Evaluation of Computer-Assisted Instructional Technology Modules for Chemistry Learning at Higher Secondary Level

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Abstract: *Modular instruction is one of the methods of individualized instruction. It helps the students to accomplish certain well defined objectives of learning through a module which is a self-contained Instructional package. The technology module gives opportunities for learning from animated objects. Multimedia simulations can penetrate more and leave permanent learning in the cognitive domain. The technology module provides Self Motivation to the learners, so that they can gain better knowledge with the best style of learning. Thus, a proper use of the technology module could stimulate effective learning among learners. The researcher has chosen the topic in order to help the learners to learn chemistry according to their own pace and ability.*

Keywords: Animated Objects, Higher Secondary level, Individualized Instruction, Instructional package, Learning Chemistry, Self Motivation , Technology Module.

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I. INTRODUCTION

The present educational system becomes complex due to lack of individual attention in the classroom. The expansion of education in the form of greater enrolment of learners in schools and colleges makes the system more rigid and complex. The best answer to this problem is the application of information and communication technology which endeavors to remove monotony, but at the same time, enhances motivation and interest among learners. In the modern educational system, computers are used extensively and their impact on the social, economic, educational and scientific spheres is greatly recognized. The benefits of this type of learning include flexibility of scheduled instruction at locations continent to learners, reduced time, assumed skill development, increased achievement, increased retention, continuous report to the learners' progress and accomplishments, good response and feedback.

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Hence, there is a need for greater application of computer supported devices in the form of course works and modules for the benefit of learners at all levels of education. The investigator used texts, videos, audio, animation, virtual environment etc., to make the learning of chemistry enjoyable. This study attempts in explaining students conceptual understanding about chemistry and attitude towards Computer Assisted Instructional Technology Module (CAITM) in learning chemistry.

II. LITERATURE REVIEW

Muhamed Arpan, Salaman, Ridho Dedy Arief Budiman ,Ambay, Wakhinuddin (2020) studied that the "Student Learning Outcomes Using Drill And Practice Type Of Computer Assisted Instruction". The study aims to determine the effect of the Drill and Practice type of Computer Assisted Instruction model on student learning outcomes. The research method uses experiments with a Quasi-experimental form and Non-equivalent Control Group Design. The population of the study was all class XI SMK of the Multimedia Department. Using purposive Sampling techniques, the sample of the study was class XI B as an experimental class and class XI A as a control class. Data collection techniques used measurements and data collection tools used tests. Data analysis techniques used the T-test. The result of the study showed that the Drill and Practice type of Computer Assisted Instruction model affected the student learning outcomes.

Neha Bhatnagar (2019) studied that "New Trends and Techniques Of 21st Century Education with Special Reference to Life Science". This Education is the leading sector that bears the biggest responsibility of shaping the future of youth of India. According to a research our traditional approach of teaching and learning of science is not preparing students to enhance their conceptual learning and they are unable to work in science and technology rich environment of the 21st century. As a result of this the interest and attitude of student towards science is declining day by day. The reason for this is poor teaching methodology and unsatisfactory quality of education. So it's the need of time to change the educational learning

method from theoretical approach to practical and concept based approach. We should encourage the educators to adopt modern and innovative methods of teaching like videos, digital literacy, role playing and kinesthetic activities. So, that learning can become easy, meaningful and more interesting. As the life science or natural science is an immensely important stream of science which is all about the environment, human life, plant cell, animal evolution and all other living organism around us, it's very essential to increase the interest of student towards this to save our earth or nature from deterioration. Through this paper the present status of higher education system is summarized and also reviewed the teaching approaches that are recommended to improve the quality of science education. This paper is also present new trends and techniques for enhancing the conceptual learning of students of Life science at higher level.

Arockia Anita.X and Kalaiyarasan.G (2017) studied that" Role of Computer Assisted Instructional Materials (CAIM) In Teaching-Learning". Today is the age of science and technology. In the field of education, computer takes a necessary place. Computer improves the students' way of thinking and problem solving. E-mail, database and other software are generally used for Computer Assisted Instruction. So, if we don't prepare the students with computer knowledge and skill, they will not be able to keep the society towards the advance future. Similarly, the CAIM has an important role in teaching-learning process to enhance the academic achievement of students. Hence, this paper elaborately explains about the CAIM and its scope, importance, and uses in teaching- learning process.

Qaisersuleman, Ishtiaq Hussain, Naseer Ud Din.M & Khalid Iqbal (2017) This paper was aimed to examine "The effects of Computer-Assisted Instruction (CAI) on the academic achievement of secondary school students in the subject of physics". A sample of 46 students of Grade-09 was selected randomly from Government High School, Hurram Karak. For data collection, pre-test, post-test equivalent group design was used. Experimental group was taught through computer-assisted instruction technique whereas control group was taught through conventional teaching method. On the completion of six weeks' experimental process, post-test was planned immediately to examine the level of students' achievement of both groups. Two weeks later, retention test was arranged to examine their retention. Statistical tools such as mean, standard deviation and independent samples t-test were employed through SPSS for analyzing data. The findings show that computer-assisted instruction has a significant positive effect on students' academic achievement and retention in Physics. Based on findings, it was recommended that computer assisted instruction technique should be used by the science teachers for stimulating and boosting students' academic achievement in Physics at secondary level.

Neelam Dhamija and Munni Kumari (2016) found out "The effect of Computer Assisted Instructional (CAI) and Lecture Method of teaching on the performance of IX class students in Mathematics". The significance of academic achievement scores for experimental group (using CAI) and control group (using lecture method) were examined in this study. A Pre-test - Post-test control group experimental design was used on forty five students of IX class. The results showed that the experimental group was significantly higher in academic achievement of students in Mathematics than the control group. Findings supported that experimental group (CAI) where students performed better than control group (lecture method) in Mathematics.

Samsul Alam (2015) studied that "Investment on IT: Students Perspective". The focus of this study is to seek the relevance of investing in Information Technology (IT) by the students. The research takes into account 50 students studying at different disciplines at Dhaka University. The respondents were visited randomly to get the relevant data. The result of the study suggests that students' academic quality and knowledge enhancement have are relationship with investment in IT though the relationship is not significant. The result of hypothesis testing shows that students those have invested in personal computer and internet secure comparatively higher cumulative grade point average (CGPA) rather than those who haven't invested on these IT tools. But the likelihood of investing higher amount in IT will pay-off better CGPA is not found thus there is no association of good result and investing heavily on IT. However, the findings of this exploratory study offer insights that the money invested in IT for academic purpose is more advantageous than otherwise be invested especially for those students whose academic curriculum mainly decorated in accordance with the modern up-to-date era of Information Technology. Eventually, this study will help concerned students guardians and academicians understanding how important IT is for student's academic performance.

Yogesh.M et.al., (2014) "The Effect of Computer Assisted Instruction Material as Teaching Aid on Chemistry Learning of High School Students." Two groups of 15 students each were set for the study of chemistry. One group was set for lecture method while other was for CAI material method. Pre-test, post-test and additional tests were applied to quantify the achievement of students. Pre-test and post-test are planned to know understanding level while additional test were designed to know understanding and application level, of the subject. Statistical analysis of data obtained implies that use of CAI material has more potential for learning chemistry than lecture method. In the additional test, use of CAI material has progressive effect

but at the same time improvement in the performance of control group noticeable

Jignesh J. Parmar (2013) studied that "Effectiveness of Computer Aided Instructional Material (CAIM) on chemistry for Gujarati English Medium Students of Standard XI," The investigator used Purposive Sampling Method was selecting Sample. The effectiveness was measured by taking 55 students as sample using single group pre-test and post-test. After conducting experiment, reactions of students and chemistry teacher were collected using reaction scale. The descriptive statistical technique like frequency, percentage analysis, mean, standard deviation and t-test was used to analyze the data. The study found that CAIM is effective for learning concept of chemistry and positive reactions are found towards CAIM of students and chemistry teacher.

Ahiatrogah, P. D., Madjoub, M. B. & Bervell, B. (2013) studied that "Effect of computer assisted instruction on the achievement of basic school students in pre-technical skills". The study compared the effects of Computer Assisted Instruction (CAI) on the achievement of Junior High School (J.H.S) students in Pre-Technical skills after exposing them to CAI and the traditional methods of instruction. The theoretical framework for the study is that people learn most things better through construction of computer games or multimedia composition rather than through traditional methods of directly teaching content. The study involved 59 students from two schools in Kumasi Metropolis. Twenty eight of the students formed the CAI group while 31 formed the traditional group. Quasi-experimental design was used for the study. Structured pre-test and post-test achievement test with a reliability co-efficient ļ= 0.74 and 0.75 respectively were used to collect data. The data was analyzed using Predictive Analysis Software (PASW) version 18. The study revealed that the CAI group performed better than the traditional method of instruction group. However, there was no statistically significant difference between the achievements levels of the two groups. It was recommended that CAI should be introduced in the teaching of Pre-Technical skills throughout the country.

Kannaiah.N (2012) studied that the "Effectiveness of CAIM approach on teaching Zoology of the students of standard XI". The sample consisted of 100 students. The treatment was given to Control and Experimental groups. Mean and Standard Deviation of achievement in Zoology was calculated. In this study, observed through experimentation that the self-learning package was an advantage point over the traditional method in teaching zoology effectively. The students are also interested in learning zoology through self-learning package.

Ronnie. O. Alejan and Alben P Sagpang, (2010 "Studied that Computer-Aided Instructional Module (CAIM) for the Mathematics Enhancement Program ". The purposes of this study were to describe the development of Computer-Aided Instructional Module (CAIM) in the Mathematics Enhancement Program and to determine the effectiveness of this module in improving students' level of proficiency in basic Mathematics in 2nd semester of 2006-2007. Employing experimental design, two types of instruments with mean, t-test for Correlated Samples, t-Test for Uncorrelated Samples as statistical tools, results revealed that CAIM was effective in increasing Mathematics performance level of the experimental group in all eight topic areas. It is suggested that the administration needs to show full support to the utilization of CAIM as the major teaching-learning tool for the program. Further research study is also recommended to determine other factors excluded in the study.

III. COMPUTER ASSISTED INSTRUCTIONAL TECHNOLOGY MODULE (CAITM)

Computer assisted instructional technology module is an appropriate educational tool in the hands of competent teachers who can ensure a better teaching-learning process. The modern Indian classroom is crowded with a heavy amount of syllabi; the pupils are expected to gain knowledge to improve the level of understanding. To develop the interest of pupils, to enrich meaningful development of independent study habit and to create purposeful development of self confidence in learning, an alternative process of teaching has to be adopted. The investigator found that the students in rural areas find it difficult to learn the fundamentals of chemistry. As a result, they could not score high marks when they complete the higher secondary stage. It is felt that the learners struggle to write chemical equations on their own and balance it due to their poor knowledge of basic chemistry. They cannot attain the required knowledge in chemistry, leave alone mastering over the subject. The traditional methods of teaching chemistry cannot help the students to attain mastery. The computer assisted instructional technology module is a special unique medium with features of quality in audio-visual recording and instant feedback. It can be conveniently used to convey well designed information with varying special effects.

IV NEED AND SIGNIFICANCE OF THE STUDY

An appropriate educational technology in the hands of competent teachers can ensure better teaching and learning

process. The technology module helps to go out of four walls of the classroom. Everything can be viewed by just sitting in a room. Since it provides animation pictures, even the most difficult concepts can also be taught easily to the students. It can be used for stimulating better teaching-learning environment. The technology module can penetrate more deeply into the development of human cognitive system with an immediate excitement than any other medium. In this module, the student can work at his own pace. The present study is designed by taking one unit namely, "Basic Concepts of Organic Chemistry" from the 11th standard chemistry textbook of Tamil Nadu State Board syllabus. The chemical reactions and the diagrams given in the book in the form of text only, but the module gives texts, graphics, sound, animation and video to convey information. Module can prove to be useful because it provides meaning for every difficult word in each slide. As a result, the level of achievement of the learner will also greater. Hence, the technology module will be interesting and more meaningful for every learner and will bring about purposeful learning.

V. SCOPE OF THE STUDY

The computer assisted instructional technology module has a wider scope in the instructional process by bringing the difficult concepts to reality. Therefore, the learners will be able to understand the difficult concepts easily. Hence, the present study aims at developing computer assisted instructional technology module for individualized instruction in teaching chemistry at higher secondary level and the study provides scope for the development of innumerable soft-ware which can suit different categories of learners and subjects, since the higher secondary learners are expose to this type of instruction. It is worthwhile to study attitude of students towards the computer assisted technology module in order to find out its usefulness to them. It is maintained that any attitudinal change in favor of technology support module would lead to a greater application in teaching-learning process and stable the learners to attain mastery of subject.

VI. OBJECTIVES OF THE STUDY

[1] To develop the Computer Assisted Instructional Technology Module (CAITM) in learning chemistry at higher secondary level.

[2] To find out whether CAITM proves to be effective in learning chemistry at the higher secondary level.

[3] To study the attitude of the higher secondary class students towards the CAITM.

VII. DATA AND METHODS

The investigator has chosen the XI standard first Group (Maths, Physics, Chemistry and Biology) students from Alagappa Model Higher Secondary School, Karaikudi for the investigation. There were 80 students in the XI standard first group (XIA & XI B). Out of that the investigator selected 40 students as samples. 20 samples from XI A and 20 samples from XI B have been taken, based on their marks obtained in their pre-test. For the selection of the students, purposive Sampling Technique was adopted.

The investigator has chosen the experimental method for the present study. In this study, pre-test post-test control group design was employed. First step in the experimentation is the administration of a pre-test to both control and experimental group to assess the entry behavior of the students. The second step is the application of the experimental treatment to the experimental group and traditional approach to the control group for 45 days. The third step is the administration of Progressive Tests and the final step is the administration of post-test to assess the terminal behavior of the students of control and experimental groups. The differences due to the application of the experimental treatment are then determined by comparing the pre-test, progressive-test I, progressive-test II and the post-test scores.

VIII. RESEARCH TOOLS FOR THE STUDY

The investigator used the following tools for the study.

[1] Achievement Tests(pre-test, progressive test-I and progressive Test-II, Post-Test)

[2] Computer Based Module Attitude Scale (CBMAS).

These tools were structured in order to find out the effectiveness of the CAITM

IX. RESULTS

Testing of Hypothesis

Hypothesis 1

There is no significant difference between the mean scores of pre-test and progressive-test I of the control group.

Table 1: Comparison of the mean scores of the pre-test and progressive-test I of the control group

S. No	TEST	N	Mean	SD	t-value	Level of Significance
1	Pre-Test	20	18.55	3.36	8.396	Significant at 0.05 level
2	Progressive – Test I	20	23.2	2.93		

The above table shows that the mean scores of the control group in Pre-test is 18.55 and the progressive- test I is 23.2 for N=20. It is understood that the mean scores of progressive-test-I is greater than the pre-test of the control group. Also, the obtained t-value 8.396 is greater than the table value 1.96 and is significant at 0.05level. So, the null hypothesis is rejected and research hypothesis is accepted. Thus, the hypothesis of the study is verified showing that the control group has also improved in learning chemistry.

Hypothesis 2

There is no significant difference between the mean scores of the Pre-test and Progressive-test I of the experimental group.

Table 2: Comparison of the mean scores of the pre-test and progressive-test I of the experimental group

S. No	TEST	N	Mean	SD	t-value	Level of Significance
1	Pre – Test	20	18.55	23.36	10.798	Significant at 0.05 level
2	Progressive-Test I	20	26.3	2.69		

The above table reveals that the mean score of pre-test is 18.55 and the progressive-test I is 26.3 of the experimental group for N=20. This shows that the mean score of the experimental group in progressive-test I is greater than the mean scores of the Pre-test. Also the obtained t-value 10.798 is greater than the table value 1.96 and is significant at 0.05level. So, the null hypothesis is rejected and research hypothesis is accepted. Thus, the hypothesis of the study is shows that there is a positive impact in learning chemistry through CAITM.

Hypothesis 3

There is no significant difference between the mean scores of progressive-test I and progressive-test II of the control group.

Table 3: Comparison of the mean scores of the progressive-test I and progressive-test II of the control group

S. No	TEST	N	Mean	SD	t-value	Level of Significance
1	Progressive-Test I	20	23.2	2.93	12.350	Significant at 0.05 level
2	Progressive – Test II	20	30	2.83		

The above table reveals that mean score of progressive-test I is 23.2, and the progressive-test II is 30 for N=20. This shows that the mean scores of the control group in Progressive-Test II is greater than the mean score of the progressive-test I. Also the obtained t-value of 12.350 is greater than the table value of 1.96 and is significant at 0.05level. So, the null hypothesis is rejected and research hypothesis is accepted. This significance reveals that the control group has also improved in learning chemistry.

Hypothesis 4

There is no significant difference between the mean scores of the progressive test I and progressive-test II of the experimental group

Table 4: Comparison of the mean scores of the Progressive-Test I and Progressive –Test II of the experimental group

S. No	TEST	N	Mean	SD	t-value	Level of Significance
1	Progressive-Test I	20	26.3	2.69	14.405	Significant at 0.05 level
2	Progressive-Test II	20	33.8	3.03		

The above table reveals that the mean scores of progressive-test I is 26.3 and the experimental group in Progressive-Test II is 33.8 for N=20. This shows that, the mean score of the experimental group in Progressive–Test II is greater than the mean score of the experimental group in Progressive-Test I. Also the obtained t-value of 14.405 is greater than the table value of 1.96 and is significant at 0.05level. . So, the null hypothesis is rejected and research hypothesis is accepted. This shows that, there is a positive impact in learning chemistry through CAITM.

Table 5: Effect Size (d) for the difference between Means of the sample with respect to Progressive-Test I and Progressive-Test II scores of the experimental group.

S.	TEST	N	Mea	SD	S_1+S	E.S(	Effect

No			n		$\frac{2}{2}$	d)	size(d)
1	Progressive-Test I	20	26.3	2.69	2.86	2.62	Large size effect
2	Progressive-Test II	20	33.8	3.03			

According to the broad guidelines created by Cohen (1988) for interpreting d, d=0.8 or more shows large effect size. Therefore, the obtained d=2.62 which is greater than 0.8 shows a large effect size. Thus, the effect size shows that the CAITM has significantly improved and enhanced learning of chemistry.

Hypothesis 5

There is no significant difference between the mean scores of Progressive-Test I of the control group and the experimental group.

Table 6: Comparison of the mean scores of progressive-test I of the control group and the experimental group

S.No	Group	N	Mean	SD	t-value	Level of Significance
1	Control	20	23.2	2.93	8.396	Significant at 0.05 level
2	Experimental	20	26.3	2.69		

This table reveals that, the mean scores of the control group is 23.2 and the experimental group is 26.3 for N=20 in progressive-test I. Also, the obtained t-value of 8.396 is greater than the table value of 1.96 and is significant at 0.05level. So, the Null hypothesis is rejected and research hypothesis is accepted. The experimental group has achieved better than the control group. This shows that, the effectiveness of teaching and learning through CAITM is better than through conventional method.

Hypothesis 6

There is no significant difference between the mean scores of progressive-test II of the control group and the experimental group.

Table 7: Comparison of the mean scores of progressive –test II of the control group and the experimental group

S.NS.No	Test	N	Mean	SD	t-Value	Level of significance
1	Control	20	30.0	2.82	7.933	Significant at 0.05 level
2	Experimental	20	33.8	3.03		

This table reveals that, the mean scores of the control group is 30 and the experimental group is 33.8 for N=20 in progressive- Test II. Also the obtained t-value of 7.933 is greater than the table value of 1.96 and is significant at 0.05level. So, the null hypothesis is rejected and research hypothesis is accepted. The experimental group has achieved better than the control group. This shows that, the effectiveness of teaching and learning through CAITM over conventional method.

Hypothesis 7

There is no significant difference between the mean scores of post-test of the control group and the experimental group.

Table 8: Comparison of the mean scores of post-test of the control group and the experimental group.

S.No	Group	N	Mean	SD	t-value	Level of Significance
1	Control	20	32.6	2.062	19.052	Significant at 0.05 level
2	Experimental	20	44.7	2.48		

This table reveals that, the mean scores of the control group is 32.6 and the experimental group is 44.7 for N=20. This shows that, the mean score of the experimental group is greater than the control group. Also the obtained t-value of 19.052 is greater than the table value of 1.96 and is significant at 0.05 level. So, the Null hypothesis is rejected and research hypothesis is accepted. The experimental

group has achieved better than the control group. This shows that, the effectiveness of teaching and learning through CAITM over conventional method.

HYPOTHESIS 8

There is no significant difference between the scores of progressive-test II and post-test scores of the experimental group

Table 9: Comparison of mean scores of the progressive – test II and post-test scores of the experimental group

S.No	TEST	N	Mean	SD	t-value	Level of Significance
1	Progressive-Test II	20	33.8	3.03	18.374	Significant at 0.05 level
2	Post-Test	20	44.7	2.48		

The above table reveals that the progressive-test II and post-test scores of the experimental group shows a significant difference when compared with the table value of 1.96, it is inferred that the t-value of 18.374 is significant at 0.05level. So, the Null hypothesis is rejected and research hypothesis is accepted. The greater deviation of scores between progressive-test II and the Post-test is the result of exposure to CAITM. Thus, the hypothesis of the study is verified showing that the CAITM has significantly enhanced learning of chemistry.

Hypothesis 9

There is no significant difference between the mean scores of pre-test and post-test of the experimental group.

Table10: Comparison of mean scores of pre-test and post test scores of the experimental group

S.No	TEST	N	Mean	SD	t-value	Level of Significance
1	Pre-Test	20	18.55	3.36	39.263	Significant at 0.05 level
2	Post-Test	20	44.7	2.48		

The above table reveals that, the table value of 1.96 is inferred that the t-value of 39.263 is significant at 0.05level. So, the Null hypothesis is rejected and research hypothesis is accepted. The greater deviation of scores between the pre-test and the post-test of the experimental group shows that the exposure to CAITM to the learners for a longer period would ensure better learning outcomes. Thus, the hypothesis of the study is verified showing that the CAITM has significantly enhanced learning of chemistry.

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Table 11: Effect Size (d) for the difference between Means of the sample with respect to Pre-Test and Post-Test scores of the experimental group

S.No	TEST	N	Mean	SD	$\frac{S_1+S_2}{2}$	E.S(d)	Effect Size(d)
1	**Pre-Test**	**20**	**18.55**	**3.36**	**2.92**	**8.96**	**Large size effect**
2	**Post-Test**	**20**	**44.7**	**2.48**			

According to the broad guidelines created by Cohen (1988) for interpreting d, d=0.8 or more shows large effect size. Therefore, the obtained d=8.96 which is greater than 0.8 shows a large effect size. Thus, the large effect size shows that the CAITM has significantly improved and enhanced learning of chemistry.

Hypothesis 10

There is no significant difference between the mean scores of the pre-treatment and the post-treatment of the experimental group with reference to attitude towards CAITM.

Table12: Mean Standard Deviation and t-value of the Pre-treatment and the Post-treatment scores of the experimental group with reference to attitude towards CAITM

S.No	Treatment	N	Mean	SD	t-value	Level of Significance
1	Pre-treatment	20	79.05	18.91	4.202	Significant at 0.05 level

2	Post-treatment	20	92.15	6.81		

The mean score of the attitude in the pre and post-treatments are found to be 79.05 and 92.15 respectively for N = 20. Also the obtained t-value 4.202 is greater than the table value 1.96 and is significant at 0.05level. So, the null hypothesis is rejected. Therefore, it is concluded that the attitude of the experimental group is more positive after the treatment and shows a significant level at 0.05level. This shows that, the CAITM based learning courseware makes positive attitudinal changes in the experimental group.

GAIN RATIO

Mc.Guin and Peters (1965) suggested that best criterion of a programmed effectiveness is the gain ratio between the amount learned and the amount that could be learnt.

$$\text{Gain ratio} = \frac{\text{Mean of (post –test scores – pre-test scores)}}{\text{Mean of (Full-scores – Pre -Test scores)}}$$

Gain Ratio for the Experimental Group = 26.2/31.45
= 0.8330
Gain = 83.30%.

Gain ratio of 83.30% of the experimental group shows that the experimental group learners have indeed benefited through CAITM.

Gain Ratio for the control group = 14.05/31.45
= 0.4467
Gain = 44.67%

X. LIMITATIONS OF THE STUDY

1 .The study is confined to eleventh standard students only.

2. For the development of the modules, the chemistry textbook prescribed by the Tamilnadu textbook corporation was considered.

3. Only a few chemistry concepts contained in the eleventh chemistry textbook was selected for developing computer assisted technology modules.

4. The Experimental treatment was given only for 45 days.

5. The hard spots of chemistry were alone taken for the present study that is important and difficult concepts were taken for study.

X. CONCLUSION

The present study was undertaken to find out the "Effectiveness of Computer Assisted Instructional Technology Module for enhancing the learning of chemistry at higher secondary level". The present piece of research work may contribute to alleviation of fear in approaching chemistry concepts, infuses interest and enthusiasm among them. As the present teaching learning process at the higher secondary level is rigid, time bound and out molded, it was proposed to device learning tasks in the form of multimedia courseware, so that the learner could spend their time with the computer and feel motivated through personal involvement in the process of learning. The present study clearly demonstrates that the module provides ample scope for learner motivation and user friendliness in learning through CAITM.

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