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A Study on CAI as Remedial Teaching on Eye–hand Coordination of Learning Disabled Fifth Grade Students

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Abstract

Computers are increasingly being used in school education today, even in remote and rural areas. Internet connectivity is possible through the ubiquitous mobile. Computer serves a number of purposes in a classroom and can be utilised to help students in all subjects. Computer Assisted Instruction (CAI) refers to the use of computer as a tool to enhance learning through a combination of texts, graphics, sounds and videos. This article presents a study, investigating the efficacy of CAI in remedial teaching for eye–hand coordination among learning disabled children in the fifth grade for boys and girls. The study adopted pre– and post–test control group design. A random sample of 64 school students was drawn from Meerut, Uttar Pradesh. The researcher used CAI (games and simulations) as an instrument for studying the eye–hand coordination for learning disabled children in the experimental group, while students in the control group were exposed to traditional teaching method. The instrument for data collection was Diagnostic Test of Learning Disability (DTLD). T–test statistics were used to analyse the hypothesis. The findings revealed that the experimental group performed better than the control group. It was found that the CAI method was better than the traditional method for improving the eye–hand coordination of learning disabled fifth grade students.

Keywords: Eye–hand coordination, computer assisted instruction, learning disabled, diagnostic test of learning disability, remedial teaching

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INTRODUCTION

Computer programs are interactive and can illustrate a concept through animation, graphics and sounds. They allow students to progress at their own pace and work individually or solve problems in a group. Computers provide immediate feedback, letting the students know if their answers are correct. If an answer to a question is not correct, then a program gives the correct answer. Computers offer a variety of activities and enable a refreshing change from teacher-led or group instruction.

Computer Assisted Instruction (CAI) is a new teaching-learning strategy, in which the topics to be taught are planned, written and programmed in a computer. These can be run at the same time in several computer units, allowing one computer terminal to each student. The instructions are also programmed on a compact disc (CD), which can be played using audio, video, drag and drop, gaming and simulation activity for each student to learn the topic at one's time and pace. The potential benefit of CAI cannot be underestimated in the contemporary world. There are a lot of established findings on the instructional value of computer, particularly, in advanced countries. There are several CAI packages for different subjects. The current trend in research is towards investigating 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 accessible on the web (p. 521), even though teachers do not use these facilities. Jenk and Springer (2005) stated that the way CAI is delivered can affect its effectiveness. Instructional material and strategies through CAI have been found to aid academic achievement and retention. Orisebiyi (2007), who investigated the effect of computer assisted package on students' achievement in learning disability, found CAI to be effective. However, from reviews, it was observed that many studies focused on some parts of mathematics, such as algebra, statistics, word problem and quadratic equation, and not much on geometry using CAI package.

CAI improves instruction for students with disabilities because they receive immediate feedback and do not continue to practise wrong skills. Computers capture the students' attention as the programs are interactive and encourage to increase their scores. Also, CAI progresses at the students' pace and, usually, does not move ahead until they have mastered a skill.

LEARNING DISABILITY

Learning disability is a 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 an individual and presumed to be due to the dysfunction of the central nervous system. Even

though a learning disability may occur concomitantly with other handicap conditions (e.g., sensory impairment, mental retardation, social and emotional disturbance) or environmental influences (e.g., cultural differences, insufficient or inappropriate instruction, psychogenic factors, etc.), it is not a direct result of these conditions or influences.

EYE-HAND COORDINATION

It is the ability to coordinate vision with hand movements effectively. A child having deficient eye-hand coordination might face difficulty in controlling movements required for smooth flow in writing. Such a child may read, spell and comprehend well, and may also be good at oral work. However, the visual-motor production deficit due to problems in eye-hand coordination may hamper the child's scholastic performance.

The purpose of this study was to investigate the effectiveness of CAI developed by the researcher for use by primary school children, particularly, fifth graders, for reducing their learning disabilities. Follow-up data were gathered in order to determine whether CAI was used regularly and check its efficacy.

OBJECTIVES OF THE STUDY

- To compare the effectiveness of remediation of eye-hand coordination learning disabilities with pre- and post-test of traditional method of teaching

- To compare the effectiveness of remediation of eye-hand coordination learning disabilities with pre- and post-test of CAI method of teaching
- To compare the relative effectiveness of remediation of eye-hand coordination learning disabilities with CAI and traditional method of teaching

HYPOTHESES OF THE STUDY

- There was no significant difference between pre- and post-test in the traditional method of teaching in the remediation of the eye-hand coordination of learning disabled children.
- There was no significant difference between pre- and post-test in the CAI method of teaching in the remediation of eye-hand coordination of learning disabled children.
- There was no significant difference between the effectiveness of CAI and traditional methods of teaching in the remediation of eye-hand coordination of learning disabled children.

SCOPE OF THE STUDY

The study focused on the effectiveness of CAI as a remedial teaching method for learning disabled fifth grade school students in Meerut, Uttar Pradesh. It was limited to the eye-hand coordination of the learning disabled children there.

METHODOLOGY

Two groups were formed for the study and both were pre- and post-tested. The sample for this study consisted of 64 students using simple random sampling technique (behavioural checklist, non-verbal group of intelligence test, DTLD). The experimental group consisted of 32 students — boys (n=17) and girls (n=15), while the control group had 17 boys (n) and 15 girls (n). The experimental group was taught using CAI package (game and simulation), which covered eye-hand coordination of learning disability, while the control group was taught using the traditional method.

RESEARCH INSTRUMENTS

The following tools were used by the researcher to conduct the study.

- Behavioural checklist for screening the learning disabled developed by Swaroop and Mehta
- Diagnostic Test of Learning Disability (DTLD) developed by Swaroop and Mehta
- Non-verbal Group of Intelligence Test (NVGIT) developed by Imtisungba
- CAI package involving games and simulations developed by Shikha Chatruvedi and Ravindra Kumar

CAI FOR EYE-HAND COORDINATION OF LEARNING DISABLED

In this group, six games were selected for the remediation of graphic motor sequencing disability.

Eyesight challenge game

In this game, the children were needed to match the names with various objects being shown on screen. The efficiency between children was compared on the basis of time taken and scores secured.

Join the numbers

In this game, the children were required to join the dots, point-to-point, and work out a complete figure as shown on screen.

Fleabag vs. mutt game

This is a group playing game. In this game, one or two children were required to play at the same time. Firstly, they needed to select a character either dog or cat. Then, they were required to start attacking each other with inbuilt weapons. The game was divided into three levels like 'I am a beginner', 'I am average', and 'bring it on'.

Mini golf game

In this game, four children can play at a time. Here, many levels were arranged as per the difficulty order. The children were required to play with mouse and their efficiency was compared on the basis of their scores.

Ping-pong 3D

The children needed to select the level of difficulty like easy, medium and hard. In this game, they hit a ball left or right side of the paddle to make it go left or right. The efficiency between children was compared on the basis of the scores secured by them.

Flashman

This is a fast game. The player is required to help the Flashman reach the destination, avoiding ghosts by shooting down all yellow dots.

All games were arranged in the order of difficulty level and the children were trained to participate in the games. Eye-hand coordination test was applied to check if these games and simulations overcame this particular type of disability completely or partially. After performing this activity, it was found that the children were able to coordinate the eye-hand tasks satisfactorily.

METHOD OF DATA COLLECTION

Teachers in the selected schools were trained as research assistants in the use of CAI package. The study period was 45 classes for five months, twice a week. The classes were conducted in a computer institute with CAI for eye-hand coordination among learning disabled students. There was an orientation between the researcher and the students of the selected schools, who took the test. The experimental group students were exposed to CAI package (games), which had been installed on desktop computers, while those in the control group were taught using traditional teaching method having the same content being used for the experimental group. At the end of the experimental study, DTLD was administered as a post-test to measure the outcome of learning

disability of the students. The test was conducted simultaneously in each school with the help of research assistants. T-test was used to test 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 to eye-hand coordination of learning disabled children

Table 1

Statistical values on DTLD sub-test of eye-hand coordination of Group A (control group) students on pre- and post-test

Testing	n	M	S.D.	'r'	't'
Pre-test	32	3.06	0.91	0.75*	7.26**
Post-test	32	3.84	0.76		

* Significant at 0.05 level

** Significant at 0.01 level

Table 1 shows that the mean scores on DTLD sub-test of eye-hand coordination of Group A students on pre-test and post-test were 3.06 and 3.84, respectively. The 't'-value for the difference in mean scores came to be highly significant ($t=7.26$, $p<0.01$). It infers that the traditional method of teaching was helpful in improving the eye-hand coordination among the selected subject, i.e., grade five learning disabled children, significantly. Furthermore, a highly positive ($r = 0.75$) correlation was

yielded between pre- and post-test scores on this sub-test, thereby, meaning that the traditional method was consistent and equally effective for almost all children, i.e., there was an improvement in the eye-hand coordination regardless of their prior achievement on DTLT sub-test of eye-hand coordination.

Phase 2

Remediation of learning disability through CAI method of teaching with reference to eye-hand coordination of learning disabled children

Table 2

Statistical values on DTLT sub-test of eye-hand coordination of Group B (experiment group) students on pre- and post-test

Testing	n	M	S.D.	'r'	't'
Pre-test	32	3.09	0.82	0.53*	12.34**
Post-test	32	5.23	0.92		

* Significant at 0.05 level

** Significant at 0.01 level

The data shown in Table 2 reveal that the mean scores on DTLT sub-test of eye-hand coordination of Group B students on pre- and post-test were 3.09 and 5.23, respectively, the difference being 2.14. The difference was found to be highly significant ($t=12.34$, $P<0.01$). Thus, the CAI (game and simulations) method was effective in improving the eye-hand coordination among fifth grade learning disabled students.

The product-moment correlation achieved between pre- and post-test

scores was again high and positive ($r=0.53$). However, the correlation coefficient for the computer assisted method ($r=0.53$) is much less than its value for traditional method ($r=0.75$). This shows that the traditional method of teaching is more consistent in improving eye-hand coordination among fifth grade learning disabled students as compared to the CAI method. The reasons may be the same as stated earlier for the overall remediation of learning disability.

Phase 3

Comparing relative effectiveness of CAI (games) and traditional methods in the remediation of eye-hand coordination of learning disabled children

Table 3

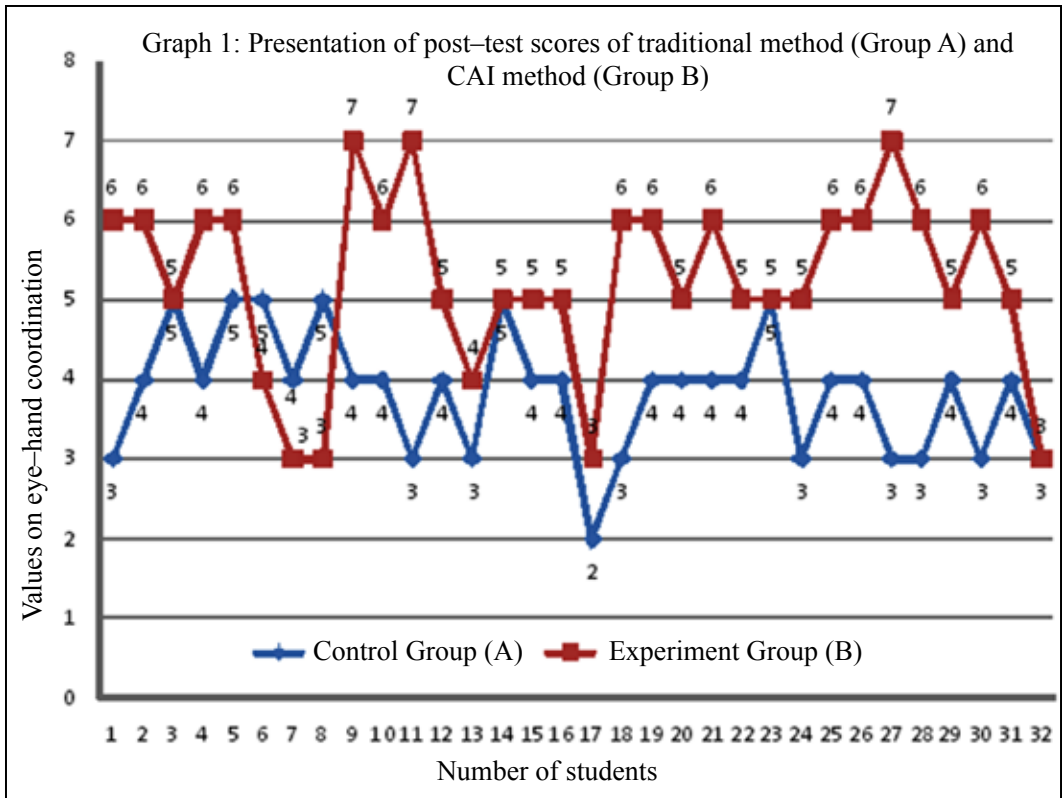
Statistical values on DTLT sub-test of eye-hand coordination of Group A (Control Group) and B (Experiment Group) students on post-test

Groups	n	M	S.D.	't'
Group A	32	3.84	0.76	5.63**
Group B	32	5.23	1.13	

* Significant at 0.05 level

** Significant at 0.01 level

An observation of Table 3 shows that the mean scores achieved on DTLT sub-test of eye-hand coordination on post-test by Group A and Group B students differ significantly ($t=5.63$, $p<0.01$). It implies that CAI was better than the traditional method in improving the eye-hand coordination among fifth grade learning disabled children.



Graph 1

Graphical representation of post-test values on DTLD sub-test of the eye-hand coordination of Group A (Control Group) and B (Experimental Group) students on post-test

FINDINGS

Hypothesis 1

The traditional method of teaching, which included individual attention, drill and practice, was significantly effective in the remediation of eye-hand coordination of fifth grade learning disabled children.

Hypothesis 2

The CAI (games and simulations) method of teaching was found to be significantly effective in the remediation of eye-hand coordination of fifth grade learning disabled children.

Hypothesis 3

The CAI (games and simulations) method was significantly better than the traditional method in the remediation of eye-hand coordination of fifth grade learning disabled children.

The findings are consistent with the results reported by Haberman

(1977) for socially or emotionally disturbed school children, as well as, research conducted by Lavine (1980); Watkins and Webb (1981); Bukatman (1981); Maccini Gagnon, Hughes (2002); Vasanthal (1994); Kim (1998); Gleason et al. (1990); Reddy et al. (1997); R.A. Sharma (2014); Crute (2000); Agrawal (2000); Chiang (1986); Seo and Bryant (2009); Scheid (2010); Anyamene (2012); Singh (2013); Brown et.al. (2013); etc. It was found that various forms of CAI have the potential for improving student achievement scores.

EDUCATIONAL IMPLICATIONS OF THE FINDINGS

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

- 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 are supported by almost all operating systems.
- The findings of the study may help develop the habit of practice, trial and error in the students.
- It was found that the CAI package may prove to be effective but is not a panacea for students with learning disabilities.
- The findings of the study show that the CAI package may improve the thinking process of learning disabled children and can also be useful in providing ways to teach learning disabled students.
- The findings reveal CAI package may be helpful in making the teachers aware enough to teach. They may use the selected games and simulations as a teaching material to improve the students' performance.

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