Chapter VI

CONCLUSIONS AND SUGGESTIONS

6.1 Conclusions of the Study

6.2 Recommendations of the Study

6.3 Suggestions for further Research
CONCLUSIONS AND SUGGESTIONS

This chapter presents the conclusions and suggestions derived from the present study. The chapter concludes with recommendations based on the findings of the study and suggestions for further research. The details are given under appropriate heads.

6.1 CONCLUSIONS OF THE STUDY

The major conclusions that have emerged out from the present study are summarised below under appropriate heads.

6.1.1 COMPARISON OF PRE-TEST ACHIEVEMENT SCORES: CAI, CM AND CCAI GROUPS (TOTAL SAMPLE)

Comparison of the Pre-test Achievement scores of CAI, CM and CCAI groups revealed that there is no significant difference between the three groups. Hence, it can be concluded that the entry behaviour of students in the three groups are more or less similar with respect to Pre-test Achievement.

6.1.2 COMPARISON OF IMMEDIATE POST-TEST ACHIEVEMENT SCORES: CAI, CM AND CCAI GROUPS (TOTAL SAMPLE)

Comparison of the Immediate Post-test Achievement scores of CAI, CM and CCAI groups revealed significant difference between the three groups. The analysis of the adjusted means revealed that CM and CCAI are significantly superior to CAI whereas there is no significant difference
between CM and CCAI with regard to the Immediate Post-test Achievement. This also revealed the fact that students who worked on the computer cooperatively performed better in the Immediate Post-test than those who worked on the computer singly.

6.1.3 COMPARISON OF DELAYED POST-TEST ACHIEVEMENT SCORES: CAI, CM AND CCAI GROUPS (TOTAL SAMPLE)

Comparison of the Delayed Post-test Achievement scores of CAI, CM and CCAI groups revealed no statistically significant difference between the three groups with regard to the Delayed Post-test Achievement. This means that all the three methods used are equally effective in the retention of concepts in Molecular Genetics.

6.1.4 COMPARISON OF IMMEDIATE POST-TEST ACHIEVEMENT SCORES OF CAI GROUP (SUB-SAMPLES)

Analysis of the Immediate Post-test Achievement scores of sub-samples (based on gender, locality and management) of CAI Group revealed that there is no significant difference in the Immediate Post-test Achievement with regard to gender (boys and girls), locality (urban and rural) and management (government and private). So, it can be concluded that the Immediate Post-test Achievement scores of CAI group are not influenced by the variables; gender, locality and management and CAI can be used to learn Molecular Genetics at the Higher Secondary Level irrespective of these variables.
6.1.5 COMPARISON OF IMMEDIATE POST-TEST ACHIEVEMENT SCORES OF CM GROUP (SUB-SAMPLES)

Analysis of the Immediate Post-test Achievement scores of sub-samples (based on gender, locality and management) of CM Group revealed that there is no significant difference in the Immediate Post-test Achievement with regard to gender (boys and girls), locality (urban and rural) and management (government and private). So, it can be concluded that the Immediate Post-test Achievement scores of CM group are not influenced by the variables; gender, locality and management and CM can be used to learn Molecular Genetics at the Higher Secondary Level irrespective of these variables.

6.1.6 COMPARISON OF IMMEDIATE POST-TEST ACHIEVEMENT SCORES OF CCAI GROUP (SUB-SAMPLES)

Analysis of the Immediate Post-test Achievement scores of sub-samples (based on gender, locality and management) of CCAI Group revealed that there is no significant difference in the Immediate Post-test achievement with regard to gender (boys and girls), locality (urban and rural) and management (government and private). So, it can be concluded that the Immediate Post-test achievement scores of CCAI group are not influenced by the variables; gender, locality and management and CCAI can be used to learn Molecular Genetics at the Higher Secondary Level irrespective of these variables.
6.1.7 COMPARISON OF DELAYED POST-TEST ACHIEVEMENT SCORES OF CAI GROUP (SUB-SAMPLES)

Analysis of the Delayed Post-test Achievement scores of sub-samples (based on gender, locality and management) of CAI Group revealed that there is no significant difference in the Delayed Post-test Achievement with regard to gender (boys and girls), locality (urban and rural) and management (government and private). So, it can be concluded that the Delayed Post-test Achievement scores of CAI group are not influenced by the variables; gender, locality and management and CAI helps retention of concepts in Molecular Genetics at the Higher Secondary Level irrespective of these variables.

6.1.8 COMPARISON OF DELAYED POST-TEST ACHIEVEMENT SCORES OF CM GROUP (SUB-SAMPLES)

Analysis of the Delayed Post-test Achievement scores of sub-samples (based on gender, locality and management) of CM Group revealed that there is no significant difference in the Delayed Post-test Achievement with regard to gender (boys and girls), locality (urban and rural) and management (government and private). So, it can be concluded that the Delayed Post-test Achievement scores of CM group are not influenced by the variables; gender, locality and management and CM helps retention of concepts in Molecular Genetics at the Higher Secondary Level irrespective of these variables.
6.1.9 COMPARISON OF DELAYED POST-TEST ACHIEVEMENT SCORES OF CCAI GROUP (SUB-SAMPLES)

Analysis of the Delayed Post-test Achievement scores of sub-samples (based on gender, locality and management) of CCAI Group revealed that there is no significant difference in the Delayed Post-test Achievement with regard to gender (boys and girls), locality (urban and rural) and management (government and private). So, it can be concluded that the Delayed Post-test Achievement scores of CCAI group are not influenced by the variables; gender, locality and management and CCAI helps to retain the concepts in Molecular Genetics at the Higher Secondary Level irrespective of the variables.

6.1.10 COMPARISON OF IMMEDIATE POST-TEST ACHIEVEMENT SCORES OF CAI, CM AND CCAI GROUPS WITH REGARD TO THE ATTAINMENT OF THE INSTRUCTIONAL OBJECTIVE: REMEMBERING

Analysis of the Immediate Post-test scores revealed that there is no significant difference between CAI, CM and CCAI groups with regard to the attainment of the objective: remembering.
6.1.11 COMPARISON OF IMMEDIATE POST-TEST ACHIEVEMENT SCORES OF CAI, CM AND CCAI GROUPS WITH REGARD TO THE ATTAINMENT OF THE INSTRUCTIONAL OBJECTIVE: UNDERSTANDING

Analysis of the Immediate Post-test scores revealed that there is no significant difference between CAI, CM and CCAI groups with regard to the attainment of the objective: understanding.

6.1.12 COMPARISON OF IMMEDIATE POST-TEST ACHIEVEMENT SCORES OF CAI, CM AND CCAI GROUPS WITH REGARD TO THE ATTAINMENT OF THE INSTRUCTIONAL OBJECTIVE: APPLYING

Analysis of the Immediate Post-test scores revealed that there is no significant difference between CAI, CM and CCAI groups with regard to the attainment of the objective: applying. It can be concluded that all the three methods contribute equally to students’ understandings at the ‘applying’ level.

6.1.13 COMPARISON OF IMMEDIATE POST-TEST ACHIEVEMENT SCORES OF CAI, CM AND CCAI GROUPS WITH REGARD TO THE ATTAINMENT OF THE INSTRUCTIONAL OBJECTIVE: ANALYSING

Analysis of the Immediate Post-test scores of CAI, CM and CCAI groups revealed that there is statistically significant difference between the three groups with regard to the attainment of the objective: analysing. The analysis of the adjusted means revealed that CM and CCAI are significantly
superior to CAI whereas there is no significant difference between CM and CCAI with regard to the attainment of the objective ‘analysing’.

6.1.14 COMPARISON OF IMMEDIATE POST-TEST ACHIEVEMENT SCORES OF CAI, CM AND CCAI GROUPS WITH REGARD TO THE ATTAINMENT OF THE INSTRUCTIONAL OBJECTIVE: EVALUATING

Analysis of the Immediate Post-test scores revealed that there is no significant difference between CAI, CM and CCAI groups with regard to the attainment of the objective: evaluating.

6.1.15 COMPARISON OF IMMEDIATE POST-TEST ACHIEVEMENT SCORES OF CAI, CM AND CCAI GROUPS WITH REGARD TO THE ATTAINMENT OF THE INSTRUCTIONAL OBJECTIVE: CREATING

Analysis of the Immediate Post-test scores revealed that there is statistically significant difference between the three groups with regard to the attainment of the instructional objective: creating. The analysis of the adjusted means revealed that CM and CCAI are significantly superior to CAI whereas there is no significant difference between CM and CCAI with regard to the attainment of the objective ‘creating’.

6.2 RECOMMENDATIONS OF THE STUDY

6.2.1 The study has revealed that all the three methods, namely CAI, CM and CCAI are effective in learning Molecular Genetics at the Higher
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Secondary Level. Hence, it is recommended that all the three methods, namely CAI, CM and CCAI can be used in learning Biology, especially, different topics in Molecular Genetics at the Higher Secondary School Level.

6.2.2 The study has provided data on the effectiveness of the three methods of teaching in enhancing academic achievement. Hence, it is recommended that the use of the three methods, namely CAI, CM and CCAI in teaching or learning Biology, especially, Molecular Genetics at the Higher Secondary School Level can address the poor performance of students in the particular area.

6.2.3 Since the findings of this study has revealed that students who worked on the computer cooperatively performed better in the Immediate Post-test than those who worked on the computer singly, students should be encouraged to develop social interaction in the use of computer.

6.2.4 The study has revealed that CAI, CM and CCAI are effective with regard to the attainment of the instructional objectives of the cognitive domain. Hence, it is recommended that all the three methods, namely CAI, CM and CCAI be judiciously used in teaching or learning Biology, especially, Molecular Genetics at the Higher Secondary School Level.

6.2.5 All the three methods can be used in schools as they are all learner-centered and can be used irrespective of the variables, namely; gender, locality and management.
6.2.6 Potentials of the new teaching-learning strategies can be used to enhance the quality of education at the school level.

6.2.7 Effective integration of the different methods in to the teaching-learning process would enable educational institutions to cater to the needs of the present day students.

6.2.8 The investigator hopes that the study would supplement the Government's efforts of improving Biology education in the Higher Secondary Schools of Kerala.

6.2.9 Government should take efforts to conduct more research studies in these new methods of instruction and develop suitable computer assisted instructional softwares and curricular materials based on constructivist model.

6.2.10 Government should take necessary steps to provide sufficient number of computers, internet access and other resource materials to all the schools in the state.

6.2.11 Frequent faculty improvement programmes and in-service training programmes should be given for updating the teachers in the areas of CAI and Constructivist Model.

6.2.12 Government should offer incentives to teachers who implement the new methods of instruction in their classrooms and contribute to enhance the new teaching-learning strategies.
6.2.13 Government support is needed for sending selected experts to foreign countries to study the implementation of the new methods in the teaching-learning process.

6.2.14 Sufficient number of books and literatures on new teaching-learning strategies should be made available in all schools so that the teachers can make effective use of these literatures.

6.2.15 Curriculum developers would find the study helpful in designing appropriate instructional strategies involving CAI, CM and CCAI, which would enhance the learning of Biology, particularly Molecular Genetics.

6.2.16 Teacher educators would find the study useful in developing programmes aimed at producing teachers capable of structuring learning environment that can equalise their interaction with learners, enabling learner participation, satisfaction and further academic aspirations.

6.2.17 Biology teachers and education inspectors would identify these as effective teaching methods that would be suitable to provide favourable learning conditions for all the students rather than just for the top fraction of the class.

6.2.18 Assessment and evaluation tools may be modified to reflect the nature of the program that is being offered.
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6.2.19 Educational programmes should be conducted in schools so that the parents, teachers and students become aware of the advantages and weaknesses of the new methods of instruction.

6.3 SUGGESTIONS FOR FURTHER RESEARCH

6.3.1 The present study is limited to a sample of 232 Higher Secondary School students. The study can be replicated on a larger sample.

6.3.2 The study is confined to Thiruvananthapuram district only. It can be extended to other districts also.

6.3.3 The study is limited to Molecular Genetics. It can be conducted in other areas of Biology also.

6.3.4 The study is limited to only a few topics in Molecular Genetics. It can be conducted in other topics also.

6.3.5 The study is limited to the Higher Secondary Level. Similar studies can be done at Elementary, Secondary and College Levels.

6.3.6 Similar studies can be conducted in other disciplines like Languages, Physics, Chemistry, Mathematics, History, Geography, etc. to test the effectiveness of the three methods.

6.3.7 Similar studies can be conducted among slow learners and under achievers.

6.3.8 The impact of the three methods in the development of Affective and Psychomotor Domains can be studied.
6.3.9 Study on social interactions among students in CAI, CM and CCAI Groups can be attempted.

6.3.10 Study on the effectiveness of CAI, CM and CCAI in developing the various Process Skills can be attempted.

6.3.11 Attitude of teachers, students and parents towards CAI, CM and CCAI can be studied.

6.3.12 Attitudes of students towards Molecular Genetics class in the three treatment groups can be studied.

The investigator would be greatly delighted if the findings of the present study would lead to a better understanding of the innovative methods, namely, Computer Assisted Instruction, Constructivist Model and Constructivist-Computer Assisted Instruction in the teaching-learning process. The world around us is changing very rapidly, and there is more scope for research in the areas of CAI and Constructivism as these are areas which are highly significant in the present educational scenario. The investigator hopes that the humble attempt on her part has a practical significance and help students to learn in a natural, interactive and meaningful way and support curriculum planners and teachers to design new curriculum based on these new and more effective learning methods, rather than replicate in another form, the activities which have already taken place in ordinary teaching-learning environment.
It is also assumed that the observations made by the investigator would yield fruitful results in the hands of resourceful persons who have a positive bend to effect changes in the teaching and learning of Biology, especially Molecular Genetics, which in turn would go a long way in improving the acquisition of Scientific Knowledge, Process Skills and Reflective Thinking among students and motivate researchers to undertake follow-up investigations and establish some important reforms in the field of Education.