & Developmental Studies,
   MG University.
4. Dr. M. Saheedali,
   Senior Lecturer in Educational Technology,
   DIET Palakkad
5. Divya D.,
   Lecturer,
   DIET Calicut
6. Dr. Ramitha P,
   Lecturer and Course Developer,
   Astria Learning,
   Florida, USA
7. Aboobacker Sidheeq,
   Karuthedath,
   Trainer BRC Vengara,
   UPST. Kallarkutty.
8. Bineesh T P,
   H S T Natural Science,
   Govt. H S S Puthur
9. Ramla P,
   H S T Natural Science,
   Crescent H S S Vanimel.