

Effectiveness of Computer Assisted Instruction for Remedial Teaching of Children with Cognitive Learning Disabilities

Dr. Shikha Chaturvedi *

ABSTRACT

A study investigated whether computer-assisted instruction (games) as remedial teaching for cognitive abilities 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 coordinates the computer assisted instructions (game/simulations) for cognitive abilities 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 DTLD Test. The t-test statistics was used to analyze 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 cognitive abilities learning disabled students.

KEY WORDS: cognitive ability, computer assisted instruction, learning disabled, diagnostic test of learning disability, remedial teaching

INTRODUCTION

For far too long have the schooling system ignored children with special needs. Now with the Right to Education Act 2009 in place, it has become imperative for most children with special needs to be mainstreamed, and not kept in ghettos of 'special schools'. This has resulted in the possibility of each teacher being required to facilitate the learning of, say, a mentally challenged child, or a child with hearing impairment, alongside the children they are used to teaching.

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 & 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) cannot be underestimated in the contemporary world. There is 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 & Springer (2005) opined that the way CAI is delivered can affect its effectiveness, and that new studies are needed to clarify the effect of

* Head & Associate Professor, NAS (PG) College, Meerut UP (India)

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.

Disability: Disability is more than a problem or difficulty with how our body works – a child with an impairment may experience disability when functioning in an environment that impact the child's successful performance at a task. (NCERT Focus Paper, 2014)

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.

Cognitive Ability (CA): The way a child learns is impacted and, also influenced, by how different sense organs, parts of our bodies and the brain, are co-ordinating or how they are affected. Since specific disabilities, such as Autism, Spectrum, intellectual impairments and learning difficulties are primary associated with the working of the brain and/or how brain processes the information received, these are addressed under cognitive and intellectual disability. (NCERT 2014)

The cognitive abilities include the subject's ability to manipulate the stimuli in reversed order which calls for a cognitive retracing, subject's ability to categorization and the level of his/her cognitive processing, involving encoding and memory of the input from the range of his/her experimental worked, the ability to recognized the subtle difference within its common category required for adequate task performance, it., the subject's higher level processing abilities.

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 computer assisted instruction.

OBJECTIVES OF THE STUDY

1. To compare the effectiveness of remediation of cognitive learning disabilities with pre-test and post test of traditional method of teaching.
2. To compare the effectiveness of remediation of cognitive learning disabilities with pre-test and post test of computer assisted instruction method of teaching.
3. To compare the relative effectiveness of remediation of cognitive learning disabilities with computer assisted instruction and traditional method of teaching.

HYPOTHESES OF THE STUDY

1. There was no significant difference between the pre-test and post test of traditional method of teaching in remediation of children with cognitive learning disabilities.
2. There was no significant difference between the pre-test and post test of computer assisted instruction (CAI) method of teaching in remediation of children with cognitive learning disabilities.
3. There was no significant difference between the effectiveness of computer assisted instruction and traditional method of teaching in remediation of children with cognitive learning disabilities.

SCOPE OF THE STUDY

The study focused on the effectiveness of computer assisted instruction as remedial teaching for learning disabled fifth grade students. It was limited to children with cognitive learning disabilities of fifth grades of CBSE board in Meerut, Uttar Pradesh State.

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 was 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, DTLD). 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 eye-hand coordination of learning disability, while control group was taught using traditional method.

RESEARCH INSTRUMENTS

The following tools were used by the researcher to conduct the Study:

1. Behavioural Checklist for Screening the Learning Disabled (B.C.S.L.D.) developed by *Swaroop and Mehta*.
2. Diagnostic Test of Learning Disability (D.T.L.D.) developed by *Swaroop and Mehta*.
3. Non-verbal Group of Intelligence Test (NGIT) developed by *Imtisungba*.
4. Computer Assisted Instruction (CAI) package consisting of games/simulations developed by *Dr. Shikha Chatruvedi* and *Dr. Ravindra Kumar*.

Computer Assisted Instruction (CAI) for Cognitive Learning Disability: In this package following games/simulations were selected for remediation of cognitive learning disability.

1. *Learning Math videos:* In these simulation children need to listen two math video on number quiz; greater and lesser. These videos provide insight to children what is greater and what is lesser or what digit put on between two more digit figures.
2. *Words Game:* In this games children needs to make a new work with the help of given words as on shown screen. In the first stage children change the first alphabet of selected word and make a new word such as shuffling of first alphabet e.g. Map and Cap. In second stage, a different word shown on screen. Children needs to put first alphabet to make new word.
3. *Shorting-out and magic page game:* This is drag and drop games. In this game group the children needs to select same category of object shown on the screen and in magic page game children need to select the same category of objects with the help of mouse.
4. *IQ Test Games:* In this game two categories game, one verbal IQ test and nonverbal IQ test. In this game children need to cross the odd one from the list, match the words in groups A

with those in group B, select the shape of specific blank space shown on the screen. All shapes were arranged as per difficulty order.

5. *Addition Math Games*: In this game children needs to complete a pipe line with the help of given numeric numbers shown on the screen. Every time a new number will be displayed to create a new situation for children.
6. *Quick Math Games*: In this game children need to select the mathematical sign for the final result figure. The main function of quick math game is to aware the children to fundamental mathematical activity like addition, subtraction, multiplication and divided. The efficiency between children was compared by time factor and scores acquired.

In this computer assisted instruction package all the games were arranged as per order and children train to participate in the games/simulation. These games/simulations overcome cognitive learning disabilities completely or to some extent.

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 institute with Computer Assisted Instruction for eye-hand coordination learning disability. 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 (games) 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, DTLD was administered as the post-test to measure the outcome of learning disability of the students. The DTLD 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 AND DISCUSSION

Phase 1: Remediation of Learning Disability through Traditional Method with reference of children with cognitive learning disabilities

Table: 1.1 Statistical values on the DTLD sub test of cognitive ability of group–A (control group) students on the pre-test and post-test.

Testing	N	M	S.D.	‘r’	‘t’
Pre-test	32	2.53	0.84	0.85	7.69**
Post-test	32	3.18	0.93		

* Significant at 0.05 level

** Significant at 0.01 level

A perusal of table 1.1 clearly stated that mean DTLD scores achieved by group–A subject. Taught through the traditional method, on the subtest of cognitive abilities on pre-test were 2.53 and 3.18 respectively. The difference in mean-scores was highly significant (t=7.69, p<0.01). The significant gain in scores on the post-test reveals that traditional method of teaching was significantly effective in improving cognitive abilities in learning disabled fifth grade students.

Furthermore, the pre-test and post-test scores of the sample-subjects were positively and highly correlated (r = 0.85). Thus, the students, who achieved higher on the pre-test, were high-achievers on the post-test as well and vice-versa. This indicates that the improvement in cognitive abilities was almost equal among all the students regardless of their prior achievement on this sub-test of DTLD. Hence, it may be concluded that traditional method of teaching was equally beneficial in improving the cognitive abilities for all the learning-disabled children or the selected fifth grade students.

Phase 2: Remediation of Learning Disability through Computer Assisted Instruction (CAI) Method of teaching with reference of cognitive ability (CA) for learning disabled children

Table: 1.2. Statistical values on the DTLD sub-test of cognitive abilities (CA) of group-B (experiment group) students on the pre-test and post-test.

Testing	N	M	S.D.	'r'	't'
Pre-test	32	2.65	0.82	0.63	13.42**
Post-test	32	4.40	0.91		

* Significant at 0.05 level

** Significant at 0.01 level

An observation of the data displayed in table 1.2 shows that mean scores on the DTLD sub-test of cognitive abilities yielded by group-B subjects, taught through computer assisted instruction (games/simulations) methods, on pre-test and post-test were 2.65 and 4.40 respectively, the difference being 1.75. The obtained 't' value (t=13.42, p<0.01) was highly significant. It concludes that computer assisted method is also beneficial in improving cognitive abilities of fifth grade learning disabled children.

Also, the product moment correlation between pre-test and post-test scores on this sub-test of DTLD was found to be highly positive (r=0.63). These finding are almost similar to those reported for the traditional method (refer table 1.2). However, the value of 'r' for computer assisted instruction method (r=0.63) is much less than its value for traditional method (r=0.85). Therefore, improvement in cognitive abilities was more consistent among subjects taught through traditional method as compared to their counterparts belonging to computer assisted instruction group.

Phase 3: Comparing Relative Effectiveness of Computer Assisted Instruction (Games) and Traditional Methods in Remediation of Cognitive ability of Learning Disability:

Table: 1.3. Statistical values on the DTLD sub-test of cognitive ability (CA) of group-A and B students on the post-test.

Groups	N	M	S.D.	't'
Group A	32	3.18	0.93	5.08**
Group B	32	4.43	0.91	

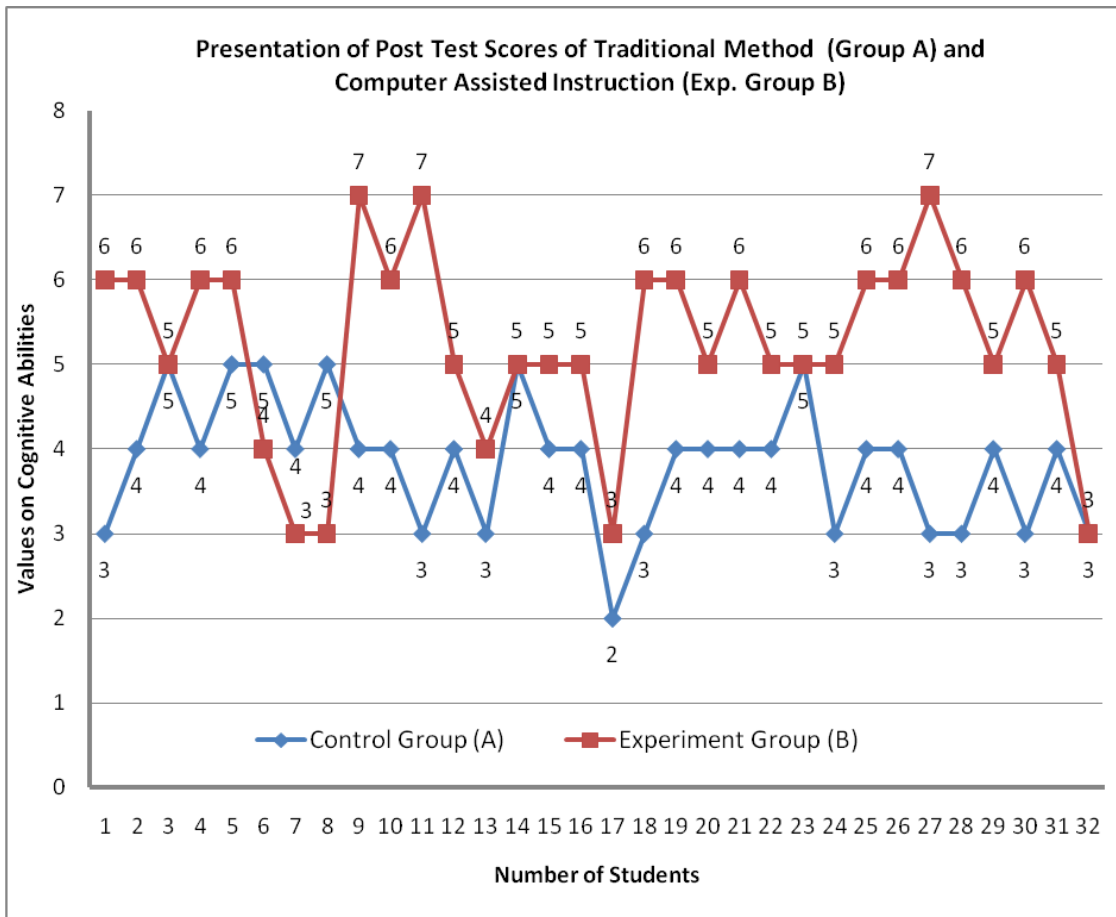
* Significant at 0.05 level

** Significant at 0.01 level

A look at table 1.3 indicates that mean scores on the DTLD sub-test of cognitive abilities of group A and group B students on the post-test were 3.18 and 4.43 respectively. The 't' value yielded (t=5.08, p<0.01) was highly significant. This infers that computers assisted instruction (games/simulations) method was better than the traditional method in improving the cognitive abilities among the learning disabled students studying in fifth grade.

Summing up, tables infer that computer assisted instruction method as well as traditional method are effective in improving sample subject's ability of recognizing an objectives position in space but computer assisted instruction method was better than the traditional method in ding so. However, traditional method was better in consistency than the computer assisted instruction method.

Graph: 1.1. Graphical Presentation of post test values on the DTLD sub-test of cognitive abilities of group-A (Control Group) and B (Experiment Group) students on the post-test.



A look at graph 1.1 indicates that mean scores on the DTLD sub-test of cognitive abilities of group A and group B students on the post-test. The graph shows that experimental group scores were better than traditional group scores. It is indicated that the computer assisted instruction better than traditional method of teaching.

FINDINGS AND CONCLUSIONS

H₀₋₁ The traditional method of teaching, which included individual attention and drill and practice, was significantly effective in remediation of cognitive ability of learning disability for fifth grade learning disabled children. The traditional method was found to be effective in cognitive abilities (CA) of learning disabled (EHC).

H₀₋₂ The computer assisted instruction (games/simulations) method of teaching was found to be significantly effective in effective in remediation of cognitive abilities of learning disability for fifth grade learning disabled children. The traditional method was found to be effective in cognitive abilities of learning disabled (EHC).

H₀₋₃ The computer assisted instruction (games/simulations) method was significantly better than the traditional method in remediation of cognitive abilities of learning disability for fifth grade learning disabled children. The traditional method was found to be effective in cognitive abilities of learning disabled (EHC).

The findings are consistent with the results reported by *Haberman* (1977) for socially/emotionally disturbed school children, *Lavine* (1980); *Watkins & Webb* (1981); *Bukatman*,(1981); *Maccini*, (1998); *Vasanthal* (1994); *Kim* (1998); *Gleason et.al.* (1990);

Reddy *et.al.* (1997); Sharma, R.A. (2014), *Crute* (2000); Pandya & Chaudhary (2000); Agrawal (2000); *Vaupel* (2002); *Chiang* (1986); *Fuch, et.al.* (2006); *Kundu* (2008); *Seo & Bryant* (2009); *Scheid* (2010); *Anyamene* (2012); *Singh* (2013); *Brown et.al.* (2013); etc. found that various forms of computer delivered instruction have the potential for improving student achievement scores.

EDUCATIONAL IMPLICATIONS OF THE FINDINGS

The findings of the study provide the awareness to the teachers, parents and guardians of learning disabled children. The educational implications of the findings of study are as follows:

1. All games and simulations may be used for helping the learning disabled children because in CAI package, all games and simulations are easy to download and supported almost all the operating systems.
2. The findings of the study may be developing the tendency of practices, trial and error habits in students.
3. It was found that the CAI package may provide to be effective but is not the panacea for students with learning disabilities.
4. The findings of the study that CAI package may improves the thinking process of learning disabled children can also be useful in providing the ways to teach for learning disabled students.
5. The findings of the study reveals that the CAI package may be helpful in making teacher awareness to teach as teaching material. The teachers may be used the selected games and simulations as a teaching material to improving the performance of students.

References:

- Agarwal, A.* (2000). Remediation of learning disabilities through CAI and traditional method. Unpublished Ph.D. thesis MJP Rohilkhand University, Bareilly.
- Bukatman, K.L.* (1981). The effect of computer assisted instruction for mastery of multiplication facts on learning disabled elementary school aged children differing in locus control. (Doctoral dissertation, Boston College, 1981). *Dissertation Abstracts International*.42, (9), 3944-A.
- Chiang, B.* (1986). Initial learning and transfer effects of microcomputer drills LD students' multiplication skills. *Learning Disability Quarterly*, 9(2), 118-123.
- Crute, T.D.* (2000). Classroom nomenclature Games-BINGO, *Journal of Chemical Education*. Vol. 77(4), pp. 481-493.
- Hallahan, D. & Lloyd J., Kauffman, J., Marteniz, E., & Weiss, M.* (2005). *Learning Disabilities: Foundations, Characteristics and effective teaching* (3rd ed.). New York: Allyn & Bacon.
- Jenk, M. & Springer, J.M.*(2005). A view of the research on the efficacy of CAI . *Electronic Journal for the integration of Technology in Education* 1(2), 43-58. Retrieved July 15, 2006, from <http://ejite.Isu.edu/volume 1 No2/Jenks.pdf>
- Kim, S.C.* (1998). The relative effects of rule based strategy and traditional method of instruction on the spelling performance of elementary students with learning disabilities. (Doctoral dissertation. Auburn University, 1998:). *Dissertation Abstracts International*. 59, (8) 2925-A.
- Kumar, R. & Chaturvedi, S.* (2015). Effectiveness of Computer assisted instruction as remedial teaching for learning disabled children, Ph.D. Thesis, Meerut University, Meerut India.
- Lavine, J.A., & Kareev, Y.* (1980). Personal computers and education: The challenge to schools. Sna Diego, C.A.; University of California Center for Human information Processing (Report No. 98)
- Maccini, P., Gagnon, J.C., & Hughes, H.A.,* (2002). Technology-based practices for secondary students with learning disabilities, *Learning Disability Quarterly*, 25(4), 247-261.
- Miller, K., Fitzgerald, G., Koury, K., Mitchem, H., & Hollingsead, C.,* (2007). Kids Tools: self-management, Problem-solving, Organizational, and Planning Software for Children and Teachers, *Intervention in School and Clinic*, 43, 12-19.

- NCERT* (2014). Including Children with Special Needs (Primary Stage), National Council of Educational Research and Training (NCERT), New Delhi.
- NCERT* (2006). Position Paper, National Focus Group on Education of Children with Special Needs, National Council of Educational Research and Training (NCERT), New Delhi.
- Mohammed, A.* (2006 March). Cognitive Development in Kindergarteners with Low level of preacademic skills as precursors for consequent learning disabilities. Paper presented at the First International conference for Childhood Impairments. Faculty of Education, Kuwait University, Muwait.
- Orisebiyi, O.O.* (2007). *Effects of instructional Video Tape Package on senior secondary school students performance in Biology in Fidit, Oyo state* Unpublished M-Tech thesis F.U.T, Minna.
- Reddy, G.I. Kumar J.* (1997). Effectiveness of the remedial package in learning spoken English by low achievers at the secondary level, *Prespectives in Education*. Vol. 13(1), pp. 43-52.
- Scheid, J.M.* (Nov. 2010). Effectiveness of computer aided instruction in mathematics for students with learning disabilities, Northern Michigan University.
- Sharma R.A.* (2004). Exploring effective remedial teaching for learning disabled children, UGC Project, New Delhi. India.
- Singh, Y. & Agrawal, A.* (2013). Teaching mathematics to children with mental retardation using computer gamews. *Educationia Confab*. P 44-58.
- Vasanthal, S.P.* (1994). Developing problems solving strategies in learning Mathematics among IX standard students. Unpublished M.Phil. Thesis, Alagappa University, Karaikudi.
- Watkins, M., & Webb, C.,* (1981). Computer-assisted instruction with learning disabled students. *Educational Computer Magazine*, 1 (3), 24-27.
- Yusuf, I.F.* (2009). *Effect of using Computer Assisted Instruction on learning Statistics in selected senior secondary schools in Minna, Niger State*. Unpublished M-Tech thesis F.U.T Minna.
-