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Effect of Computer Assisted Cognitive Training to Enhance Academic Performance among Children with Intellectual Disability

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KEYWORDS

Intellectual disability, Academic performance, Computer assisted cognitive training.

ABSTRACT:

Introduction Pediatric occupational therapy uses a number of intervention techniques to enhance children's engagement and participation in life responsibilities. Marginalization, social isolation, and diminished self-esteem can result from being unable to engage due to a sickness, disability, or skill deficit. Children's responsibilities include gaining self-reliance, learning to work hard, and taking part in play and other activities. A child's performance in carrying out daily tasks, how their performance is impacted by a handicap, and how their environment supports or hinders their performance are all factors that occupational therapists consider when choosing therapies for children. (Iona Novak et al., 2019)

Intellectual disability is the most common developmental disability, affecting 0.8% to 3% of the population. Definitions of intellectual disability have three key factors : significantly impaired intellectual ability, usually on standardized psychoeducational tests, onset before 18 years of age; and impairment of the adaptive abilities necessary for the independent living (i.e.; communication, ADLs, instrumental activities of daily living (IADLs), work, play/leisure, education, and social participation. (Case-Smith et al., 2013). The diagnostic and statistical manual of mental disorders (DSM - 5; American psychiatric association 2013) identifies three domains of adaptive functioning; conceptual, social, and practical. To be diagnosed with ID, individuals must show impairment in at least one domain. Children with mild intellectual disabilities may be able to learn basic computations, but maybe unable to apply concepts appropriately in a problem solving situation (Beirne-Smith et al., 2006). A growing body of research has indicated that children with moderate to severe intellectual disabilities can be taught academics as a means to gain information, participate in social settings, increase their orientation and mobility, and make choices. (Browder et al., 2006). When compared to peers without impairments, people with intellectual disabilities build their knowledge sets more slowly, and they struggle to apply knowledge to novel contexts. (Beirne-Smith et al., 2006).

Objectives

- To identify the children who are intellectual disabled of age group 5-10 years (chronological age) with poor academic skills, using the academic performance rating scale.
- To find out the effect of conventional occupational therapy to improve academic skills in control group.
- To find out the effect of computer assisted cognitive training to improve academic skills in experimental group.
- To compare the post test scores between the control group (conventional occupational therapy) and experimental group (computer assisted cognitive re- training).

Methods: The participants of the study were children with intellectual disability aged 5-10 years. There were 30 children in total and were divided into two groups namely, control and experimental group with 15 participants in each group. The participants in the experimental group received computer assisted cognitive training for 40 minutes per session (3 sessions per week) for about 3 months. They underwent training for about

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36 sessions in total. Meanwhile the participants in control group received their conventional occupational therapy for the same duration. The pre-test and post-test scores of the children in both the groups were assessed using the academic performance rating scale.

Results: Results indicated that the experimental group showed statistically significant improvement in enhancing academic performance with the use of computer assisted cognitive training when compared to control group.

Conclusions: From the findings of this study, it was concluded that Computer assisted cognitive training has proved its effect in enhancing academic performance among children with Intellectual Disability.

• Introduction

disability Intellectual is the most common developmental disability, affecting 0.8% to 3% of the population. Definitions of intellectual disability have three key factors : significantly impaired intellectual ability, usually on standardized psychoeducational tests, onset before 18 years of age; and impairment of the adaptive abilities necessary for the independent living (i.e.; communication, ADLs, instrumental activities of daily living (IADLs), work, play/leisure, education, and social participation. (Case-Smith et al., 2013). The diagnostic and statistical manual of mental disorders (DSM - 5; American psychiatric association 2013) identifies three domains of adaptive functioning; conceptual, social, and practical. To be diagnosed with ID, individuals must show impairment in at least one domain.

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When compared to peers without impairments, people with intellectual disabilities build their knowledge sets more slowly, and they struggle to apply knowledge to novel contexts. (Beirne-Smith et al., 2006).

These include activities which are directed to the person's care of her/his bodily needs (ADL) like eating, dressing, personal hygiene, and IADL (instrumental activities of daily living) like preparing a meal/finance managing etc. this field shows a focus of intervention in occupational therapy population. Play-intervention, as an occupational therapy goal in this population, is directed towards the most basic experiencing of play as a source of pleasure, as well as providing the client with an opportunity to participate in play activities. (Learning) The intervention varies and may focus on gaining the basic learning-skills, such as understanding cause and effect process and object permanence, or on more complicated skills, such as preparation for learning and writing, organization in time, in space and with accessories, adaptation to different learning environments, the use of information technologies and computers and gaining learning strategies. (yalon-Chamovitz et., al 2010)

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Methods

AIMS:

To determine the effect of Computer assisted cognitive training to enhance academic performance among children with Intellectual Disability.

OBJECTIVES:

- To identify the children who are intellectual disabled of age group 5-10 years (chronological age) with poor academic skills, using the academic performance rating scale.
- To find out the effect of conventional occupational therapy to improve academic skills in control group.
- To find out the effect of computer assisted cognitive training to improve academic skills in experimental group.
- To compare the post test scores between the control group (conventional occupational therapy) and experimental group (computer assisted cognitive re- training).

RESEARCH HYPOTHESIS: There is a statistic difference between the pre and post test score of APRS in control and experimental group.

RESEARCH DESIGN:

Quasi experimental type of design was used to determine the effect of computer assisted cognitive training to enhance academic performance among children with intellectual disability.

SAMPLE TECHNIQUE: Convenient sampling technique was adopted.

SAMPLE SIZE:

- 30 subjects
- 15 subjects in control group
- 15 subjects in experimental group

SAMPLE SETTING: In and around Chennai.

VARIBLES:

Independent variable: Computer assisted cognitive training.

Dependent variable: Academic performance

SELECTION CRITERIA

Inclusion criteria:

- Children with Mild Intellectual Disability were included.
- Children aged between 5-10 years were included.
- Both moth and female were included
- Children who have difficulty in their academic skills.

Exclusion criteria:

- Children with moderate to severe intellectual disability.
- Children of age above 10 years.
- Children with severe visual impairments, severe orthopedic problems in upper limb, severe cognitive impairment, Aphasia, Apraxia were excluded.
- Children with any other neurological condition.

INSTRUMENTS USED: Academic Performance Rating Scale (APRS)

PROCEDURE: Totally thirty (30) subjects were selected according to the inclusion criteria. The subject's academic performance level is measured using the academic performance rating scale from faith special school. The samples are divided equally, 15 samples in control group and 15 samples in experimental group. After the baseline data is obtained the experimental group underwent computer assisted cognitive training sessions which consisted of pictoword, spelling and phonics, maze activity etc. The therapy consists of totally

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JCHR (2023) 13(6), 1096-1103 | ISSN:2251-6727

36 sessions, 3 sessions per week in alternative days and each session lasted for about 45 minutes. After the sessions academic performance rating scale is again administrated, to get the post-test values. The pre and post-test values are used to find out the result of the study.

• Results

Since the samples belonged to the sample size (30), nonparametric method was used to test the statistical difference between pre-test and post-test score of group A and Group B. Wilcoxon signed rank test was used to test the statistical difference between pre-test and posttest of group A and B. Mann Whitney U Test was applied for the comparison of posy-test score, which identifies whether their exists statistically difference in consideration of the treatment given. An alpha level of P0.05 was measured to be statistically significant. The statistical analysis was done with the help of IBM SPSS version 23.0.

The scores between pre-test and post-test of academic performance among control group. The mean values are 35.2667 & 36.7333 and a 'Z' value is -3.508. 'P' value is 0.00. Since the P value of 0.00 is lesser than 0.05, alternate hypothesis is accepted. Hence, there is statistically significant difference between pre-test and post-test scores in the control group of the APRS.



The statistical analysis of academic performance scores between pre-test and post-test of experimental group-The mean values are 35.3333 and 38.3333 and the 'Z' value is -3.499. 'P' value is 0.00 in the experimental group, since the p value of 0.00 is less than 0.05 alternate



hypothesis is accepted. Hence, there is a statistically significant difference in experimental group between the pre-test and post-test scores of academic performance rating scale (APRS).



The statistical analysis of academic performance score between post-test scores of control group and experimental group. The mean of the control group is 36.7333 and the mean value of experimental group is 38.3333. The 'Z' value is -2.53. The 'P' value is 0.0114. Since the p value of 0.0114 is lesser than 0.05, alternate hypothesis is accepted.



Hence, there is a statistically significant difference in the post-test scores between experimental and control group of the academic performance rating scale (APRS). This suggests that the intervention received by the www.jchr.org

JCHR (2023) 13(6), 1096-1103 | ISSN:2251-6727



experimental group had more improvement when compared to the control group.

Discussion The aim of the study is to find out the effectiveness of Computer Assisted Cognitive Training to enhance Academic Performance among children with Intellectual Disability.A sum of (30) students between the group 5-10 years were included in the study. Among them 2 groups have divided and each group has 15 members. The study was done at faith special school, thiruninravur, Tiruvallur. The levels of academic performance in both experimental group and control group were measured by Academic Performance rating scale. The experimental group also underwent Computer Assisted Cognitive Training for a period of 3 months, whereas conventional intervention was given to control group. The post-test evaluation was done and the results were analyzed and the scores were tabulated. The Mann Whitney U Test & Wilcoxon test gives us the process results.

In table 1 and Figure 1 shows that the scores between pre-test and post-test of academic performance among control group. The mean values are 35.2667 & 36.7333 and a 'Z' value is -3.508. 'P' value is 0.00. Since the P value of 0.00 is lesser than 0.05, alternate hypothesis is accepted. Hence, there is statistically significant difference between pre-test and post-test scores in the control group of the Academic performance rating scale (APRS). This suggests that the intervention received by the control group had a significant improvement.

Similar to this study, a previous study (R13) by lia lopes (2017), showed the effect of massage and storytelling reduces aggression and improve academic performance in children attending elementary school. The training was significantly helpful in improving academic performance by the end of 6th month.

Table 2 and figure 2 shows statistical analysis of academic performance scores between pre-test and posttest of experimental group. The mean values are 35.3333 and 38.3333 and the 'Z' value is -3.499. 'P' value is 0.00 in the experimental group, since the p value of 0.00 is less than 0.05 alternate hypothesis is accepted. Hence,

there is a statistically significant difference in experimental group between the pre-test and post-test scores of academic performance rating scale (APRS). This suggests that the intervention received by the experimental group had a significant improvement.

Similarly the result was supported by a review done by (R3) Supawadee Cindy Lee et.al (2013), this study aims the effect of computer of computer based intervention on enhancing visual perception of pre-school children with autism. 2 children with autism spectrum disorder between the ages 4 and 5 years participated. The study was conducted at their homes where the developmental test of visual perception-2 (DTVP-2) is one of the several tests which was used to gather data, along with computer software programmes and non-standardized two dimensional examinations. The participants' visual perceptual skills were tracked over time using an ABAB design with a single subject. The results implied that computer based intervention was beneficial in enhancing preschoolers with autism's motor reduced visual perceptual. Hence, computer based intervention showed more statistical significant improvement in autistic children with motor-reduced visual perceptual skills.

Table 3 and figure 3 shows statistical analysis of academic performance score between post-test scores of control group and experimental group. The mean of the control group is 36.7333 and the mean value of control group is 38.3333. The 'Z' value is -2.53. The 'P' value is 0.0114. Since the p value of 0.0114 is lesser than 0.05, alternate hypothesis is accepted. Hence, there is a statistically significant difference in the post-test scores between experimental and control group of the academic performance rating scale (APRS). This suggests that the intervention received by the experimental group had more improvement when compared to the control group.

Similarly, the results are supported by the review (R1) gargi bansal et.al (2021). This study examined the efficacy of computer assisted cognitive training in remediation of specific learning disorders. The aim of the study was to determine how well CACT (Computer assisted cognitive training) worked in conjunction with (EBRT) education based remedial training for children

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JCHR (2023) 13(6), 1096-1103 | ISSN:2251-6727



with reading, spelling and math difficulties. 10 children were a part of this intervention between the ages 8-15 who met at least one of the ICD 10 criteria. 5 children made each group where CACT (computer assisted cognitive training) and EBRT was given to group 1 and EBRT only was given to group 2. NIMHANS SLD INDEX was used for the pre and posttest assessment. The intervention took place for 8-12 sessions for 2 months. The result of CACT +EBRT during the post test showed a significant difference and improvement when compared to group 2 receiving EBRT only. Hence, Computer Assisted Cognitive Training showed a statistically significant difference in children with specific learning disorders when compared to education based remedial training.

Thereby using computer assisted cognitive training improves Academic Performance more than other conventional therapy programs.

LIMITAIONS AND RECOMMENDATIONS LIMITATIONS

- The study was done on a small sample size.
- The study was conducted for a shorter duration of time.

RECOMMENDATIONS

- The study can be done for a larger sample size.
- The study can be done for different age groups with difficulties in academic performance.
- The study can be done for a longer duration of time.
- The study can be done with other conditions or disorders.

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