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EFFECT OF COMPUTER MEDIATED INSTRUCTION ON ACHIEVEMENT IN BIOLOGY IN RELATION TO INTELLIGENCE

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ABSTRACT :
        The present study aims at finding the effect of computer mediated instruction on achievement of secondary school biology students of Chandigarh in relation to intelligence. Researchers conducted this study to know that which of the instructional strategy is more useful to improve the achievement in biology and which intelligence group will get more benefit of instructional strategies. For this purpose, experiment carried out involved pre-test post-test control group design with two groups of students, each imparted instruction with different instructional strategy. The group, taught through Computer Mediated Instruction (CMI) was taken as experimental group while the group taught through Traditional Instruction (TI) was taken as control group. The classifying variable was intelligence and dependent variable was achievement in Biology. Researchers selected 120 students from the senior secondary schools of Chandigarh, and then classified them into two intelligence groups (high and average) using Raven's Progressive Matrices and further distributed into two groups CMI and TI. t-test was used to find out the significant differences. The results of the study revealed that students taught through CMI showed significantly better results in achievement in biology as compared to that taught through TI; both the groups (high and average intelligence) showed improvement in achievement in biology after treatment.

KEYWORDS : *CMI- Computer Mediated Instruction, TI- Traditional Instruction.*

INTRODUCTION

        Science constitutes a significant part of the foundation for education for all children.
        The Science based subjects require effective and interactive instructional methodologies at academic level. There is a need to find innovative methods of teaching that explore the potentialities of the learners.
        Technology plays a crucial role in the learning process and with the advent of new technologies like CMI; modern information and communication technologies make process of learning more productive. Modern technologies like CMI bring profound change in the field of education. These latest technologies make teacher much resourceful from the learners' point of view. By using computer mediated instruction, the classroom teacher gives a more engaging environment to the teaching learning process. CMI makes teaching learning process learner specific. It is helpful for teacher, because the interactive multimedia presented by teacher in this process, enables greater span of attention of

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learners. Moreover, it is also useful for learner, because it provides opportunity of self pacing to learners. Therefore, teacher must be equipped and updated with technology to deal with today's digital savvy students.

RATIONALE OF THE STUDY

Science educators are keen to bring quality to learning of Science. And Biology as a Science subject is no longer confined to a limited domain. The teacher needs to adopt various teaching methods in order to achieve the teaching objectives effectively. The teacher should also yield effective course content and the resource materials of all forms. Then, there will be better understanding thereby leading to higher achievement by the students. And consequently, will also steer the students in effectively achieving the objectives of teaching Biology.

Now-a-days Computer has become a vital and integral part of all aspects of educational settings. Computer is used to supplement the efforts of teachers for instruction. Researchers have reviewed literature about the effectiveness of these instructional strategies CMI and TI to bring about a change in students' learning abilities. In traditional instruction (TI), teacher is the centre of the learning. Traditional learning is mainly based on lecture and classroom demonstration method. Traditional learning is not competent enough to cope with the challenges of educational field. In order, to remove the basic problems of the traditional learning, technology like CMI should be introduced in the traditional learning method.

Researcher's keen interest in the present study is because of the fact that researcher wanted to know that which instructional strategy (i.e. CMI or TI) is effective in teaching learning process. Also, researchers would like to examine the effect of these instructional strategies on the achievement of students with different intelligence levels.

OBJECTIVES OF THE STUDY
1. To examine the effect of Computer Mediated Instruction on Achievement in Biology.
2. To examine the effect of Traditional Instruction on Achievement in Biology.
3. To examine the effect of Computer Mediated Instruction on Achievement in Biology for high intelligence group.
4. To examine the effect of Computer Mediated Instruction on Achievement in Biology for average intelligence group.
5. To examine the effect of Traditional Instruction on Achievement in Biology for high intelligence group.
6. To examine the effect of Traditional Instruction on Achievement in Biology for average intelligence group.
7. To compare the effect of Computer Mediated Instruction and Traditional Instruction on Achievement in Biology for high intelligence group.
8. To compare the effect of Computer Mediated Instruction and Traditional Instruction on Achievement in Biology for average intelligence group.

HYPOTHESES
1. Subjects in Computer Mediated Instruction group will improve significantly on Achievement in Biology after treatment.
2. Subjects in Traditional Instruction group will improve significantly on Achievement in Biology after treatment.
3. Subjects with high intelligence in Computer Mediated Instruction group will improve significantly on Achievement in Biology after treatment.
4. Subjects with average intelligence in Computer Mediated Instruction group will improve significantly on Achievement in Biology after treatment.
5. Subjects with high intelligence in Traditional Instruction group will improve significantly on Achievement in Biology after treatment.

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6. Subjects with average intelligence in Traditional Instruction group will improve significantly on Achievement in Biology after treatment.
7. Subjects with high intelligence in Computer Mediated Instruction group after treatment will be significantly better on Achievement in Biology as compared to those in Traditional Instruction.
8. Subjects with average intelligence in Computer Mediated Instruction group after treatment will be significantly better on Achievement in Biology as compared to those in Traditional Instruction.

METHODOLOGICAL PROCEDURE

Sample: The population of this study comprised of students of class IX studying in Secondary Schools of Chandigarh. Four schools were selected randomly for this study, two for each instructional strategy. On the basis of marks obtained on Raven's Progressive Matrices, students were divided into high and average intelligence group. A sample of 120 students were taken from 4 schools selected randomly, 30 students from each school comprising 15 students of high abilities and 15 students with average abilities.

Tools: Raven's Progressive Matrices was to divide the students into high and average intelligence group. An achievement test and Computer Mediated Instruction material and lesson plans in biology were constructed by the researchers to teach the students through CMI and TI.

Treatment: Pre test in achievement was given to the students. Experimental group students were taught by researcher in the Virtual environment using CMI, for this purpose CMI material was provided to the students, while control group was taught by chalk-board and lecture method. After treatment post test was given to the students. Gains in achievement scores were calculated.

ANALYSIS AND INTERPRETATION OF RESULTS

The data obtained from the experiments has been subjected to descriptive as well as to suitable inferential statistical techniques.

Table-1 shows statistics effect of CMI on Achievement

Statistics	Pre-test	Post-test	t
Mean	27.27	50.30	5.61[*]
S.D.	4.96	15.78	

[*]Significant at .01 level

Table-1 indicates significant difference in the mean achievement scores after treatment in CMI group. This difference was found to be significant (t=5.61; p<.01). Results indicated that CMI is effective for achievement in biology.

Table-2 shows statistics effect of TI on Achievement

Statistics	Pre-test	Post-test	t
Mean	29.70	44.25	6.82[*]
S.D.	6.27	11.61	

[*]Significant at .01 level

Table-2 shows that, after administration of TI, gain in achievement of subjects in biology was significant (t=6.82; p<.01), which proves TI is effective technique for the improvement in achievement in biology. This method was planned by the teachers for the benefit of the students. So, hypothesis no.2 stands accepted.

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Table-3 shows statistics effect of CMI on Achievement in High Intelligence Group

Statistics	Pre-test	Post-test	Gain scores	t
Mean	28.03 (n=30)	60.30 (n=30)	32.27 (n=30)	6.23*
S.D.	5.58	12.49	14.25	

*Significant at .01 level

Table-3 reveals that the gain after administration of CMI is significant (t = 6.23; p<.01) as far as achievement in biology is concerned. This is true for high intelligence group. The results fulfil objective no. 3 and hypothesis no.3.

Table-4 shows statistics effect of CMI on Achievement in Average Intelligence Group

Statistics	Pre-test	Post-test	Gain scores	t
Mean	26.50 (n=30)	40.30 (n=30)	13.80 (n=30)	2.98*
S.D.	5.58	11.98	11.04	

*Significant at .01 level

Table-4 depicts that the gain after administration of CMI is significant in case of average intelligence group also (t_{29} = 2.98; p<.01). The results fulfil objective no.4 and hypothesis no.4. Earlier literature (Folger, 1988; Hayes, 1988; Hopkins, 1990; Cortez, 1996; Adonri & Elizabeth, 1998; Rivet, 2001; Singh, 2001; Bingham, 2002; Vernadakis et al., 2006; Akram et al., 2011; Serin, 2011; Kaur, 2012 and Yusuf et al., 2012) corroborate findings from Table-3 and Table-4.

Table-5 shows statistics effect of TI on Achievement in High Intelligence Group

Statistics	Pre-test	Post-test	Gain scores	t
Mean	30.63 (n=30)	51.17 (n=30)	20.53 (n=30)	4.87*
S.D.	6.22	11.06	12.02	

*Significant at .01 level

Table-5 shows that the gain after administration of TI is significant (t_{29} = 4.87; p<.01) as far as achievement in Biology is concerned. This holds true for high intelligence group. This finding fulfils objective no.5 and hypothesis no.5.

Table-6 shows statistics effect of TI on Achievement in Average Intelligence Group

Statistics	Pre-test	Post-test	Gain scores	t
Mean	28.77 (n=30)	37.33 (n=30)	8.57 (n=30)	5.15*
S.D.	6.27	7.25	7.24	

*Significant at .01 level

Table-6 reveals that the gain after administration of TI is significant in case of average intelligence group also (t_{29} = 5.15; p<.01). The results fulfil objective no.6 and hypothesis no.6. Earlier research studies (Esmaelili, 2001; Mckethan et al., 2001; Pride, 2004 and Zhang, 2005) corroborate finding from Table-5 and Table-6.

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Table-7 represents the comparison of t-ratio for gain scores in CMI & TI methods on Achievement in High Intelligence Group

Methods	Mean	S.D.	t-ratio	Level of Significance
CMI (n=30)	32.27	14.25	3.41	p<.01
TI (n=30)	20.53	12.02		

Table-7 indicates that the difference in mean gain scores in achievement of CMI & TI interventions is significant for high intelligence group (t=3.41; p<.01) in favor of CMI. The earlier research supports this finding (Rivet, 2001; Bingham, 2002; Lonigan et al., 2003; Mahmood, 2004; Siskos et al., 2005). The results fulfil objective no. 7 and hypothesis no. 7.

Table-8 represents the comparison of t-ratio for gain scores in CMI & TI methods on Achievement in Average Intelligence Group

Methods	Mean	S.D.	t-ratio	Level of Significance
CMI (n=30)	13.80	11.04	2.19	p<.05
TI (n=30)	8.57	7.24		

It is seen in Table-8, the difference in mean gain scores in achievement of CMI & TI interventions is significant for average intelligence group also (t = 2.19; p<.05). The research conducted earlier supports this finding (Kochar, 2007; Moosavi, 2009 and Yusuf & Afolabi, 2010). The results fulfil objective no.8 and hypothesis no. 8. CMI has proved to be better than TI for both intelligence groups in case of achievement.

CONCLUSION

From the above study it may be concluded that teaching through instructional strategy like CMI is beneficial in improving achievement among the students. They acquire better learning form after teaching through Computer Mediated Instruction as compared to traditional instruction.

For both the interventions CMI and TI subjects showed significant improvement in the mean achievement scores in biology after treatment. Students taught through CMI showed significantly better results in achievement in biology as compared to that taught through TI. This shows instructional strategy like CMI is more useful in improving achievement in biology. So, for achievement in biology CMI intervention found to be more useful.

Both the groups (high and average intelligence) showed improvement in achievement in biology. However, high intelligence group gain more in achievement in biology as compared to average intelligence group.

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