Chapter V
Summary & Conclusion
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SUMMARY AND CONCLUSIONS

5.1 INTRODUCTION

Fast pace of advancement in the contemporary times consequential to rapid emergence of new technologies is greatly influencing the human values, perceptions and interactions; resulting in a totally changed social milieu. In wake of the changing needs of the modern society, a major shift in the methods of teaching and learning has been called for so as to ensure that the main aim of education, to prepare progressive and contributing global individuals, is accomplished.

Keeping in mind the different needs, interests and abilities of students, educational programmes are to be designed in a way that ensures that the environment provided to them is conducive for learning. To this end, integration of technology into education has great potential to augment the tools and environment for learning by offering them flexible and student-centred learning situations and also by enhancing teacher/student interaction. Benefits of using technology in education seem insurmountable to both teachers and students as technology not only increases student motivation and trains them for the future but also amplifies teacher efficiency by furnishing them with distinctive instructional capabilities.

A change in the attitude of teachers is considered necessary so that they can appreciate their changed role, which is more versatile than the conventional one. The teachers in their new roles as mentors, facilitators and researchers need to equip and empower themselves with the knowledge and application of integrating technology with instruction. This will enable them to design suitable instructional strategies that can bring desirable learning outcomes by helping students acquire knowledge and develop required skills to cope and thrive in this changing society as productive human beings.
5.2 NEED OF THE STUDY

The impact of technology on education is undeniable and over a period of years it has dramatically transformed the methods of teaching learning process by bringing positive changes in the learning environment. A variety of studies suggest that, over time, technology can serve as a strong catalyst for change in teaching learning practices (Hawkins, Spielvogel & Panush, 1996; Means, 1994; Chang et al., 1994). The research also points out emphatically that interactive and self directed learning, which can instil high order thinking, can be fostered by technology. Technology has opened new horizons for designing effective instructional strategies thus broadening the range of presenting the learning material in multiple ways suitable to meet individual needs of students by providing them different paths of learning for desirable learning outcomes.

With prevalent integration of technology with education, research in this field certainly has greater scope than ever before in exploring and designing new methods and strategies of instructions to address the futuristic and ever emerging new educational needs of the fast transforming society. As a result educators would better fit in to their new roles of facilitators and mentors as they can apply their innovative ideas to use computers in a variety of ways to deliver instruction to support new levels of learning and creativity of students. Many research studies have found computer based instruction strategies such as multimedia presentations and computer-assisted instruction to be effective over traditional methods for imparting and receiving instruction (Astleitner & Wiesner, 2004; Bockholf et al, 2000; Boster et al., 2002; Brusie, 1991; Clark et al., 2002; Cooper, 2001; Culbertson et al., 2004; Ford et al, 2005; Gangwar, 2008; Gili et al., 2008; Hounshell & Stanford, 1989; Kadiyala & Crynes, 1998; Karper et al., 2005; Khalili & Shashaani, 1994; Koeber, 2005; Kochhar, 2007; Kosakowski, 1998; Lee, 1999; Liao 1998; Macaulay, 2003; Mahmood, 2004; Mantei, 2000; Mautone et al., 2005; McLean et al., 2005; Moore & Miller, 1996; Moreno et al., 2001; Morgil et al., 2005; O’Day, 2006, 2007; Pabla, 2006; Peat, 2006; Perez-Prado & Thirunarayanan, 2002; Peterson & Orde, 1995; Powell et al., 2003; Rahman et al., 1996;
Siskos et al., 2005; Sharma, 2006; Shuell & Farber, 2001; Smith et al., 2001; Stephenson et al., 2008; Stith, 2004; Williamson & Abraham, 1995; Wenglinsky, 1998; Yarbrough, 2001; Yalcinalp et al., 1995; Zubas et al., 2006).

In light of the above findings, the present study was undertaken to analyze the effectiveness of multimedia presentations and computer-assisted instruction in acquisition of biological concepts.

5.3 STATEMENT OF THE PROBLEM

EFFECTIVENESS OF MULTIMEDIA PRESENTATIONS AND COMPUTER ASSISTED INSTRUCTION IN ACQUISITION OF BIOLOGICAL CONCEPTS IN RELATION TO COGNITIVE STYLE

5.4 OBJECTIVES OF THE STUDY

The study was undertaken keeping in view the following objectives:

1. To develop multimedia presentations on various biological concepts.
2. To develop a package for computer-assisted instruction in biological concepts.
3. To compare the effect of computer-assisted instruction with multimedia presentations in acquisition of biological concepts.
4. To compare the effect of computer-assisted instruction with lecture method in acquisition of biological concepts.
5. To compare the effects of multimedia presentation and lecture method in acquisition of biological concepts.
6. To study whether gender accounts for differential achievement in acquisition of biological concepts.
7. To study the effect of cognitive style on achievement.
8. To study whether there is a significant interaction among gender, cognitive style and different instructional strategies.
9. To evaluate students’ attitude regarding multimedia presentations and computer-assisted instruction in acquisition of biological concepts.

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5.5 HYPOTHESES

The study was conducted to test the following hypotheses:

1. There will not be a significant difference between mean achievement scores of students exposed through various instructional strategies:
   a) Computer assisted instruction and multimedia presentations
   b) Multimedia presentations and lecture method
   c) Computer assisted instruction and lecture method

2. Gender does not account for differential achievement in learning of biological concepts, irrespective of instructional strategies.


4. There will be no significant interaction between instructional strategies and gender.

5. There will be no significant interaction between instructional strategies and cognitive style.

6. There will be no significant interaction between gender and cognitive style in acquisition of biological concepts.

7. There will be no significant interaction among instructional strategies, cognitive style and gender in acquisition of biological concepts.

8. There will be a significant difference in the attitude of students towards various instructional strategies viz. computer assisted instruction, multimedia presentations and lecture method.

5.6 DELIMITATION

1. The present study was delimited to 180 class IX science students of CBSE affiliated English medium schools of Chandigarh.

2. The study was also delimited to selected topics of Biology included in the CBSE syllabus of class IX.

3. The study was confined to two variables i.e., gender and cognitive style.
5.7 EXPERIMENTAL DESIGN

The study was conducted through pre-test, post-test 3x3x2 factorial design. Achievement test was used as pre-test as well as post-test. Students were distributed into three experimental groups employing randomized sampling technique; each imparted instruction with different instructional strategy viz. Multimedia Presentation, Computer Assisted Instruction and Lecture Method. The classifying variables were gender and cognitive style. Witkin’s Group Embedded Figures Test was employed to study the cognitive style of students, thus categorising them into field dependents (FD) and field independents (FI). The post-test achievement scores of the three groups were subjected to statistical treatment as per the statistical design drawn for the study. Conclusions were drawn on the basis of descriptive and inferential statistics.

Figure 5.1 Layout of the factorial design

*Figure 5.1 Layout of the factorial design*

Ci Field Independent
C2: Field Dependent

C1: Field Independent
C2: Field Dependent
5.8  SAMPLE

The study was conducted on a sample of 180 students of class IX taken randomly from two English medium secondary schools situated in the Union Territory of Chandigarh where computer facilities were available. Another sample of 120 students was selected for development and validation of Achievement test. In addition, a sample of 10 students and 10 biology teachers / experts was taken for validation of MMP and CAI package developed by the investigator.

5.9  TOOLS USED

The following techniques and tests were used for collecting data during the study.

1. An Achievement test in selected topics of biology was developed and standardized by the investigator to measure the performance of students before and after the treatment.

2. Witkin’s Group Embedded Figures Test (Witkin et al, 1971) was used to study the cognitive style.

3. MMPs in selected topics in Biology were developed by the investigator.

4. CAI package in same topics was developed by the investigator.

5. Lesson plans of the same topics for lecture instructional strategy were also prepared by the investigator.

6. An opinionnaire to measure the attitude of students towards various instructional strategies was developed by the investigator.

5.10  STATISTICAL ANALYSIS OF DATA

The data were subjected to statistical analysis through descriptive and inferential statistics by using SPSS software. Descriptive statistics such as Mean, Mode, Median and Standard deviation were used to classify the sample into various groups. Kurtosis and Skewness were computed to study the nature of data. Analysis of Variance and t-tests were computed to test the hypotheses.
5.11 RESULTS

The data were analysed using descriptive statistics such as Mean, Mode, Median, Standard deviation, Kurtosis and Skewness. Analysis of Variance and t-tests were computed to test the hypotheses and t-ratios were computed to find out the significance of difference between means. Likert scale was used to analyze the attitudes of learners regarding MMP and CAI as instructional strategies. The results and interpretations are given in Chapter-IV.

5.12 CONCLUSIONS

The following conclusions are drawn from the results of the present study:

a) Students taught through instructional strategies viz. Multimedia Presentations (MMP) and Computer Assisted Instruction (CAI) were found to have achieved significantly higher in acquisition of Biological Concepts than through traditional Lecture Method (LM). Thus Multimedia Presentations and Computer Assisted Instruction proved to be superior instructional strategies over Lecture Method (LM) in the acquisition of biological concepts.

b) Students taught through Multimedia Presentations (MMP) instructional strategy outscored and achieved significantly higher in the acquisition of biological concepts than through Computer Assisted Instruction (CAI) instructional strategy. Thus Multimedia Presentations were found to be the most effective, Computer Assisted Instruction less effective than Multimedia Presentations and Lecture Method the least effective out of all the three instructional strategies.

c) Gender proved as redundant factor in the acquisition of biological concepts.

d) Cognitive style was found to significantly affect the mean achievement of students in the acquisition of biological concepts. Field Independent students achieved significantly higher than Field Dependent students.
e) No significant interaction was found between Instructional Strategies and Gender on the achievement of students in the acquisition of biological concepts.

f) No significant interaction was found between Instructional Strategies and Cognitive Style on the achievement of students in the acquisition of biological concepts.

g) No significant interaction was found between Gender and Cognitive Style on the achievement of students in the acquisition of biological concepts.

h) No significant interaction was found between Instructional Strategies, Gender and Cognitive Style on the achievement of students in the acquisition of biological concepts.

5.13 EDUCATIONAL IMPLICATIONS OF THE PRESENT STUDY

The findings of this study have wide implications in enhancing the effectiveness of instruction in acquisition of biological concepts. With the rapid advancement in the field of both educational and instructional technology in recent years, infusion of computer based technology with classroom instruction has opened new possibilities for meeting the new educational needs of the contemporary society. Multimedia Presentations (MMP) and Computer Assisted Instruction have an enormous prospective to be used as alternative instructional strategies for Indian classrooms as the use of computers in schools of our country is being encouraged for improving the quality of education.

Thoughtfully designed MMP and CAI instructional strategies have immense potential of motivating learners by gaining their attention, increasing their perception, enhancing their comprehension skills and eventually resulting into greater achievement as compared to traditional methods of teaching not only in Biology but also in other Science subjects viz. Physics, Chemistry, General Science etc.
The reason for MMP having an edge over CAI lies in the fact that MMP instructional strategy has not replaced teachers with technology; rather it has equipped them with the tools, the integration of which can help them gain and hold attention of students, make points clearer, inspire discussion, and in general, enhance the learning process. A multimedia presentation allows the educators to present more information, more examples, illustrations, and problems for students to solve than the conventional instructional method, thus facilitating their conceptual understanding of biological and other scientific concepts.

Computer-assisted instruction (CAI) being an interactive instructional strategy has the potential to meet the individual needs of students. The automatic interaction and immediate feedback provided by the computer during CAI enables students to learn at their own pace and progress on an individual basis. Moreover CAI can provide more accurate information more quickly through the use of a combination of text, graphics, sound and video. CAI, when used as supplementary teaching strategy, can reduce the work loads of teachers, thus enabling them to think about and add innovations to make the teaching-learning process more effective.

The results of the present study can benefit educators, administrators and instructional designers who can incorporate MMP and CAI in school curricula that can prove to be effective teaching strategies in the teaching of various concepts in diverse subject areas. The government should encourage use of technology in education and fund the research projects to develop MMP and CAI software packages in all school subjects, ensuring their distribution to all rural and urban schools of the country. Such projects can also be undertaken for higher levels of education with an aim to improve overall quality of education in our country.

It is further suggested that while developing such instructional material in Biology, cognitive style of students should be kept in mind so that the needs of both Field Independent and Field Dependent students are catered to, thus assisting all students in acquisition of biological concepts.
5.14 SUGGESTIONS FOR FURTHER STUDY

Based on the conclusions drawn from the present studies, the following suggestions may be considered for further studies:

- The study was delimited to class IX students only. To substantiate these findings and to see if the findings are consistent at classes of different levels, the same may be conducted for other classes which may include classes of Secondary, College and University levels where there is a wider scope of variability in academic performance and teaching abilities.
- The study was delimited to Biology Curriculum only, the same may be replicated to other subjects also viz. Physics, Chemistry, Biochemistry, Microbiology, Geography, Economics etc.
- Other studies comparing the effectiveness of MMP with other instructional strategies viz. Concept Maps, Mind Maps, VAI, Self Learning Modules, Inductive teaching etc. may be conducted.
- This study may be replicated to other variables viz. Interest, Motivation, Intelligence, Personality traits, Study habits, Style of Learning and Thinking, Problem solving etc. at different age groups.