Summary and Conclusions
CHAPTER VI

SUMMARY AND CONCLUSIONS

In the preceding chapters, introduction to the problem, development of tools, methods of study and interpretation of results were discussed. The present chapter focuses around a brief description of the purpose, design and procedure of the study along with conclusions and suggestions for further research.

Introduction

Earlier the teaching consists mainly of giving lecture by the instructor and expecting students to be cognitively active but physically inactive. It was totally teacher centered but the advancement of technology has acted as a catalyst for considering full scale changes leading to quality education. The methodology of teaching is in a state of dynamic revolution today and use of computers in the classroom is a major transformation.

Computer Mediated Instructions

Computer Mediated Instruction is the instruction (which is usually curriculum based) that is presented, to the student channeled or processed through the medium of computer software. Computer Mediated Instructions is an umbrella term that subsumes computer based instructions, computer enriched instructions, online instructions, and computer mediated communication.

No doubt, technology enhances the quality of teaching learning process but it cannot replace teachers. Technology alone does not improve students’ achievements; trained teachers, school settings, smaller class size, proper content materials, cooperative learning and authentic instructions are an equally contributory factor in achievement (Johnson & Jennifer, 2005).

Thus, without declining either of human or technology part, an attempt has been made in present study to combine the advantages from both in the form of Hybrid Instruction.
6.1 Hybrid Instructions

Hybrid Instruction, also called blended learning/instructions, integrated teaching and web-enhanced instruction, combines the important features of traditional face to face classroom methods with more modern computer mediated instruction. It is format of instruction that combines dynamically both technology and human instruction components to maximize respective advantages, but excluding the passive co-presence of the both (Park, 2000). This strategy creates a more integrated approach for teachers and learners resulting in a socially supported, constructive, learning experience.

In this study the term hybrid instruction is used to denote fusion and integration of Computer Mediated Instructions (CMI) in traditional classroom environment, where the students will not be spoon fed rather they will explore the content themselves in cooperative settings with teacher intervention according to the need of the content and learner. In combination, the model is distinguished from either distance or traditional instruction, and can be employed in campus computer laboratories.

The use of technology in classroom does not only encourage teachers and students to work collaboratively but also results in more cooperative learning activities among the students. Thus, facilitating an atmosphere of cooperation rather than competition in the classroom.

6.2 Cooperative Learning

Cooperative learning is a generic term for various small group interactive instructional procedures where small groups of students work on a specified mission to trounce their collective weaknesses, build on their strengths and share their experiences with one another to gain knowledge. Students work in groups of four to six members to earn group recognition, rewards, and grades based on group performance.

The five basic attributes of cooperative learning approach are-
1. Positive interdependence
2. Face to face interaction
3. Individual accountability
4. Collaborative skills
5. Group processing
**Summary and Conclusions**

**Outcomes of Cooperative Learning:** Cooperative Learning provides opportunity to the students to present alternative perspective and viewpoints. This promotes student’s academic achievement, retention, critical thinking, reasoning, problem solving behaviour and self-esteem. It enables the students to develop communication and social skills.

**Computer Supportive Cooperative Learning (CSCL)**

Technology can be integrated in the cooperative learning environment and can be helpful in achieving a common goal of group learners (Steelman, 2005). Cooperative learning with computer mediated learning tools makes the group learning more efficient and enjoyable. When students pair up or work in small groups with the computer, they learn much more than the subject matter. They learn to work collaboratively, a skill that today's employers are looking for (Mandell, Sorge, & Russe 2002). All the principles, strategies apply equally well with computer supported cooperative learning.

Cooperative learning includes groupings of learners around computers, as in conventional classroom arrangements; and groupings of learners via computer networks (Higgins, 1991). Collaboration can take place at four points in computer use: (a) before working at the computer, (b) while using the computer, (c) during a pause in computer use and (d) after using the computer.

**6.3 Life Skills**

Life skills are a set of human skills acquired via direct experience or teaching that are used to handle problems and questions commonly encountered in life.

WHO (1997) defined Life Skills as the abilities for adaptive and positive behaviour that enable individuals to deal effectively with the demands and challenges of everyday life. They are abilities that facilitate the physical, mental and emotional well-being of an individual.

UNICEF defines life skills as “a behaviour change or behaviour development approach designed to address a balance of three areas: knowledge, attitude and skills”.

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UNICEF, UNESCO and WHO list the ten core Life Skills which are further segregated into three core groups. These are:

- Creative-Thinking
- Critical-Thinking
- Problem-Solving
- Decision-Making
- Self-Awareness
- Interpersonal-Relationships
- Empathy
- Effective-Communication
- Managing Feelings/Emotions
- Coping with Stress

The present study focused around thinking skills namely Critical Thinking, Creative Thinking, Decision Making and Problem Solving.

**Critical Thinking:** is an ability to analyze information and experiences in an objective manner. Critical-thinking can contribute by helping us to recognize and assess the factors that influence attitudes and behaviour, such as values, peer-pressure and the media.

**Creative Thinking:** contributes to both decision making and problem solving by enabling us to explore the available alternatives and various consequences of our actions or non-action. It helps us to look beyond our direct experience and even if no problem is identified, or no decision is to be made, creative-thinking can help us to respond adaptively and with flexibility to the situations of our daily lives.

**Decision Making:** helps us to deal constructively with decisions about our lives. This can have positive consequences for the health of young people when they actively make decisions about their own health practices by assessing different options and the effects of different decisions.

**Problem Solving:** enables us to deal constructively with problems in our lives. Significant problems that are left unresolved can cause mental-stress and give rise to accompanying physical strain.
The various Life Skills work best in conjunction. Many Life-Skills are required to manage a particular situation and cope with it effectively. One particular skill may be effectively utilized in diverse situations. The appropriate combination of Life Skills at a given moment is an art and adolescents learn their Life Skills from parents, teachers and their role models.

**Cooperative Learning and Thinking Skills**

Cooperative Learning tasks provide an ideal social environment in which we training of thinking skills can be incorporated. According to Lee (1997) four key thinking strategies that can be enhanced through it are: Problem Solving, Decision Making, Critical Thinking, and Creative Thinking. By using this technique teachers can help students analyze their thinking processes and encourage all students to interact with their teachers and peers. The use of cooperative learning provides all students with opportunities to recognize diversity in the views of their classmates while being held accountable, on an individual basis, for their own learning. The sharing of ideas allows students to explore, refine, and question new ideas. 

The ability to learn is the most important skill one can acquire. Better learning performance and life situation can be achieved through improving the match between learning approach and life situation. Key elements of quality learning relate to the students' perception of quality teaching that in turns influence their approach to study and ultimately learning outcomes.

**6.4 Learning Approaches**

An approach to learning describes the relationship between the student and a learning task. Morgan (1997) defines student approach to learning as what student do while studying course materials. The approach to learning the students undertake can have an influence on outcome of a course. This process is not static but is dynamic and changes as the situation changes. The important researches on approaches to learning are of Marton and Sajlo (1976), Biggs (1987) and Enstwistle (1991).
Classification of Learning Approaches

There are three common approaches to learning, which students follow while studying course materials:

❖ Deep Approach

Deep learning involves the critical analysis of new ideas, linking them to already known concepts and principles, and leads to understanding and long-term retention of concepts so that they can be used for problem solving in unfamiliar contexts. Deep learning promotes understanding and application for life.

❖ Surface Approach

Surface learning is the tacit acceptance of information and memorization as isolated and unlinked facts. It leads to superficial retention of material for examinations and does not promote understanding or long-term retention of knowledge and information.

❖ Achieving/Strategic Approach

Strategy Approach is the strategy in which learners adapt their learning style in order to fit with the needs of the task. The strategic approach derives from an intention to obtain the highest possible grades and involves adopting well-organized and efficient study methods.

Although, learners may be classified in terms of two or three categories of approach described above but they are not attributes of individuals. Rather they refer to the different approaches that students adopt. Students’ approaches can vary according to students’ perceptions of their learning environment. Students’ approaches to learning can be influenced by the teacher. All that is needed is the understanding on the part of teacher how to design learning opportunity that encourages students to adopt a particular approach. Good teaching should encourage a deep approach (together with an achieving approach) at the expense of a surface approach.

Thus, teachers can discourage cynicism and encourage intrinsic interest by sharing their own passion and enthusiasm for the subject, emphasizing its relevance, devising interesting assessments which help students to make connections between the subject and the ‘real world’.
6.5 Statement of the Problem

EFFECT OF HYBRID INSTRUCTIONAL MODEL IN COOPERATIVE LEARNING SITUATION ON LIFE SKILLS OF SECONDARY STUDENTS IN RELATION TO LEARNING APPROACHES

6.6 Delimitations of the Study

The present study was delimited with respect to the following:

1. HYBRID Instructions has been operationalised in two ways: (1) Computer Mediated Instructions in Cooperative Learning (HI-CL) provided in School campus computer Labs; (2) Fusion of selected life skill training in science curriculum.

2. The study was confined to students of class IX studying in Govt. Model Senior Secondary Schools situated in the Union Territory of Chandigarh.
   - Affiliated to CBSE.
   - English medium.
   - Co-educational.
   - Basic facilities of Computer Laboratory

3. The sample of the study was delimited to 300 students only.

4. The effect of treatment was studied on Achievement in science subject (Physics, Chemistry & Biology) only.

5. Only five Life Skills have been selected in the present study i.e.
   - Skill of Acquiring Knowledge
   - Skill of Problem Solving
   - Skill of Critical Thinking
   - Skill of Creative Thinking
   - Skill of Decision-Making
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6.7 Objectives of the Study
The study is designed to attain the following objectives

- To develop and validate Hybrid Instructional modules in science (Chemistry, Biology and Physics) for secondary students.
- To compare effectiveness of Hybrid Instructional modules in Cooperative Learning (HI-CL) situation as against Cooperative Learning (CL) and Conventional Group Learning (CGL).
- To study the impact of Hybrid Instructional Model in Cooperative Learning (HI-CL) situation on Life Skills namely Skill of Acquiring Knowledge, Skill of Critical Thinking, Skill of Decision-Making, Skill of Problem Solving and Skill of Creative Thinking.
- To study the impact of Learning Approaches on the selected Life Skills.
- To study interaction effect of Hybrid Instructional Model in Cooperative Learning (HI-CL) situation and Learning Approaches on the selected Life Skills.

6.8 Hypotheses

Ho. 1: The three treatment groups do not differ in respect of means of entry behaviour

Skill of Acquiring Knowledge

Ho. 2: HI-CL, CL and CGL instructional modes yield equal gain means for the Skill of Acquiring Knowledge in Chemistry.

- Ho. 2.1: HI-CL and CL instructional modes yield equal gain means for the Skill of Acquiring Knowledge in Chemistry.
- Ho. 2.2: HI-CL and CGL instructional modes yield equal gain means for the Skill of Acquiring Knowledge in Chemistry.
- Ho. 2.3: CL and CGL instructional modes yield equal gain means for the Skill of Acquiring Knowledge in Chemistry.

Ho. 3: Two Learning Approaches, Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Acquiring Knowledge in Chemistry.
Summary and Conclusions

Ho. 4: Instructional modes (HI-CL/CL/CGL) and Learning Approaches (DA/SA) do not interact in respect of gain means for the Skill of Acquiring Knowledge in Chemistry.

- **Ho. 4.1:** Through HI-CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Acquiring Knowledge in Chemistry.
- **Ho. 4.2:** Through CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Acquiring Knowledge in Chemistry.
- **Ho. 4.3:** Through CGL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Acquiring Knowledge in Chemistry.
- **Ho. 4.4:** For Deep Approach: HI-CL and CL yield equal gain means for the Skill of Acquiring Knowledge in Chemistry.
- **Ho. 4.5:** For Deep Approach: HI-CL and CGL yield equal gain means for the Skill of Acquiring Knowledge in Chemistry.
- **Ho. 4.6:** For Deep Approach: CL and CGL yield equal gain means for the Skill of Acquiring Knowledge in Chemistry.
- **Ho. 4.7:** For Surface Approach: HI-CL and CL yield equal gain means for the Skill of Acquiring Knowledge in Chemistry.
- **Ho. 4.8:** For Surface Approach: HI-CL and CGL yield equal gain means for the Skill of Acquiring Knowledge in Chemistry.
- **Ho. 4.9:** For Surface Approach: CL and CGL yield equal gain means for the Skill of Acquiring Knowledge in Chemistry.

Ho. 5: HI-CL, CL and CGL instructional modes yield equal gain means for the Skill of Acquiring Knowledge in Physics.

- **Ho. 5.1:** HI-CL and CL instructional modes yield equal gain means for the Skill of Acquiring Knowledge in Physics.
- **Ho. 5.2:** HI-CL and CGL instructional modes yield equal gain means for the Skill of Acquiring Knowledge in Physics.
- **Ho. 5.3:** CL and CGL instructional modes yield equal gain means for the Skill of Acquiring Knowledge in Physics.

Ho. 6: Two Learning Approaches, Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Acquiring Knowledge in Physics.
Summary and Conclusions

Ho. 7: Instructional modes (HI-CL/CL/CGL) and Learning Approaches (DA/SA) do not interact in respect of gain means for the Skill of Acquiring Knowledge in Physics.

- **Ho. 7.1:** Through HI-CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Acquiring Knowledge in Physics.
- **Ho. 7.2:** Through CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Acquiring Knowledge in Physics.
- **Ho. 7.3:** Through CGL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Acquiring Knowledge in Physics.
- **Ho. 7.4:** For Deep Approach: HI-CL and CL yield equal gain means for the Skill of Acquiring Knowledge in Physics.
- **Ho. 7.5:** For Deep Approach: HI-CL and CGL yield equal gain means for the Skill of Acquiring Knowledge in Physics.
- **Ho. 7.6:** For Deep Approach: CL and CGL yield equal gain means for the Skill of Acquiring Knowledge in Physics.
- **Ho. 7.7:** For Surface Approach: HI-CL and CL yield equal gain means for the Skill of Acquiring Knowledge in Physics.
- **Ho. 7.8:** For Surface Approach: HI-CL and CGL yield equal gain means for the Skill of Acquiring Knowledge in Physics.
- **Ho. 7.9:** For Surface Approach: CL and CGL yield equal gain means for the Skill of Acquiring Knowledge in Physics.

Ho. 8: HI-CL, CL and CGL instructional modes yield equal gain means for the Skill of Acquiring Knowledge in Biology.

- **Ho. 8.1:** HI-CL and CL instructional modes yield equal gain means for the Skill of Acquiring Knowledge in Biology.
- **Ho. 8.2:** HI-CL and CGL instructional modes yield equal gain means for the Skill of Acquiring Knowledge in Biology.
- **Ho. 8.3:** CL and CGL instructional modes yield equal gain means for the Skill of Acquiring Knowledge in Biology.

Ho. 9: Two Learning Approaches, Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Acquiring Knowledge in Biology.
Summary and Conclusions

Ho. 10: Instructional modes (HI-CL/CL/CGL) and Learning Approaches (DA/SA) do not interact in respect of gain means for the Skill of Acquiring Knowledge in Biology.

- **Ho. 10.1**: Through HI-CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Acquiring Knowledge in Biology.
- **Ho. 10.2**: Through CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Acquiring Knowledge in Biology.
- **Ho. 10.3**: Through CGL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Acquiring Knowledge in Biology.
- **Ho. 10.4**: For Deep Approach: HI-CL and CL yield equal gain means for the Skill of Acquiring Knowledge in Biology.
- **Ho. 10.5**: For Deep Approach: HI-CL and CGL yield equal gain means for the Skill of Acquiring Knowledge in Biology.
- **Ho. 10.6**: For Deep Approach: CL and CGL yield equal gain means for the Skill of Acquiring Knowledge in Biology.
- **Ho. 10.7**: For Surface Approach: HI-CL and CL yield equal gain means for the Skill of Acquiring Knowledge in Biology.
- **Ho. 10.8**: For Surface Approach: HI-CL and CGL yield equal gain means for the Skill of Acquiring Knowledge in Biology.
- **Ho. 10.9**: For Surface Approach: CL and CGL yield equal gain means for the Skill of Acquiring Knowledge in Biology.

Skill of Critical Thinking

**Ho. 11**: HI-CL, CL and CGL instructional modes yield equal gain means for the Skill of Critical Thinking.

- **Ho. 11.1**: HI-CL and CL instructional modes yield equal gain means for the Skill of Critical Thinking.
- **Ho. 11.2**: HI-CL and CGL instructional modes yield equal gain means for the Skill of Critical Thinking.
- **Ho. 11.3**: CL and CGL instructional modes yield equal gain means for the Skill of Critical Thinking.
Summary and Conclusions

**Ho. 12:** Two Learning Approaches, Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Critical Thinking.

**Ho. 13:** Instructional modes (HI-CL/CL/CGL) and Learning Approaches (DA/SA) do not interact in respect of gain means for the Skill of Critical Thinking.

- **Ho. 13.1:** Through HI-CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Critical Thinking.
- **Ho. 13.2:** Through CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Critical Thinking.
- **Ho. 13.3:** Through CGL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Critical Thinking.
- **Ho. 13.4:** For Deep Approach: HI-CL and CL yield equal gain means for the Skill of Critical Thinking.
- **Ho. 13.5:** For Deep Approach: HI-CL and CGL yield equal gain means for the Skill of Critical Thinking.
- **Ho. 13.6:** For Deep Approach: CL and CGL yield equal gain means for the Skill of Critical Thinking.
- **Ho. 13.7:** For Surface Approach: HI-CL and CL yield equal gain means for the Skill of Critical Thinking.
- **Ho. 13.8:** For Surface Approach: HI-CL and CGL yield equal gain means for the Skill of Critical Thinking.
- **Ho. 13.9:** For Surface Approach: CL and CGL yield equal gain means for the Skill of Critical Thinking.

**Skill of Decision Making**

**Ho. 14:** HI-CL, CL and CGL instructional modes yield equal gain means for Decision Making Ability.

- **Ho. 14.1:** HI-CL and CL instructional modes yield equal gain means for Decision Making Ability.
- **Ho. 14.2:** HI-CL and CGL instructional modes yield equal gain means for Decision Making Ability.
Summary and Conclusions

- **Ho. 14.3:** CL and CGL instructional modes yield equal gain means for Decision Making Ability.

**Ho. 15:** Two Learning Approaches, Deep Approach (DA) and Surface Approach (SA) yield equal gain means for Decision Making Ability.

**Ho. 16:** Instructional modes (HI-CL/CL/CGL) and Learning Approaches (DA/SA) do not interact in respect of gain means for Decision Making Ability.

  - **Ho. 16.1:** Through HI-CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for Decision Making Ability.
  - **Ho. 16.2:** Through CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for Decision Making Ability.
  - **Ho. 16.3:** Through CGL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for Decision Making Ability.
  - **Ho. 16.4:** For Deep Approach: HI-CL and CL yield equal gain means for Decision Making Ability.
  - **Ho. 16.5:** For Deep Approach: HI-CL and CGL yield equal gain means for Decision Making Ability.
  - **Ho. 16.6:** For Deep Approach: CL and CGL yield equal gain means for Decision Making Ability.
  - **Ho. 16.7:** For Surface Approach: HI-CL and CL yield equal gain means for Decision Making Ability.
  - **Ho. 16.8:** For Surface Approach: HI-CL and CGL yield equal gain means for Decision Making Ability.
  - **Ho. 16.9:** For Surface Approach: CL and CGL yield equal gain means for Decision Making Ability.

**Ho. 17:** HI-CL, CL and CGL instructional modes yield equal gain means for Factors Influencing Decisions.

  - **Ho. 17.1:** HI-CL and CL instructional modes yield equal gain means for Factors Influencing Decisions.
  - **Ho. 17.2:** HI-CL and CGL instructional modes yield equal gain means for Factors Influencing Decisions.
Summary and Conclusions

- **Ho. 17.3**: CL and CGL instructional modes yield equal gain means for Factors Influencing Decisions.

**Ho. 18**: Two Learning Approaches, Deep Approach (DA) and Surface Approach (SA) yield equal gain means for Factors Influencing Decisions.

**Ho. 19**: Instructional modes (HI-CL/CL/CGL) and Learning Approaches (DA/SA) do not interact in respect of gain means for Factors Influencing Decisions.

- **Ho. 19.1**: Through HI-CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for Factors Influencing Decisions.
- **Ho. 19.2**: Through CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for Factors Influencing Decisions.
- **Ho. 19.3**: Through CGL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for Factors Influencing Decisions.
- **Ho. 19.4**: For Deep Approach: HI-CL and CL yield equal gain means for Factors Influencing Decisions.
- **Ho. 19.5**: For Deep Approach: HI-CL and CGL yield equal gain means for Factors Influencing Decisions.
- **Ho. 19.6**: For Deep Approach: CL and CGL yield equal gain means for Factors Influencing Decisions.
- **Ho. 19.7**: For Surface Approach: HI-CL and CL yield equal gain means for Factors Influencing Decisions.
- **Ho. 19.8**: For Surface Approach: HI-CL and CGL yield equal gain means for Factors Influencing Decisions.
- **Ho. 19.9**: For Surface Approach: CL and CGL yield equal gain means for Factors Influencing Decisions.

**Skill of Problem Solving**

**Ho. 20**: HI-CL, CL and CGL instructional modes yield equal gain means for the Skill of Problem Solving.

- **Ho. 20.1**: HI-CL and CL instructional modes yield equal gain means for the Skill of Problem Solving.
- **Ho. 20.2**: HI-CL and CGL instructional modes yield equal gain means for the Skill of Problem Solving.
Summary and Conclusions

- Ho. 20.3: CL and CGL instructional modes yield equal gain means for the Skill of Problem Solving.

Ho. 21: Two Learning Approaches, Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Problem Solving.

Ho. 22: Instructional modes (HI-CL/CL/CGL) and Learning Approaches (DA/SA) do not interact in respect of gain means for the Skill of Problem Solving.

  - Ho. 22.1: Through HI-CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Problem Solving.
  - Ho. 22.2: Through CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Problem Solving.
  - Ho. 22.3: Through CGL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Problem Solving.
  - Ho. 22.4: For Deep Approach: HI-CL and CL yield equal gain means for the Skill of Problem Solving.
  - Ho. 22.5: For Deep Approach: HI-CL and CGL yield equal gain means for the Skill of Problem Solving.
  - Ho. 22.6: For Deep Approach: CL and CGL yield equal gain means for the Skill of Problem Solving.
  - Ho. 22.7: For Surface Approach: HI-CL and CL yield equal gain means for the Skill of Problem Solving.
  - Ho. 22.8: For Surface Approach: HI-CL and CGL yield equal gain means for the Skill of Problem Solving.
  - Ho. 22.9: For Surface Approach: CL and CGL yield equal gain means for the Skill of Problem Solving.

Ho. 23: HI-CL, CL and CGL instructional modes yield equal gain means for the Higher Mental Abilities in Science.

  - Ho. 23.1: HI-CL and CL instructional modes yield equal gain means for the Higher Mental Abilities in Science.
  - Ho. 23.2: HI-CL and CGL instructional modes yield equal gain means for the Higher Mental Abilities in Science.
Summary and Conclusions

• Ho. 23.3: CL and CGL instructional modes yield equal gain means for the Higher Mental Abilities in Science.

Ho. 24: Two Learning Approaches, Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Higher Mental Abilities in Science.

Ho. 25: Instructional modes (HI-CL/CL/CGL) and Learning Approaches (DA/SA) do not interact in respect of gain means for the Higher Mental Abilities in Science.

• Ho. 25.1: Through HI-CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Higher Mental Abilities in Science.
• Ho. 25.2: Through CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Higher Mental Abilities in Science.
• Ho. 25.3: Through CGL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Higher Mental Abilities in Science.
• Ho. 25.4: For Deep Approach: HI-CL and CL yield equal gain means for the Higher Mental Abilities in Science.
• Ho. 25.5: For Deep Approach: HI-CL and CGL yield equal gain means for the Higher Mental Abilities in Science.
• Ho. 25.6: For Deep Approach: CL and CGL yield equal gain means for the Higher Mental Abilities in Science.
• Ho. 25.7: For Surface Approach: HI-CL and CL yield equal gain means for the Higher Mental Abilities in Science.
• Ho. 25.8: For Surface Approach: HI-CL and CGL yield equal gain means for the Higher Mental Abilities in Science.
• Ho. 25.9: For Surface Approach: CL and CGL yield equal gain means for the Higher Mental Abilities in Science.

Skill of Creative Thinking

Ho. 26: HI-CL, CL and CGL instructional modes yield equal gain means for the Skill of Creative Thinking-Fluency.

• Ho. 26.1: HI-CL and CL instructional modes yield equal gain means for the Skill of Creative Thinking-Fluency.
• Ho. 26.2: HI-CL and CGL instructional modes yield equal gain means for the Skill of Creative Thinking-Fluency.
Summary and Conclusions


Ho. 27: Two Learning Approaches, Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Creative Thinking-Fluency.

Ho. 28: Instructional modes (HI-CL/CL/CGL) and Learning Approaches (DA/SA) do not interact in respect of gain means for the Skill of Creative Thinking-Fluency.

- Ho. 28.1: Through HI-CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Creative Thinking-Fluency.
- Ho. 28.2: Through CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Creative Thinking-Fluency.
- Ho. 28.3: Through CGL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Creative Thinking-Fluency.
- Ho. 28.4: For Deep Approach: HI-CL and CL yield equal gain means for the Skill of Creative Thinking-Fluency.
- Ho. 28.5: For Deep Approach: HI-CL and CGL yield equal gain means for the Skill of Creative Thinking-Fluency.
- Ho. 28.6: For Deep Approach: CL and CGL yield equal gain means for the Skill of Creative Thinking-Fluency.
- Ho. 28.7: For Surface Approach: HI-CL and CL yield equal gain means for the Skill of Creative Thinking-Fluency.
- Ho. 28.8: For Surface Approach: HI-CL and CGL yield equal gain means for the Skill of Creative Thinking-Fluency.
- Ho. 28.9: For Surface Approach: CL and CGL yield equal gain means for the Skill of Creative Thinking-Fluency.

Ho. 29: HI-CL, CL and CGL instructional modes yield equal gain means for the Skill of Creative Thinking-Flexibility.

- Ho. 29.1: HI-CL and CL instructional modes yield equal gain means for the Skill of Creative Thinking-Flexibility.
- Ho. 29.2: HI-CL and CGL instructional modes yield equal gain means for the Skill of Creative Thinking-Flexibility.
Summary and Conclusions

- **Ho. 29.3**: CL and CGL instructional modes yield equal gain means for the Skill of Creative Thinking-Flexibility.

**Ho. 30**: Two Learning Approaches, Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Creative Thinking-Flexibility.

**Ho. 31**: Instructional modes (HI-CL/CL/CGL) and Learning Approaches (DA/SA) do not interact in respect of gain means for the Skill of Creative Thinking-Flexibility.

- **Ho. 31.1**: Through HI-CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Creative Thinking-Flexibility.
- **Ho. 31.2**: Through CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Creative Thinking-Flexibility.
- **Ho. 31.3**: Through CGL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Creative Thinking-Flexibility.
- **Ho. 31.4**: For Deep Approach: HI-CL and CL yield equal gain means for the Skill of Creative Thinking-Flexibility.
- **Ho. 31.5**: For Deep Approach: HI-CL and CGL yield equal gain means for the Skill of Creative Thinking-Flexibility.
- **Ho. 31.6**: For Deep Approach: CL and CGL yield equal gain means for the Skill of Creative Thinking-Flexibility.
- **Ho. 31.7**: For Surface Approach: HI-CL and CL yield equal gain means for the Skill of Creative Thinking-Flexibility.
- **Ho. 31.8**: For Surface Approach: HI-CL and CGL yield equal gain means for the Skill of Creative Thinking-Flexibility.
- **Ho. 31.9**: For Surface Approach: CL and CGL yield equal gain means for the Skill of Creative Thinking-Flexibility.

**Ho. 32**: HI-CL, CL and CGL instructional modes yield equal gain means for the Skill of Creative Thinking-Originality.

- **Ho. 32.1**: HI-CL and CL instructional modes yield equal gain means for the Skill of Creative Thinking-Flexibility.
- **Ho. 32.2**: HI-CL and CGL instructional modes yield equal gain means for the Skill of Creative Thinking-Originality.
Summary and Conclusions

• **Ho. 32.3:** CL and CGL instructional modes yield equal gain means for the Skill of Creative Thinking-Originality.

**Ho. 33:** Two Learning Approaches, Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Creative Thinking-Originality.

**Ho. 34:** Instructional modes (HI-CL/CL/CGL) and Learning Approaches (DA/SA) do not interact in respect of gain means for the Skill of Creative Thinking-Originality.

- **Ho. 34.1:** Through HI-CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Creative Thinking-Originality.
- **Ho. 34.2:** Through CL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Creative Thinking-Originality.
- **Ho. 34.3:** Through CGL: Deep Approach (DA) and Surface Approach (SA) yield equal gain means for the Skill of Creative Thinking-Originality.
- **Ho. 34.4:** For Deep Approach: HI-CL and CL yield equal gain means for the Skill of Creative Thinking-Originality.
- **Ho. 34.5:** For Deep Approach: HI-CL and CGL yield equal gain means for the Skill of Creative Thinking-Originality.
- **Ho. 34.6:** For Deep Approach: CL and CGL yield equal gain means for the Skill of Creative Thinking-Originality.
- **Ho. 34.7:** For Surface Approach: HI-CL and CL yield equal gain means for the Skill of Creative Thinking-Originality.
- **Ho. 34.8:** For Surface Approach: HI-CL and CGL yield equal gain means for the Skill of Creative Thinking-Originality.
- **Ho. 34.9:** For Surface Approach: CL and CGL yield equal gain means for the Skill of Creative Thinking-Originality.

6.9 Methodology

6.9.1 Tools Used

The following tools were used for collecting data:

- **Hybrid Instructional Packages:** Developed and validated by the investigator.
- **Entry Behaviour Test:** Developed and validated by the investigator.
Summary and Conclusions

• **Formative Tests**: Developed and validated by the investigator separately for each unit.

• **Skill of Acquiring Knowledge (Summative Criterion Tests)**: Developed and validated by the investigator for modules of Chemistry, Biology and Physics.


• **Verbal Test of Creative Thinking (TCM)** by Mehdi, B. (1976).


• **Life Skill Activities**

6.9.2 Sample

The sample in the present investigation was drawn at two levels

• School Sample

• Student Sample

• **School Sample**

The school sample was drawn randomly from 22 Govt. Model Senior Secondary Schools of Union territory of Chandigarh because basic facilities of computer laboratories were available in each of these schools. The following schools were drawn:

• Govt. Model Senior Secondary School, Sector 16-D

• Govt. Model Senior Secondary School, Sector 37-B

• Govt. Model Senior Secondary School, Sector 35-D

These three schools were assessed for matching of general background of the students and their Entry Behaviour Knowledge (Through Entry Behaviour Test). All
these schools were found to be matched. Hence Govt. Model Senior Secondary School, Sector 16-D was selected randomly for Experiment group I (HI-CL); Govt. Model Senior Secondary School, Sector 35-D was randomly chosen for Experimental group II (CL); and Govt. Model Senior Secondary School, Sector 37-D was selected as Control Group and was taught through conventional method of teaching by their own teacher.

**Student Sample**

It was ensured that none of the selected schools had done ability grouping. Two sections were randomly selected from each of these three schools. As such intact sections were taken from each school. The initial student sample comprised of 349 students-124 students of Govt. Model Senior Secondary School, Sector 16-D; 125 students of Govt. Model Senior Secondary School, Sector 35-D and 100 students of Govt. Model Senior Secondary School, Sector 37-D.

During the process of experimentation that lasted for approximately three months, some students dropped out at one stage or the other. These students were therefore dropped at the time of analysis. The final sample comprised of \( N = 253 \) students as shown below:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Instructional Treatment</th>
<th>No. of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HI-CL</td>
<td>87</td>
</tr>
<tr>
<td>2</td>
<td>CL</td>
<td>81</td>
</tr>
<tr>
<td>3</td>
<td>CGL</td>
<td>85</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>253</strong></td>
</tr>
</tbody>
</table>

Distribution of final sample according to Learning Approaches has been given below:

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Deep Approach</th>
<th>Surface Approach</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment I (HI-CL) Govt. Model Sen. Sec. School, Sector- 16/D</td>
<td>43</td>
<td>44</td>
<td>87</td>
</tr>
<tr>
<td>Treatment II (CL) Govt. Model Sen. Sec. School, Sector- 35/D</td>
<td>40</td>
<td>41</td>
<td>81</td>
</tr>
<tr>
<td>Treatment III (CGL) Govt. Model Sen. Sec. School, Sector- 37/B</td>
<td>43</td>
<td>42</td>
<td>85</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>126</strong></td>
<td><strong>127</strong></td>
<td><strong>253</strong></td>
</tr>
</tbody>
</table>
6.9.3 Design of the Study

The present study employed an experimental method with pretest posttest control group design. It employed a 3 x 2 factorial design wherein the data were analyzed through 3 x 2 ANOVA. The variables under study are discussed below:

- **Independent Variable:** Instructional Mode was treatment variable which was studied at three levels: Hybrid Instructions in Cooperative learning (HI-CL), Cooperative Learning (CL) and Conventional Group Learning (CGL)

- **Dependent Variable:** Effect of the Independent variables was studied on dependent variables i.e. Life Skills. The following Life Skills were studied: Skill of Acquiring Knowledge, (Studied separately for Chemistry, Biology and Physics), Skill of Critical Thinking, Skill of Decision Making: (Studied separately for Decision Making Ability and Factors Influencing Decisions), Skill of Problem Solving and Skill of Creative Thinking.

- **Classifying Variable:** The students were classified on the basis of their approaches to learning. It was studied at two levels: Deep Approach to Learning and Surface Approach to Learning

The schematic layout of design has been given in Figure 6.1:

![Figure 6.1: Schematic Layout of the design](image-url)
6.9.4 Procedure

Two main stages were adopted as the procedure of experiment

- **Stage I** Selecting the Sample
- **Stage II** Conducting the Experiment

- **Stage I: Selecting the Sample**
  
The sample was selected at two levels: School Level and Student Level. Three schools with N = 399 students were selected for conducting the experiment. The details have been discussed in the previous paragraphs of this chapter.

- **Stage II: Conducting the Experiment**
  
The experiment was conducted in five phases:

  **Phase 1:** Administration of Entry Behaviour Test and R-SPQ-2F for Approaches to Learning
  
  **Phase 2:** Administration of Life Skills Pretest
  
  **Phase 3:** Grouping of the students for Cooperative Learning
  
  **Phase 4:** Implementation of Instructional Modules and Life Skills Activities
  
  **Phase 5:** Administration of Life Skill Posttest
  
  **Phase 6:** Scoring and Analysis of data.

  The detail of all the phases has been discussed below:

  **Phase 1:** Administration of Entry Behaviour Test and R-SPQ-2F for Approaches to Learning

  Before implementing the instructional programme to the experimental group, all the students were given Entry Behaviour Test to establish the equivalence of level of entry behaviour status of the students in the three instructional modes.

  In order to identify the students with Deep Approach to learning and Surface Approach to learning all the students were given R-SPQ-2F.
Phase 2: Administration of Life Skills Pretest

The selected tools for the Skill of Critical Thinking, Skill of Creative Thinking, Skill of Decision making, and Skill of Problem solving were administered as pretest to all the students of selected groups.

Phase 3: Grouping of the students for Cooperative Learning

In the present study groups were made heterogeneously on the basis of marks obtained in Class VIII final Science exams. The score of students in each section was placed in descending order and divided into five quartiles. The groups were then randomly formed by selecting one member from each quartile, making a group of five students. Each student was assigned a number and daily group leader were changed in rotation. Same procedure was followed for making cooperative learning groups in two experimental treatments (viz. HI-CL and CL).

Phase 4: Implementation of Instructional Modules

The instructional procedures adopted in this study were:

- One treatment group was taught through Hybrid Instructions in Cooperative Situation (HI-CL).
- The second treatment group was taught through Cooperative Learning (CL).
- The control group was taught by their regular science teacher in the conventional way.

Both the HI-CL and CL groups were taught by investigator herself so that fine strategic differences could be taken care of.

❖ For Implementing Modules through HI-CL

➢ Instructions by the investigator to the students:

- Students were motivated to actively participate in the teaching learning process.
- They were given orientation regarding the implementation of Hybrid Instructions.
• They were given orientation regarding the concept of Cooperative Learning and different techniques of Cooperative Learning to be followed in the present study.
• They were encouraged to participate in each and every activity.

➤ Sitting Arrangement Plans:
The sitting arrangements were done by the investigator in computer laboratory. The group of five students worked as a team on the same computer. Group members had to discuss the content presented through CD’s among themselves and help each other to understand it so that everyone in the group can answer the question put by the teacher.

➤ Teacher Activities:
The role of the investigator was dynamic. While presenting the content through traditional approach she played active role. However, when the content was presented through CD and group discussions, she acted as facilitator and intervened only at the time of summarization of the content as and when required. For the smooth functioning of the Cooperative groups, investigator keenly monitored the teamwork.

➤ Process of Instructional Package:
• Investigator herself provided the initial guidelines and orientation to the students.
• The students were informed of what they were expected to learn. For this the investigator acquainted them with the instructional objectives before each module.
• Each module was presented in the designed format. Each module took eight to nine days to complete, which includes two formative tests and one summative test. Conducive environment was provided to the students to work in teams on the computer and discuss the content among themselves.
• Investigator daily provided them with some problem to be worked in groups as per the design of modules.
Evaluation:
For each module, two formative tests were given to students by using STAD technique where students were tested individually. After the completion of each module summative test was given to the students. The students were informed about status so that they can work hard to make their team win.

Implementation of Life Skill activities:
During the initial days the investigator gave an orientation to the students regarding selected Life Skills. She conducted some activities to acquaint students with the Life Skills. For the rest of the experimental period this training was given indirectly by incorporating different problem and activities in the content. Due consideration was given to present the content in a way that stimulates the thinking processes of the students. The details of activities conducted have been discussed in chapter 3.

For Implementing Modules through CL
The investigator herself taught the CL group.

Instructions by the investigator to the students:
- Students were motivated to actively participate in the teaching learning process.
- They were given orientation regarding the concept of Cooperative Learning and different techniques of Cooperative Learning to be followed in the present study.
- Students were encouraged to participate in each and every activity.

Sitting Arrangement Plans:
The sitting arrangements were done by the investigator in the class without computers. Each group consisted of five students who worked as a team. Group members have to discuss the content among themselves and help each other to understand it so that everyone in the group can answer the question put by the teacher.
Summary and Conclusions

Teacher Activities:
The role of the investigator was dynamic. While presenting the content through traditional approach she played active role. During group discussion she acted as facilitator and intervened only at the time of summarization of the content as and when required. For the smooth functioning of the cooperative groups investigator keenly monitored the teamwork.

Process of Instructional Package:
- Investigator herself provided the initial guidelines and orientation to the students.
- The students were informed of what they were expected to learn. For this the investigator acquainted them with the instructional objectives before each module.
- Each module was presented in the designed format as in HI-CL except that computers were not used in any form. Each module took eight to nine days to complete, which includes two formative tests and one summative test. Conducive environment was provided to the students to work in teams and discuss the content among themselves.
- Investigator daily provided them with some problem to be worked in groups as per the design of modules.

Evaluation:
The formative tests were given to the students after the completion of each unit by using STAD technique where students were tested individually. The marks of individual students in a team were added and the team with highest scores earned recognition. The students were informed about status so that they can work hard to make their team won. For each module two formative tests were given. After the completion of each module summative test was given to the students.

Implementation of Life Skill activities:
During the initial days the investigator gave an orientation to the students regarding selected Life Skills. She conducted some activities to acquaint students with the Life Skills. For the rest of the experimental period this training was given indirectly by incorporating different problem and activities in the content. Due consideration was given to present the content in a way that stimulates the thinking
processes of the students. The details of activities conducted have been discussed in
chapter 3.

❖ **For Implementing through Control Group**

The control group was taught by their Science teacher in the conventional way. However, the list of objectives and content of nine modules were provided to teacher of the control group. This was mostly teacher-oriented activity. It generally refers to explaining out the chapters by the teacher as a first step and then solving exercise and providing notes for certain important questions given in NCERT book. No formative unit test was conducted after the completion of each unit. But summative tests were conducted before and after the presentation of content of each module. Time schedule followed for this group was similar to that of other two experimental groups.

**Phase 5: Administration of Life Skills Posttest**

After completion of all the nine modules and activities of LIFE Skill training, posttest for selected Life Skill were administered to all the students. At the end, students were thanked for their full cooperation.

**Phase 6: Scoring and Analysis of Data**

All the tools were scored according to their prescribed keys and data was subjected to statistical analysis.

**6.9.5 Statistical Analyses**

Following statistical techniques were employed for the purpose of data analysis:

1. Graphical presentations- Bar diagrams, Frequency Polygons and Inverted Ogives were drawn.
2. Descriptive statistics namely Mean, Standard Deviation, Skewness and Kurtosis were used.
3. One way ANOVA was worked out on the entry behaviour scores.
4. $3 \times 2$ ANOVA was employed to study significance of difference among various combination groups on the selected Life Skills.
5. Significant $F$-ratios were followed by $t$ test wherever required.
6.10 Major Findings

In the light of the interpretation of the results of the present study, the following conclusions were drawn:

❖ Results Based on the Analysis of Gain Scores on The Skill of Acquiring Knowledge in Chemistry

➢ About 80 percent of students of HI-CL (DA) and HI-CL (SA) attained approximately 79 percent or more marks and 75 percent or more marks respectively. About 50 percent of students of these groups attained approximately 88 percent or more marks and 84 percent or more marks respectively. About 30 percent of students of these groups attained approximately 94 percent or more marks and 89 percent or more marks respectively.

➢ About 80 percent of students of CL (DA) and CL (SA) attained approximately 70 percent or more marks and 60.5 percent or more marks respectively. About 50 percent of these students attained approximately 81 percent or more marks and 75 percent or more marks respectively. About 30 percent of these students attained approximately 88 percent or more marks and 81 percent or more marks respectively.

➢ About 80 percent of students of CGL (DA) and CGL (SA) attained approximately 52 percent or more marks and 48 percent or more marks respectively. About 50 percent of these students attained approximately 59 percent or more marks and 54 percent or more marks respectively. About 30 percent of these students attained approximately 67 percent or more marks and 58.5 percent or more marks respectively.

➢ The students studying through HI-CL achieved higher gain means than those studying in CL situation.

➢ The students studying through HI-CL achieved higher gain means than those studying in CGL situation.

➢ The students studying through CL achieved higher gain means than those studying in CGL situation.

➢ The students with DA to learning scored higher gain means than the students with SA to learning.

➢ There was no interaction among the instructional modes (HI-CL, CL and CGL) and approaches to learning (DA and SA) in respect of gain means.
Results Based on the Analysis of Gain Scores on The Skill of Acquiring Knowledge in Physics

- About 80 percent of students of HI-CL (DA) and HI-CL (SA) attained approximately 74 percent or more marks and 64 percent or more marks respectively. About 50 percent of these groups attained approximately 84 percent or more marks and 77 percent or more marks respectively. About 30 percent of these groups attained approximately 89.5 percent or more marks and 85 percent or more marks respectively.

- About 80 percent of students of CL (DA) and CL (SA) attained approximately 64 percent or more marks and 52 percent or more marks respectively. About 50 percent of these students attained approximately 77 percent or more marks and 69.5 percent or more marks respectively. About 30 percent of these students attained approximately 84.5 percent or more marks and 77 percent or more marks respectively.

- About 80 percent of students of CGL (DA) and CGL (SA) attained approximately 49.5 percent or more marks and 42 percent or more marks respectively. About 50 percent of these students attained approximately 59 percent or more marks and 50 percent or more marks respectively. About 30 percent of these students attained approximately 67 percent or more marks and 57 percent or more marks respectively.

- The students studying through HI-CL achieved higher gain means than those studying in CL situation.

- The students studying through HI-CL achieved higher gain means than those studying in CGL situation.

- The students studying through CL achieved higher gain means than those studying in CGL situation.

- The students with DA to learning scored higher gain means than students with SA to learning.

- There was no interaction among the instructional modes (HI-CL, CL and CGL) and approaches to learning (DA and SA) in respect of gain means.
❖ Results Based on the Analysis of Gain Scores on The Skill of Acquiring Knowledge in Biology

- About 80 percent of students of HI-CL (DA) and HI-CL (SA) attained approximately 69.5 percent or more marks. About 50 percent of students of these groups attained approximately 80.5 percent or more marks and 79 percent or more marks respectively. About 30 percent of students of these groups attained approximately 87 percent or more marks and 85 percent or more marks respectively.

- About 80 percent of students of CL (DA) and CL (SA) attained approximately 63 percent or more marks and 59 percent or more marks respectively. About 50 percent of these students attained approximately 71 percent or more marks and 71 percent or more marks respectively. About 30 percent of these students attained approximately 77 percent or more marks and 76 percent or more marks respectively.

- About 80 percent of students of CGL (DA) and CGL (SA) attained approximately 47 percent or more marks and 44.5 percent or more marks respectively. About 50 percent of these students attained approximately 57 percent or more marks and 53 percent or more marks respectively. About 30 percent of these students attained approximately 64.5 percent or more marks and 59.5 percent or more marks respectively.

- The students studying through HI-CL achieved higher gain means than those studying in CL situation.

- The students studying through HI-CL achieved higher gain means than those studying in CGL situation.

- The students studying through CL achieved higher gain means than those studying in CGL situation.

- The students with DA to learning scored higher gain means than the students with SA to learning.

- There was no interaction among the instructional modes (HI-CL, CL and CGL) and approaches to learning (DA and SA) in respect of gain means.
Summary and Conclusions

❖ Results Based on the Analysis of Gain Scores on The Skill of Critical Thinking

➢ About 80 percent of students of HI-CL (DA) and HI-CL (SA) attained approximately 49.5 percent or more marks and 44 percent or more marks respectively. About 50 percent of students of these groups attained approximately 62 percent or more marks and 58 percent or more marks respectively. About 30 percent of students of these groups attained approximately 68 percent or more marks and 69.5 percent or more marks respectively.

➢ About 80 percent of students of CL (DA) and CL (SA) attained approximately 37.5 percent or more marks and 33.5 percent or more marks respectively. About 50 percent of these students attained approximately 54.5 percent or more marks and 52.5 percent or more marks respectively. About 30 percent of these students attained approximately 63.5 percent or more marks and 60 percent or more marks respectively.

➢ About 80 percent of students of CGL (DA) and CGL (SA) attained approximately 12 percent or more marks. About 50 percent of these students attained approximately 16.5 percent or more marks and 14.5 percent or more marks respectively. About 30 percent of these students attained approximately 19.5 percent or more marks and 18 percent or more marks respectively.

➢ The students studying through HI-CL achieved higher gain means than those studying in CL situation.

➢ The students studying through HI-CL achieved higher gain means than those studying in CGL situation.

➢ The students studying through CL achieved higher gain means than those studying in CGL situation.

➢ The students with DA to learning and SA to learning achieved equal gain means.

➢ There was no interaction among the instructional modes (HI-CL, CL and CGL) and approaches to learning (DA and SA) in respect of gain means.
Summary and Conclusions

Results Based on the Analysis of Gain Scores on Decision Making Ability

- About 80 percent of students of HI-CL (DA) and HI-CL (SA) attained approximately 36.5 percent or more marks and 37.5 percent or more marks respectively. About 50 percent of students of these groups attained approximately 56.5 percent or more marks and 48 percent or more marks respectively. About 30 percent of students of these groups attained approximately 68.5 percent or more marks and 59.5 percent or more marks respectively.

- About 80 percent of students of CL (DA) and CL (SA) attained approximately 39.5 percent or more marks and 36.5 percent or more marks respectively. About 50 percent of these students attained approximately 50.5 percent or more marks and 45 percent or more marks respectively. About 30 percent of these students attained approximately 63.5 percent or more marks and 51.5 percent or more marks respectively.

- About 80 percent of students of CGL (DA) and CGL (SA) attained approximately 12 percent or more marks and 12.5 percent or more marks respectively. About 50 percent of these students attained approximately 17.5 percent or more marks and 16.5 percent or more marks respectively. About 30 percent of these students attained approximately 19.5 percent or more marks and 18.5 percent or more marks respectively.

- The students studying through HI-CL and CL achieved equal gain means.

- The students studying through HI-CL achieved higher gain means than those studying in CGL situation.

- The students studying through CL achieved higher gain means than those studying in CGL situation.

- The students with DA to learning achieved higher gain means than the students with SA to learning.

- There was no interaction among the instructional modes (HI-CL, CL and CGL) and approaches to learning (DA and SA) in respect of gain means.
Results Based on the Analysis of Gain Scores on Factors Influencing Decisions

- About 80 percent of students of HI-CL (DA) and HI-CL (SA) attained approximately 21.5 percent or more marks and 24.5 percent or more marks respectively. About 50 percent of students of these groups attained approximately 33.5 percent or more marks and 34 percent or more marks respectively. About 30 percent of students of these groups attained approximately 49 percent or more marks and 44 percent or more marks respectively.

- About 80 percent of students of CL (DA) and CL (SA) attained approximately 20.5 percent or more marks and 22 percent or more marks respectively. About 50 percent of these students attained approximately 34.5 percent or more marks and 32.5 percent or more marks respectively. About 30 percent of these students attained approximately 43.5 percent or more marks and 38.5 percent or more marks respectively.

- About 80 percent of students of CGL (DA) and CGL (SA) attained approximately 12.5 percent or more marks and 12 percent or more marks respectively. About 50 percent of these students attained approximately 16.5 percent or more marks and 15.5 percent or more marks respectively. About 30 percent of these students attained approximately 18.5 percent or more marks and 18 percent or more marks respectively.

- The students studying through HI-CL and CL achieved equal gain means.

- The students studying through HI-CL achieved higher gain means than those studying in CGL situation.

- The students studying through CL achieved higher gain means than those studying in CGL situation.

- The students with DA and SA to learning achieved equal gain means.

- There was no interaction among the instructional modes (HI-CL, CL and CGL) and approaches to learning (DA and SA) in respect of gain means.
❖ Results Based on the Analysis of Gain Scores on The Skill of Problem Solving

- About 80 percent of students of HI-CL (DA) and HI-CL (SA) attained approximately 30 percent or more marks and 29 percent or more marks respectively. About 50 percent of students of these groups attained approximately 43 percent or more marks and 36 percent or more marks respectively. About 30 percent of students of these groups attained approximately 49 percent or more marks.

- About 80 percent of students of CL (DA) and CL (SA) attained approximately 30.5 percent or more marks and 24.5 percent or more marks respectively. About 50 percent of these students attained approximately 40 percent or more marks and 34.5 percent or more marks respectively. About 30 percent of these students attained approximately 46 percent or more marks and 41.5 percent or more marks respectively.

- About 80 percent of students of CGL (DA) and CGL (SA) attained approximately 12 percent or more marks and 11.5 percent or more marks respectively. About 50 percent of these students attained approximately 14.5 percent or more marks. About 30 percent of these students attained approximately 16.5 percent or more marks and 17 percent or more marks respectively.

- The students studying through HI-CL and CL achieved equal gain means.

- The students studying through HI-CL achieved higher gain means than those studying in CGL situation.

- The students studying through CL achieved higher gain means than those studying in CGL situation.

- The students with DA to learning achieved higher gain means than the students with SA to learning achieved equal gain means.

- There was no interaction among the instructional modes (HI-CL, CL and CGL) and approaches to learning (DA and SA) in respect of gain means.
Results Based on the Analysis of Gain Scores on The Higher Mental Abilities in Science

- About 80 percent of students of HI-CL (DA) and HI-CL (SA) attained approximately 60 percent or more marks and 58 percent or more marks respectively. About 50 percent of students of these groups attained approximately 69.5 percent or more marks and 70 percent or more marks respectively. About 30 percent of students of these groups attained approximately 83.5 percent or more marks and 77 percent or more marks respectively.

- About 80 percent of students of CL (DA) and CL (SA) attained approximately 55.5 percent or more marks and 53.5 percent or more marks respectively. About 50 percent of these students attained approximately 69 percent or more marks and 65.5 percent or more marks respectively. About 30 percent of these students attained approximately 78.5 percent or more marks and 73 percent or more marks respectively.

- About 80 percent of students of CGL (DA) and CGL (SA) attained approximately 17 percent or more marks and 15.5 percent or more marks respectively. About 50 percent of these students attained approximately 28 percent or more marks and 26 percent or more marks respectively. About 30 percent of these students attained approximately 39.5 percent or more marks and 36 percent or more marks respectively.

- The students studying through HI-CL and CL achieved equal gain means.
- The students studying through HI-CL achieved higher gain means than those studying in CGL situation.
- The students studying through CL achieved higher gain means than those studying in CGL situation.
- The students with DA to learning achieved higher gain means than the students with SA to learning achieved equal gain means.
- There was no interaction among the instructional modes (HI-CL, CL and CGL) and approaches to learning (DA and SA) in respect of gain means.
❖ Results Based on the Analysis of Gain Scores on The Skill of Creative Thinking-Fluency

➢ About 80 percent of students of HI-CL (DA) and HI-CL (SA) attained approximately 18 percent or more marks and 16 percent or more marks respectively. About 50 percent of students of these groups attained approximately 26 percent or more marks and 25 percent or more marks respectively. About 30 percent of students of these groups attained approximately 31 percent or more marks and 29.5 percent or more marks respectively.

➢ About 80 percent of students of CL (DA) and CL (SA) attained approximately 18 percent or more marks and 19 percent or more marks respectively. About 50 percent of these students attained approximately 23 percent or more marks and 25.5 percent or more marks respectively. About 30 percent of these students attained approximately 29 percent or more marks and 28 percent or more marks respectively.

➢ About 80 percent of students of CGL (DA) and CGL (SA) attained approximately 6 percent or more marks. About 50 percent of these students attained approximately 8 percent or more marks. About 30 percent of these students attained approximately 10 percent or more marks.

➢ The students studying through HI-CL and CL achieved equal gain means.

➢ The students studying through HI-CL achieved higher gain means than those studying in CGL situation.

➢ The students studying through CL achieved higher gain means than those studying in CGL situation.

➢ The students with DA to learning and SA to learning achieved equal gain means.

➢ There was no interaction among the Instructional Modes (viz. HI-CL, CL and CGL) and Approaches to Learning (DA and SA) in respect of gain means.
Summary and Conclusions

Results Based on the Analysis of Gain Scores on The Skill of Creative Thinking-Flexibility

- About 80 percent of students of HI-CL (DA) and HI-CL (SA) attained approximately 11.7 percent or more marks and 8.5 percent or more marks respectively. About 50 percent of students of these groups attained approximately 13.5 percent or more marks and 12 percent or more marks respectively. About 30 percent of students of these groups attained approximately 15.5 percent or more marks and 14.5 percent or more marks respectively.

- About 80 percent of students of CL (DA) and CL (SA) attained approximately 8.6 percent or more marks and 9.3 percent or more marks respectively. About 50 percent of these students attained approximately 12.5 percent or more marks and 10.6 percent or more marks respectively. About 30 percent of these students attained approximately 14.6 percent or more marks and 12.7 percent or more marks respectively.

- About 80 percent of students of CGL (DA) and CGL (SA) attained approximately 4 percent or more marks and 3.7 percent or more marks respectively. About 50 percent of these students attained approximately 6 percent or more marks and 5.2 percent or more marks respectively. About 30 percent of these students attained approximately 7.7 percent or more marks and 7.5 percent or more marks respectively.

- The students studying through HI-CL achieved higher gain means than those studying in CL situation.

- The students studying through HI-CL achieved higher gain means than those studying in CGL situation.

- The students studying through CL achieved higher gain means than those studying in CGL situation.

- The students with DA to learning achieved higher gain means than students of SA to learning achieved equal gain means.

- There was no interaction among the Instructional Modes (viz. HI-CL, CL and CGL) and Approaches to Learning (DA and SA) in respect of gain means.
Summary and Conclusions

Results Based on the Analysis of Gain Scores on The Skill of Creative Thinking-Originality

- About 80 percent of students of HI-CL (DA) and HI-CL (SA) attained approximately 18 percent or more marks and 16.5 percent or more marks respectively. About 50 percent of students of these groups attained approximately 22.5 percent or more marks and 19.5 percent or more marks respectively. About 30 percent of students of these groups attained approximately 25 percent or more marks and 21.5 percent or more marks respectively.

- About 80 percent of students of CL (DA) and CL (SA) attained approximately 15 percent or more marks and 13.6 percent or more marks respectively. About 50 percent of these students attained approximately 19.7 percent or more marks and 18.6 percent or more marks respectively. About 30 percent of these students attained approximately 23.5 percent or more marks and 23 percent or more marks respectively.

- About 80 percent of students of CGL (DA) and CGL (SA) attained approximately 5.2 percent or more marks and 5 percent or more marks respectively. About 50 percent of these students attained approximately 7 percent or more marks and 6.5 percent or more marks respectively. About 30 percent of these students attained approximately 9.5 percent or more marks and 7.5 percent or more marks respectively.

- The students studying through HI-CL and CL achieved equal gain means.
- The students studying through HI-CL achieved higher gain means than those studying in CGL situation.
- The students studying through CL achieved higher gain means than those studying in CGL situation.
- The students with DA to learning achieved higher gain means than students of SA to learning achieved equal gain means.
- There was no interaction among the Instructional Modes (viz. HI-CL, CL and CGL) and Approaches to Learning (DA and SA) in respect of gain means.
6.11 Educational Implications

The results of the present study supported that the Hybrid Instructions in Cooperative Learning Situation may be used to enhance the performance of the students in Science subject at secondary level as compared to the Cooperative Learning and the traditional method of teaching. It is evident from the research that if teachers try to switch over to Hybrid Instruction in Cooperative Learning, not only achievement of students will improve but will also enhance their thinking skills.

The school administrators and teachers can use this approach in furtherance of education at secondary stage. It simply requires management of human resource and infrastructure. The schools already have good computer laboratories with internet or LAN facilities. Moreover, the cooperative learning is a better alternative for the judicious use of the existing infrastructure. It will provide flexibility in the total educational system.

Most classrooms are highly complex and have dynamic environment that demands the use of techniques or strategies that help students to accomplish a variety of instructional or learning tasks. Research has established that well designed and carefully monitored cooperative approach to learning can be effective means to such ends. Choices about which technique to employ for various activities requires a level of expertise that novice teacher can attain through knowledge, guidance and reflection.

At present, the Indian Education System puts more emphasis on levels of achievement hence; the classroom interactions remain passive for learners. Most of the Life Skills essential for later adult life are completely ignored. The present investigation was focused on selected Life Skills to meet the challenges posed by the contemporary scenario. Integrating various activities in science classroom in cooperative setting can enhance various life skills especially thinking skills of students. The results may be of significant help for curriculum planners to view various activities that may develop thinking skills among students.

The results can also be useful for the school administrator and teachers to have mixed groups of students adopting Deep or Surface Approaches since the results reported that HI-CL has proved to improve the performance and enhance all the
thinking skills of students whether they adopt Deep Approach or Surface Approach learning.

Further, the results of the present investigation have encouraging solution for teachers and administrators in a way that students with Deep Approach and Surface Approach to learning can be mingled to have symbiotic relations as results indicated that HI-CL is beneficial for both types of students.

The teacher dominated classroom environment with maximum focus on content may be eased through teaching with HI-CL in cooperative situation which would not only make class climate lively and participative but will also help in encouraging motivation and developing thinking skills. All this prepare our students for meeting the challenges of life courageously and successfully.

HI-CL instructional strategy can also be used as an aid to promote ‘Smart learning’. Every student can be given user name (ID) and password so that they access the content, which is available 24×7, at their own pace Students can access the content even in the teacher’s absence and vice-versa that if student is absent he/she can access from home at his/her convenience. Hence, HI-CL instructional strategy helps the teacher as well as students to manage the time more appropriately.

As teacher is the pivot of success of the educational process for the development of child the findings of the study can also be incorporated in Teacher Training programme to enhance their thinking skills to:

- develop, teach and present the instructional material of Science in such ways that provide an opportunity to the students to use their thinking skills.
- develop assessment techniques that enhances the thinking skill of students
- adopt teaching practices that encourage deep approach to learning
- integrate various activities in teaching-learning process to promote higher order thinking skills
- effectively integrate technology in teaching learning process to provide constructivist environment to the students.
- implement and integrate various cooperative techniques in classroom.
Summary and Conclusions

It is suggested that even inservice teachers should be given orientation/refresher course on HI-CL instructional mode to make teaching-learning more meaningful, interesting and effective.

Last but not least, educational administrators, managers, instructional designers, curriculum developers, implementers and teachers may use the findings of the present study for the development of new instructional designs with new future vision involving technologies where the learners could learn to access information and transform it into knowledge. This may lead to develop their self-esteem, self-concept and self-confidence.

6.12 Suggestions for Further Research

The investigator is quite aware of the limitations under which the present investigation was conducted and therefore that no sweeping generalizations could be made. The findings are only indicative of trends and hence are to be viewed in light of following limitations.

- Hybrid Instructions has been operationalised as computer mediated instructions in Cooperative (HI-CL) for the present investigation.
- The sample of the student was limited to 253 students drawn mainly from the Govt. Model School having well developed infrastructures.
- The sample was limited only to the union territory of Chandigarh.
- The study was limited to only grade IX students.
- The variables studied were limited to Hybrid Instructions in Cooperative Situation, Life Skills and Learning approaches.
- Study was conducted on both boys and girls.
- Only five life skills have been selected for present study namely Skill of Acquiring Knowledge, Skill of Critical Thinking, Skill of Creative Thinking and Skill of Problem Solving, Skill of Decision-Making
- Skill of acquiring knowledge was studied as performance in Science only.

The researcher, by virtue of her experience in the field of study humbly offers the following suggestions for further research that could be taken by the perspective researchers.
Summary and Conclusions

Based on the present research about Hybrid Instructions in Cooperative Situation, Life Skills and Learning approaches, it is clear that Hybrid Instructions in Cooperative Situation seemed to be better in achieving higher gains on all the selected life skills as compared to Cooperative learning Group and control group. Effectiveness of Hybrid Instruction may be researched further at larger scale for large number of students of different age groups, grade levels, ability level, and learning disabilities and socio-economic status.

For further study, it is recommended that this research be modified at other levels of education to determine if the results of the study were influenced by other environmental factors.

Further studies may be planned and conducted around affective variables like study habits, self-concept, self-confidence, self-efficacy, levels of aspiration, anxiety and other personality traits.

For greater validity of results and for arriving at conclusive generalizations the study may be replicated on larger population.

Studies may be conducted to investigate how do study habits of students change in respect of use of new technologies in their education and in turn its impact on social and academic environment and work culture.

Some experimental studies can be planned and conducted to study the effect of Hybrid Instructions in Cooperative Situation in various subject areas like Mathematics, Languages, Environment Education and Social Sciences.

Further research can be carried out to study the effect of Hybrid Instructions in Cooperative Situation on students’ approaches to learning.

Research can be carried out to compare the effect of different cooperative strategies in Hybrid Instructions in Cooperative Situation.

Research can be carried out to compare the effect of Hybrid Instruction in cooperative learning on the students of Govt. and private schools, rural and urban areas.

Research can be carried out to compare the effect of Hybrid Instructions in Cooperative Situation and individualistic situation.

Effect of Hybrid Instructions in Cooperative Situation can be studied on other Life Skills.
Summary and Conclusions

- The effectiveness of providing online instruction in Hybrid courses can be studied at secondary or higher level.

This is not an exhaustive list. However, a few of them have been enumerated above in order to indicate the possible studies that could be undertaken immediately in this important area of Hybrid Instruction and integrated development of children. Thus research studies in this area evince good scope and will continue to make notable contributions in the future.