

Computer assisted instruction (CAI) as remedial teaching on diagnostic test of learning disability (DTLD) for fifth grade students

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Abstract

A experimental study investigated whether computer-assisted instruction package (games/simulations) as remedial teaching for learning disabled children among fifth grade students and whether computer assisted instruction help equally both boys and girls. The study adopted the pre-test-post-test-control group design. Simple random sample of sixty four students were drawn from seven schools in Meerut, Uttar Pradesh, India. The researcher developed computer assisted instructions package (game/simulations) for learning disabled children which was used as an instrument for experimental group while control group were exposed to traditional teaching method. The instrument for data collection was Diagnostic Test of Learning Disability DTLTD Test. The t-test statistics was used to analyse the hypothesis. The findings revealed that experimental group performed better than the control group. The study found to be computer assisted instruction method was better than traditional method on fifth grade learning disabled students (boys and girls).

Keywords: Computer assisted instruction, learning disability, diagnostic test of learning disability (DTLD), remedial teaching.

Introduction

Computer programs are interactive and can illustrate a concept through attractive animation, sound, and demonstration. They allow students to progress at their own pace and work individually or solve problems in a group. Computers provide immediate feedback, letting students know whether their answer is correct. If the answer is not correct, then the program gives the correct answer to the question. Computers offer a different type of activity and a change of pace from teacher-led or group instruction. (Accessed online, 2008).

Computer Assisted Instruction (CAI) is a new teaching-learning strategy in which the topics to be taught is

carefully planned, written and programmed in a computer which could be run at the same time in several computer units and allows each student a computer terminal. The instructions are also programmed on a computer disc (CD), which could be played using audio, video, drag and drop, gaming and simulation activity for the student to learn the topic at his/her leisure time and at his/her own pace. The potential benefit of Computer Assisted Instruction (CAI) can not be underestimated in the contemporary world. There are lot of established findings on the instructional value of computer, particularly in advanced countries. There are now several CAI packages on different subjects. It is obvious that current trend in research all over the world is the use

of computer facilities and resources to enhance students' learning. Chang (2000) and Yusuf (2009) opined that 'many exercises that depart from traditional method are now readily accessible on the web (p.521), even though teachers do not use these facilities'. Jenk and Springer (2005) opined that the way CAI is delivered can affect its effectiveness, and that new studies are needed to clarify the effect of CAI in contemporary student environment. Instructional material and strategies through Computer Assisted Instruction have been found to aid academic achievement and retention. Orisebiyi (2007), who investigated the effect of computer assisted package on student's achievement in learning disability found CAI to be effective on student's achievement. However from reviews, it was observed that many of the studies were focused on some parts of Mathematics such as Algebra, Statistics, word problem and quadratic equation, not much on geometry using CAI Package.

Computer-assisted instruction improves instruction for students with disabilities because students receive immediate feedback and do not continue to practice the wrong skills. Computers capture the students' attention because the programs are interactive and engage the students' spirit of competitiveness to increase their scores. Also, computer-assisted instruction moves at the students' pace and usually does not move ahead until they have mastered the skill. Programs provide differentiated lessons to challenge students who are at risk, average, or gifted.

Learning Disabilities: "Learning disability is a generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical abilities. These disorders are intrinsic to the individual and presumed to be due to Central Nervous System dysfunction." Even though learning disability may occur concomitantly with other handicapping conditions (e.g., sensory impairment, mental retardation, social and emotional disturbance) or environmental influences (e.g., cultural differences, insufficient/inappropriate instruction, psychogenic factors) it is not the direct result of these condition or influences.

Student with learning disabilities (LD) have been described in essence as those children and adolescents with at least average potential to learn, but for whom academic achievement in the core areas of learning including reading, mathematics,

and writing fall short of their potential (Hallahan and Kauffman, 2007; Hallahan, Lloyd, Kauffman, Marteniz, and Weiss, 2005). There is growing evidence that the academic difficulties experienced by students with LD are in fact cumulative in nature such that the gap between achievement and potential grows from childhood to adolescence (Miller, Fitzgerald, Koury, Mitchem, and Hollingsead, 2007). On the other hand, there is evidence that children with LD fall behind their peers without LD in the level of their cognitive development. The Difference between both parties reaches half a stage or about a sub-stage. At the time the children without learning disabilities reach the sub-stage of intuitive thought of the operational stage according to Piaget, their peers with LD are in the pre-conceptual thought (Mohammed, 2006). This gap should be borne in mind when dealing with those children or trying to educate them.

The purpose of this study was to investigate the effectiveness of computer-assisted instruction developed by researcher for use with primary school pupils, particularly fifth graders, for improving their learning disabilities. Follow up was gathered to determine the maintenance of CAI.

Statement of the Problem

Effectiveness of Computer Assisted Instructions (CAI) as Remedial Teaching on Diagnostic Test of Learning Disability (DTLD) for Fifth Grade Students'

Purpose of the Study

The specific objectives of this study are:

1. to compare the relative effectiveness of remediation of learning disabilities with computer assisted instruction and traditional method.
2. to compare the relative effectiveness of computer assisted instruction on DTLD sub-tests of learning disabilities.
3. to compare the relative effectiveness of computer assisted instruction on DTLD sub-tests of learning disabilities keeping gender constant.

Hypotheses of the Study

As the present study is exploratory in nature, a number of hypotheses have been formulated for testing in the present situation:

1. There was no significant difference between the effectiveness of CAI and traditional method of teaching in remediation of learning disability with respect to different sub-areas of learning disability.
2. There was no significant difference between the effectiveness of CAI and traditional method of teaching in remediation of overall learning disability for learning-disabled boys.
3. There was no significant difference between the effectiveness of CAI and traditional method of teaching in remediation of overall learning disability for learning-disabled girls.

Scope of the study

The study focused on the effectiveness of computer assisted instruction as remedial teaching for learning disabled fifth grade. It was limited to fifth grades of CBSE board in Meerut, Uttar Pradesh State. The sub area of learning disabilities (i) Eye-Hand Coordination (EHC), (ii) Figure Ground Perception (FGP), (iii) Figure Constancy (FC), (iv) Position-in-Space (PS), (v) Special Relation (SR), (vi) Auditory Perception (AP), (viii) Cognitive Abilities (CA), (vii) memory (M), (ix) Receptive Language (RL) and (x) Expressive Language (EL) topics taught during the study.

Methodology

The research design for this study was pre-test-post-test experimental group and pre-test-post-test control group design. The target population were seven hundred and forty-nine (749) from seven (07) CBSE schools in Meerut, Uttar Pradesh, India. The sample for this study was made up of 64 students using simple random sampling techniques (Behavioural Checklist, NVGIT, DTLT). A breakdown revealed that the experimental group consisted of 32 students with a gender balance of boys (n=17) and girls (n=15), while the control group had a gender balance of boys (n=17) and girls (n=15) respectively. The experimental group was taught using computer assisted instructional package (CAI, game/simulation) which covered ten sub-areas (*EHC, FGP, FC, PS, SR, AP, CA, M, RL and EL*) of learning disability, while control group was taught using traditional method.

Research Instruments

The instruments for this study are Behavioural Checklist and DTLT, adopted form (*Swarup and Mehta*), Non-verbal group intelligence Test (NVGIT) (*Imtisnugba Ao {Kohima}*) and Computer Assisted Instruction (CAI) package developed by researcher.

Method of Data Collection

The teachers in the sampled schools were trained as research assistants in the use of computer assisted instruction package. The study period was of 45 classes for five months, twice a week. The classes were conducted in a Computer lab with CAI package. There was an orientation between the researcher and the students who underwent the test from the selected schools. The experimental group students were exposed to Computer Assisted Instruction package which had been installed on desktop computer, while control group students were taught using traditional teaching method having the same content used for the experimental group. At the end of the experimental study, DTLT was administered as the post-test to measure the outcome of learning disability of the students. The DTLT test was administered in the same manner for the post-test also. The test was conducted at the same time with the help of research assistants in each school and the script collected immediately for scoring. The 't'-test was used to test all the null hypotheses using Statistical Package for Social Sciences (SPSS) version 20 at 0.05 alpha level.

Results

Hypothesis 1: There was no significant difference between the effectiveness of CAI and traditional method of teaching in remediation of learning disability with respect to different sub-areas of learning disability.

The mean test scores on the DTLT sub-tests achieved by group-A and B students on the final test (post-test) are given in Table 1. The 't' value yielded was highly significant on *EHC, FGP, FC, PS, SR, AP, CA, M, RL* (t -value, $p < 0.01$) and language ($t=0.77$, $p > 0.5$). This infers that computer assisted instruction (games/simulations) method was better than the traditional method in remediation of sub-area of learning disability of *EHC, FGP, FC, PS, SR, AP, CA, M, RL* for the students studying in fifth grades. Only one sub-

Table 1. Mean values of various DTLD sub-test of group-A and group-B students.

	DTLD Sub-Tests	Groups	N	M		't'
1.	Eye-hand Coordination (EHC)	Group-A Group-B	32 32	3.84 5.23	0.76 1.13	5.63**
2.	Figure-Ground Perception (FGP)	Group-A Group-B	32 32	2.93 4.09	0.84 1.20	4.11**
3.	Figure Constancy (FC)	Group-A Group-B	32 32	2.65 4.15	0.70 0.84	8.10**
4.	Position in Space (PS)	Group-A Group-B	32 32	2.62 3.96	0.79 0.78	7.13**
5.	Spatial Relation (SR)	Group-A Group-B	32 32	2.62 3.96	0.70 0.96	6.93**
6.	Auditory Perception (AP)	Group-A Group-B	32 32	3.71 4.90	0.85 0.89	5.71**
7.	Cognitive Abilities (CA)	Group-A Group-B	32 32	3.18 4.43	0.93 0.91	5.08**
8.	Memory (M)	Group-A Group-B	32 32	3.15 4.03	0.76 0.82	4.62**
9.	Receptive Language (RL)	Group-A Group-B	32 32	4.00 5.21	0.91 0.97	5.06**
10.	Expressive Language (EL)	Group-A Group-B	32 32	2.87 3.03	0.65 0.86	.77 (ns)

area of learning disability of expressive language achieved ($t=.77, p > .05$). It indicates that the two method of teaching, computer assisted instruction and traditional method, are equally effective for the learning disabled students of the selected grade in improving their expressive language.

The data displayed in Fig. 1 indicates that mean-scores on the DTLD sub-tests achieved by group-B students on the post-test were significantly higher than the mean-scores achieved on the group-A post test of nine sub-areas EHE ($t=5.63, p<0.01$), FGP ($t=4.11, p<0.05$), FC ($t=8.10, p<0.01$), PS ($t=7.13, p<0.01$), SR ($t=6.93, p<0.01$), AP ($t=5.71, p<0.01$), CA ($t=5.08, p<0.01$), M ($t=4.62, p<0.01$) and RL ($t=5.06, p<0.01$) This statistics shows that computer assisted instruction method was effective in improving first nine areas of learning disability among the fifth grade students selected for the study. The value of EL ($t=0.77$, insignificant) shows that none of the two methods computes assisted instruction and traditional method, is superior from the other in improving the expressive-language among the selected learning disabled children.

Hypothesis 2: There was no significant difference between the effectiveness of computer assisted instruction and

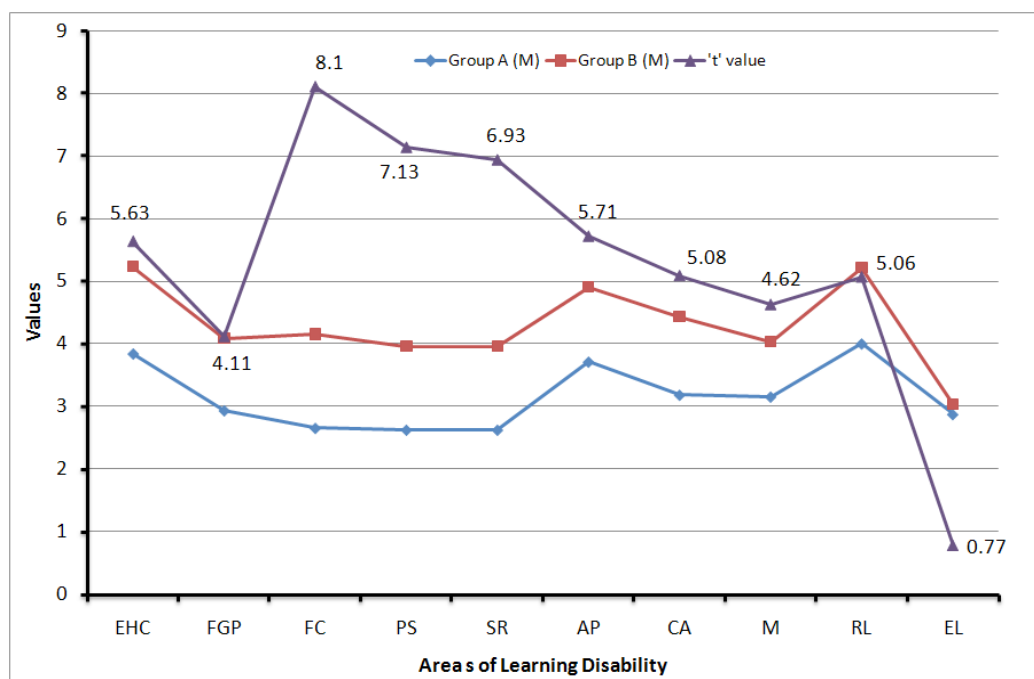


Figure 1. Mean values of various DTLD sub-test of group-A and group-B students

traditional method of teaching in remediation of overall learning disability for learning-disabled boys.

Table 2. Mean values of various DTLD sub-test of Group-A boys and Group-B boys.

S.N.	DTLD Sub-Tests	Groups	N	M	S.D.	't'
1.	Eye-hand Coordination (EHC)	Group-A	17	4.05	0.65	3.26**
		Group-B	17	5.29	1.15	
2.	Figure-Ground Perception (FGP)	Group-A	17	2.88	0.92	2.78**
		Group-B	17	4.00	1.22	
3.	Figure Constancy (FC)	Group-A	17	2.64	0.70	4.55**
		Group-B	17	4.05	1.02	
4.	Position in Space (PS)	Group-A	17	2.41	0.71	5.33**
		Group-B	17	4.05	0.82	
5.	Spatial Relation (SR)	Group-A	17	2.70	0.84	3.68**
		Group-B	17	4.00	1.06	
6.	Auditory Perception (AP)	Group-A	17	3.94	0.65	3.68**
		Group-B	17	4.94	0.96	
7.	Cognitive Abilities (CA)	Group-A	17	3.47	0.79	3.63**
		Group-B	17	4.58	0.93	
8.	Memory (M)	Group-A	17	3.05	0.74	4.76**
		Group-B	17	4.05	0.74	
9.	Receptive Language (RL)	Group-A	17	3.82	1.01	4.55**
		Group-B	17	5.23	0.83	
10.	Expressive Language (EL)	Group-A	17	3.00	0.79	.20(ns)
		Group-B	17	3.05	0.89	

The mean test scores on the DTLD sub-tests achieved by group-A boys and B boys on the post-test are given in Table 2. The post-test differ significantly ($p < 0.01$ in all cases) in nine sub areas favours of the post-test. It infers that computer assisted instruction (games/simulations) method of teaching is significantly effective that traditional teaching in remediation of first nine areas of learning disability among the learning disabled boys of the selected fifth grade students. The table

1 states that mean scores of DTLD sub-test of expressive language achieved by group-A boys and group-B boys on the post-test did not differ significantly ($t=0.20$, insignificant). It shows that none of the two methods computer assisted instruction and traditional method is superior from the other in improving the expressive-language among the selected learning disabled children.

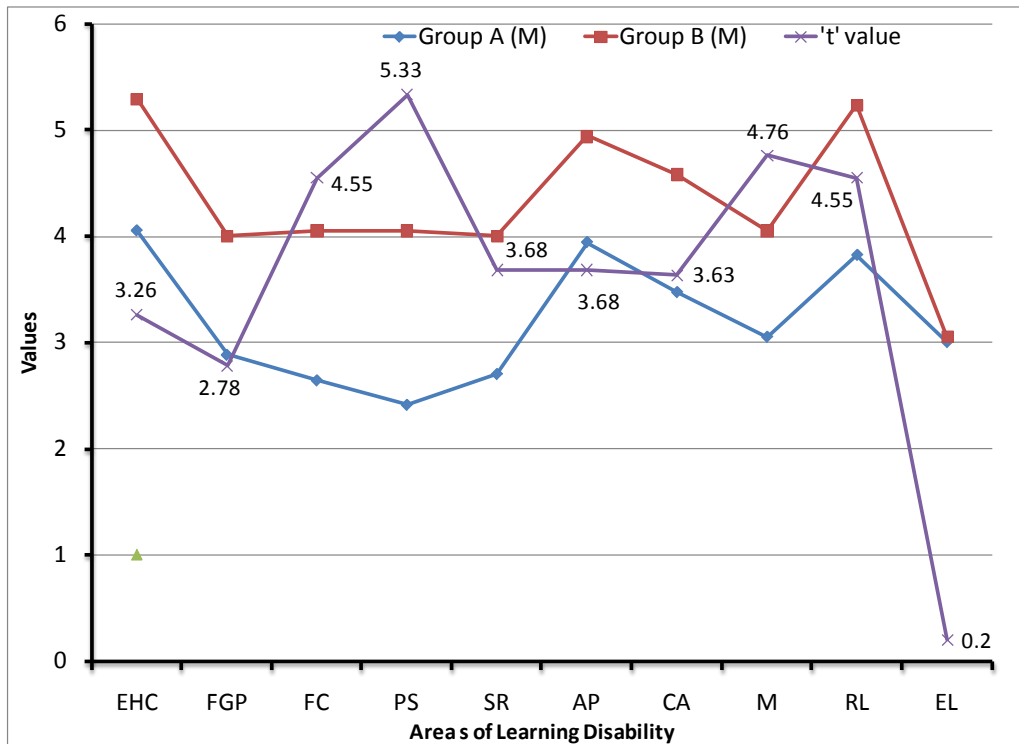


Figure 2. Mean values of the DTLD of group-A boys and group-B boys on the post-test

Table 3. Mean values of various DTLD sub-test of group A girls and group B girls.

S.N.	DTLD Sub-Tests	Groups	N	M	S.D.	't'
1.	Eye-hand Coordination (EHC)	Group-A Group-B	15 15	3.60 5.20	0.82 1.14	6.28**
2.	Figure-Ground Perception (FGP)	Group-A Group-B	15 15	3.00 4.20	0.75 1.20	3.05**
3.	Figure Constancy (FC)	Group-A Group-B	15 15	2.66 4.26	0.72 0.59	5.87**
4.	Position in Space (PS)	Group-A Group-B	15 15	2.86 3.86	0.83 0.74	3.41**
5.	Spatial Relation (SR)	Group-A Group-B	15 15	2.53 3.93	0.51 0.88	4.83**
6.	Auditory Perception (AP)	Group-A Group-B	15 15	3.46 4.86	0.99 0.83	5.50**
7.	Cognitive Abilities (CA)	Group-A Group-B	15 15	2.86 4.26	0.99 0.88	4.01**
8.	Memory (M)	Group-A Group-B	15 15	3.26 4.00	0.79 0.92	2.32*
9.	Receptive Language (RL)	Group-A Group-B	15 15	4.20 5.20	0.77 1.14	3.62**
10.	Expressive Language (EL)	Group-A Group-B	15 15	2.73 3.00	0.45 0.84	1.07(ns)

The Figure 2 indicates that mean-scores on the DTLD sub-tests achieved by group-A and group-B boys on the post-test were significantly higher than the mean-scores achieved on the group-A post test of nine sub-areas EHE ($t=3.26$, $p<0.01$), FGP ($t=2.78$, $p<0.01$), FC ($t=4.55$, $p<0.01$), PS ($t=5.33$, $p<0.01$), SR ($t=3.68$, $p<0.01$), AP ($t=3.68$, $p<0.01$), CA ($t=3.63$, $p<0.01$), M ($t=4.76$, $p<0.01$) and RL ($t=4.55$, $p<0.01$) This statistics shows that computer assisted instruction method was effective in improving first nine areas of learning disability among the fifth grade boys students selected for the study. The value of EL ($t=0.20$, insignificant) shows that none of the two methods compute assisted instruction and traditional method, is superior from the other in improving the expressive-language among the selected learning disabled children.

Hypothesis 3: There was no significant difference between the effectiveness of CAI and traditional method of teaching

in remediation of overall learning disability for learning-disabled girls.

The mean test scores on the DTLD sub-tests achieved by group-A girls and B girls on the post-test are given in Table 2. The post-test differ significantly ($p<0.01$ and $2.32 < 0.05$ in all cases) in nine sub areas favours of the post-test. It infers that computer assisted instruction (games/simulations) method of teaching is significantly effective that traditional teaching method in remediation of first nine areas of learning disability among the learning disabled girls of the selected fifth grader. The table 3 clearly states that mean scores of the DTLD sub-test of expressive language achieved by group-A girls and group-B girls on the post-test did not differ significantly ($t=1.07$, insignificant). It shows that none of the two methods compute assisted instruction and traditional method, is superior from other in improving the expressive-language among the selected learning disabled children.

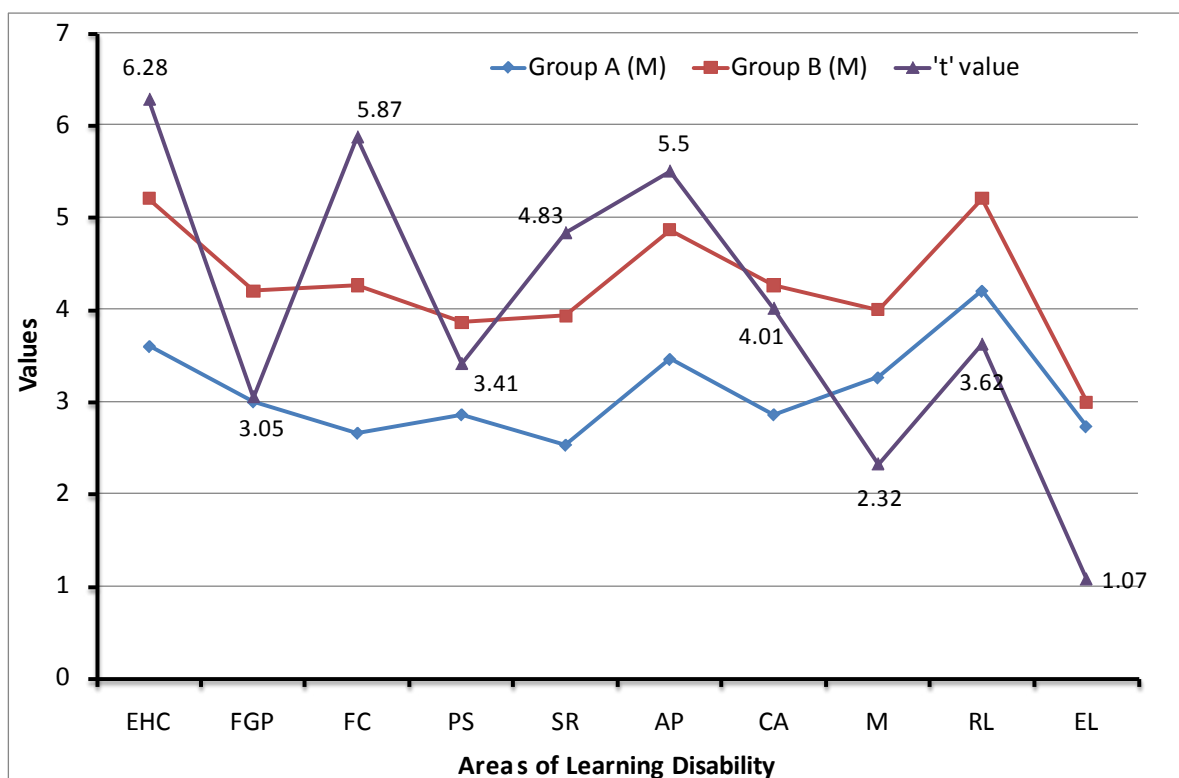


Figure 3. Mean values of the DTLD of group-A girls and group-B girls on the post-test

The Fig. 3 indicates that mean-scores on the DTLTD subtests achieved by group-A girls and group-B girls on the post-test were significantly higher than the mean-scores achieved on the group-A post test of nine sub-areas EHE (t=6.28, p<0.01), FGP (t=3.05, p<0.01), FC (t=5.87, p<0.01), PS (t=3.41, p<0.01), SR (t=4.83, p<0.01), AP (t=5.50, p<0.01), CA (t=5.5, p<0.01), M (t=2.32, p<0.05) and RL (t=3.62, p<0.01) This statistics shows that computer assisted instruction method was effective in improving first nine areas of learning disability among the fifth grade girls students selected for the study. The value of EL (t=1.07, insignificant) shows that none of the two methods compute assisted instruction and traditional method is superior from the other in improving the expressive-language among the selected learning disabled children.

Summary of the findings

The summary of findings for this study is:

1. There was significant difference between the mean score of fifth graders taught with computer assisted instruction and those taught with traditional method of teaching in remediation of learning disability.
2. There was significant difference between the mean score of fifth graders boys taught with computer assisted instruction and those taught with traditional method of teaching in remediation of learning disability.
3. There was significant difference between the mean score of fifth graders girls taught with computer assisted instruction and those taught with traditional method of teaching in remediation of learning disability.

Discussion of the Results

The tables 1, 2 and 3 show the comparison of post-test mean scores of experimental and control groups. There was significant difference between the mean scores of students (boys and girls also) taught with CAI and those taught with traditional method of teaching in remediation of learning disability. The result is in agreement with the findings Haberman (1977) for socially/emotionally disturbed school children, Lavine (1980); Watkins and Webb (1981); Bukatman,(1981); Maccini (1998); Vasanthal (1994); Kim

(1998); Gleason *et.al.* (1990); Reddy *et.al.* (1997); Agrawal (2000); Crute (2000); Vaupel (2002); Sharma (2004); Fuch, *et.al.* (2006); Seo and Bryant (2009); Scheid (2010); Anyamene (2012); Singh (2013); Brown *et.al.* (2013).

Recommendations

On the basis of findings from this study, it is recommended that there should be continuous training in computers to ensure awareness and literacy through series of symposia, seminars, conferences to in-still computer literacy among learning disabled students. Teachers and students especially of fifth grade should be made to learn how to write simple computer programs, in order to aid fast integration of skills in developing CAI by teachers.

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