NACD Neuroeducational Model Program

Fairview School
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Abstract

At a K-12 school in Rural Louisiana, the principal and staff, in collaboration with the National Association for Child Development designed a model intended to increase the cognitive processing of identified at-risk students. A second, less intense part of the program targeted the general population of students. The Fairview Neuro-educational model (FNM) was funded through a grant from the Rapides Foundation and resource donations from the National Academy for Child Development.

The results at the end of the school year showed significant improvements with both groups. The benefits to the general population of students were measured by increased scores on state mandated tests. With the at-risks students, substantial progress was reflected within the scores of standardized testing for reading recognition, reading comprehension and math computation. Within an eight month time period, tests scores increased at a level of approximate 2.9 years in reading recognition, 3.0 years in reading comprehension and 1.67 years in math computation.

Participants

Forty students were identified as participants in the present study. All of the participants were enrolled at the school and were identified as low achieving or at-risk students.

The students were identified as at-risk if they had been retained, if they scored a national stanine of three (3) or below on the Iowa Test of Basic Skills (ITBS), or if they were in special education. Forty students were selected but ten did not complete the program for various reasons. Gender, race and socio-economic standards were not considered as selection criteria.

The grade level of the target population ranged from kindergarten (n=3) to ninth grade (n=2) with the majority in the 4th-7th grade range (n=23). The participants consisted of 23 males and 7 females. The mean age of the participants was 11.44 years at the beginning of the study. All of the participants were from families at or near the poverty level that qualified for free or reduced lunch in accordance with the federal guidelines and were all white.

Introduction

According to Sheng (2002), the development of the human brain is complex and fragile. The firing pattern of electrical impulses between brain cells, called neurons, changes as external and internal stimulation. The patterns are believed to be responsible for learning and memory.(Sheng, M. 2002) Injury or environmental deprivation can inhibit the development of the human brain. Without assistance,

these brains are unable to process information at a desirable rate or level of complexity (Kotulak, R. 1996) As a direct result, students with injured or disorganized neuron connections are given labels such as learning disabled, attention deficit disorder, behavior problem and many others. The neurodevelopment and neuro-organization in the brain can be greatly enhanced by carefully planned environmental stimulation. Many of the learning difficulties and behavior problems disappear as problems in the brain can be identified and corrected (Doman, 1986).

The reader should note that the term "corrected" was used in the previous text implying that by properly providing specific stimulation to the brain, a greater level in the functional organization of neurons may be accomplished. This theory is contrary to current philosophies in public education. The apparent methods widely utilized by modern education attempt to teach information to the average level of intellectual functioning. (Carbo, 1996) This is unfortunate for those who are unable to process the information presented to them by teaching styles that are not suited to their way of learning. Instead of trying to "fix" the brain so that it can process information efficiently, educational institutions continue to teach to the injured brain, never recognizing greater potential. This results in students being placed in settings where less processing at lower levels of complexity is required. Fewer expectations usually cause students to fall behind their classmates at an accelerated pace (Falvey, Givner, Kimm, 1995).

Suppose there was hope that individuals could be taught to process information more efficiently. Students doing average academically could excel. Those students labeled as learning disabled could learn to function at a level at or above the average student. The National Academy for Child Development (NACD), based in Ogden Utah, has developed methods of increasing the efficiency of the human brain and has had success in raising cognitive function of their clients. The services are currently available to individual families only but the NACD staff is attempting to design a model to be used in schools. At the heart of their methodology is the concept that children should be given the ability to learn new information at a greater level of efficiency. According to Lyn Waldeck (2002), NACD child developmentalist, there is a false belief within the education system, that the way to increase retention is to lengthen the time of exposure through increased practice. NACD's philosophy is in direct opposition to this ideology. Increased time spent on, only leads to increased boredom on the part of the student, therefore reducing the amount of information retained in relationship to the time spent. Rather, a more effective way is to decrease the time of exposure, increase the intensity level with which the information is delivered, and to do this with enough frequency for the information to become easily retrieved (Waldeck, 2002). A twelve year old student that has the processing ability of a five year old can not, regardless of the curriculum, perform at the same level as children at the same chronological age. Some educational problems may result from traditional academic demands that are not attainable because students are simply not cognitively ready to receive the information. One unfortunate by-product of attempting to "push learning into school children much like stuffing sausages" (Healy,1990) is that students become frustrated with their fruitless efforts. Frustration leads to a belief that certain subjects, usually reading or math, are hard or boring (Healy, 1990). According to Robert Doman Jr.(1980), educators should increase a students' ability to learn rather than present the same information in the form of a new curriculum. A person can improve learning abilities at a pace determined by the frequency, duration, intensity and appropriateness of the stimulation. (Doman, 1980)

Method

The NACD agreed, after lengthy communications and negotiations, to work with the school in assisting with the development of a program designed to improve the cognitive processing abilities of students. The NACD worked beyond the contractual agreement and donated many hours working with the staff to make this pilot program a success. Each at-risk student was given an individual assessment from which a specific regiment of activities was developed for him/her. The activities were referred to as his/her program.

With the progression of time, difficulties arose and there were several misalignments between the curriculum suggested by the NACD and the state and district mandated curricula. The primary cause was the NACD's ideology that a student must have the cognitive ability and processing skills before they can absorb new information. Contrastingly, established curriculums assume that students can learn new information if it is presented in various formats. Cooperative efforts resolved the conflicts. The NACD child developmentalist assisted with re-visiting the programs and modifying each one. As a result students were not given the optimum treatment as prescribed by the NACD. The programs were modified in such a way as to require a minimum amount of out-of-class time. The NACD advised that this was not enough time to cause the greatest change in cognitive processing and would not produce the optimal results; however factors beyond local control required the changes. The average amount of time spent with the resource students individually was 90 minutes and the average amount of time spent with regular education, at-risk students was 30 minutes per day. This time was complimented by time spent with the whole group instruction in the classes.

During the one-on-one time, the tutors did various activities. Each student had a different program and did some but not all of the activities. A significant amount of the work was concentrating on increasing short term memory as well as working memory. Along with this were recommendations for exercises in visualization and conceptualization.

In the area of short-term memory, digit span exercises were used. It has long been accepted that digit spans were an accurate measurement of short term memory. They are utilized in a number of testing protocols, from IQ the testing to testing used for Alzheimer patients. Over thirty years ago, the founder of NACD, Robert Doman Jr., began working with digit spans, not as measurement, but as a means to produce cognitive change. The number of pieces of information an individual can process determines the complexity of their thinking and function. During the years that NACD has spent working with thousands of children, they have determined that low auditory and visual sequential processing ability is a major contributing factor to all learning disabilities. They have also found that over the last several decades, there has been a gradual, but consistent, decline in the average auditory sequential processing of the entire population. This greatly contributes to the number of children with learning disabilities as well as the general decline in communication skills. NACD proposes that the overall decline can be affected by several factors, including the fact that there is very little pure auditory input exposure to the brain in everyday life styles. In addition to this, some students have additional contributing factors during early child development that place them in a higher risk category for future problems. One of these factors is recurring fluid on the ear, which distorts auditory information, therefore causing auditory sequential processing delays.(Waldeck,2002)

All teachers and teachers' aides were introduced to the theories and practices of the NACD during staff development workshops. Once the general ideas had been introduced, a NACD child developmentalist

met with small groups of teachers and individually if necessary. The teachers and aides involved with the at-risk group were given more detailed and specific training. They were given instructions for each child's program and lessons were modeled.

Parents were invited to an informative seminar where they were introduced to the NACD staff and their practices. The community members were encouraged to ask questions and give any input they thought might be pertinent. Although the attendance was somewhat low, the people present were inspirational and helped tell others in the community about the program. Some parents and grand parents volunteered their time to help with the one-on-one time crucial for success while others made monetary donations needed to purchase rewards and equipment. The parent-teacher committee donated six portable CD/tape player/radio to the school to be used with the chapter tapes, math facts and auditory training. Throughout the year there was great support from the parents and other family members interested in the project.

General Population

The teachers were asked to implement several strategies in their classes. Drills to increase the students' auditory digit span, visual digit span, the use of chapter tapes and the use of math fact tapes were implemented with limited consistency in each classroom. The teachers were not required to implement the activities and some chose not to do so but the majority of the teachers were cooperative and reported positive results.

A brief description of the activities are given below.

- Auditory digit span: Various activities were utilized but all were fundamentally calling out bits of information, numbers, letters, words etc. , and asking the students to recall the information. An example is a teacher in a social studies class calling out the names of several states and having the students recall them in the same sequence.
- Visual digit span: The same types of activities are used as with auditory digit span except the bits of information is shown for 2-3 seconds in written form.
- Chapter tapes: The chapter tapes were bits of information read with enthusiasm by an aide, volunteer or teacher then played through headphones into the dominant ear for the students.
- Math fact tapes: Audio tapes were made with the math facts and skip counting (5,10,15…..) and were also played into the student's dominant ear through headphones.
- Students were allowed to drink water in class.
- Information was delivered in shorter chunks with frequent academic breaks during the day.
- Cross skipping and crawling exercises were utilized in all physical education classes.

The goals of the Neuro-Educational model for the general student body were as follows:

1. Maximize the way the brain receives information via the sensory auditory, visual and tactile channels.
2. Increase the complexity of thinking through enhancing the auditory sequential processing and affecting the ability of information processed in short term memory.
3. Improve fine and gross motor skills.
4. Enable the child to retain information received auditorially and visually.
5. Present materials and academics in a manner developed to optimize learning.
6. Integrate and accelerate the components of reading: (minor modifications to current methods)

- Rapid recognition and naming
- Phonological awareness and word attack
- Reading comprehension
- Abstract understanding

7. Develop and enhance the components of math
   - Computation
   - Memorization
   - Visualization
   - Conceptualization

At-risk

Four teachers' aides were trained to do specific activities with individual students. Much of their time was spent in a one-on-one setting with the students identified as at- risk. This was difficult and scheduling caused a fair amount of grief. The regiment of activities would not likely be effective if they were not performed as prescribed. Each of the thirty at-risk students was scheduled to receive various amounts of individual attention depending on the duration and frequency of the prescribed activities. Students that were in the resource class received additional instruction utilizing NACD methods from the resource teachers. The average amount of time spent with the resource students individually was 90 minutes and the average amount of time spent with regular education, at-risk students was 30 minutes per day. This time was complimented by time spent with the whole group instruction in the classes.

NACD follows the gestalt prospective in that all of the individual pieces of the child make up the whole and an apparent problem may not have an apparent cause. A child's learning difficulties may be linked to their walking pattern, ear infections or any number of problems. The findings within the at-risk category of students in this population mirror what the NACD has found in children and adults throughout the US and other countries they serve. In order to create change, the root problems must be identified and then remediated. While multiple dysfunctions were found in many of the students, each one presented a different combination of these problems.

During the evaluation process, inefficiencies in sensory processing were identified. There are many sensory processing problems and many more combinations of these problems. The inefficiencies also vary in degree. Adding to the sensory deficits, all but one of the at-risk students displayed mixed dominance in one or more sensory input mechanism (ears, hands, legs, eyes etc.). In order to process information efficiently, each bi-lateral sensory input mechanism should share a common hemisphere. A person who is naturally right handed should have a right dominant ear, eye and leg. Learning disabilities, behavior problems and abnormal emotionality are manifestations of an individual with mixed dominant functions. A more specific and common symptom of mixed dominance is a person that can readily recall information in a relaxed environment but if placed under stressful conditions, as in a testing situation, can not access the information. Other common characteristic of a mixed dominant person is poor organizational skills, an uncanny ability to remember trivial information while forgetting the main ideas, and generally poor memory.

The NACD evaluator determined whether the brain perceives sensory information in a state of either hypo (not enough) or hyper (too much) response evaluating. A diverse combination of hypo/hyper responses in each of the students was discovered in the at-risk population, therefore affecting the way the brain stores and recalls information from the environment. An example of hyper-sensitivity may be

illustrated with a student that is hyper sensitive to the peripheral areas of vision or hearing. This student will be distracted if a car passes or a bird flies by. His/her attention will be drawn from the direct line of vision to the activity in the peripheral areas. Peripheral sounds may also be too tempting or overwhelming to ignore. Extreme cases have been documented where the sound of florescent lights have distracted individuals to the degree that attending to the verbal stimuli was impossible. All academic learning occurs in the central area of vision and the auditory stimuli being attended. If the visual and auditory attention is given to peripheral stimuli, learning will be minimized.

Macular problems were pervasive in the majority of the at-risk population. Eye and behavioral exercises were utilized to improve macular function.

Goals for at-risk students were as follows:

1. Individually evaluate 10% of the student population to determine the areas of processing inefficiency.

2. Design individualized programs based on the aforementioned assessment.

3. Train parents, teachers, aides and student mentors in the methodologies that are required to improve the academic function of the target population.

4. Increase the reading comprehension and math at a pace of three years of cognitive development for each year of elapsed time.

Findings

The data was submitted to Irvin G. Esters Ph.D. for analysis. His findings are given below.

> Analysis of Data and Results of the Study:
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> The research design utilized in this exploratory project was a One Group, Pre-test, Post-test design. Such a research design does not control for the possible effects of various extraneous variables. The results should be interpreted cautiously.
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> Percentile scores from the Peabody Individual Achievement Test - Revised (PIAT-R), test of reading comprehension, and the standard scores from the Wide Range Achievement Test (WRAT) reading and mathematics subtests were used in the analysis. The data were analyzed using three paired samples t - tests.
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> The participants in the study who completed the pre-tests, treatment, and post-tests provided the data for the analysis. The participants consisted of 23 male and 7 female special education students at a small, rural school. The mean age of the participants was 11.44 years at the beginning of the study.
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> The difference between students' pre-treatment national percentile scores and post-treatment national percentile scores on the PIAT-R test of Reading Comprehension was statistically significant ($t(28) = 5.77$; $p > .01$). An inspection of the pre-treatment and post-treatment means

(pre = 7.66; post = 26.28) indicated that percentile scores in reading comprehension rose an average of 18.62 percentile points between testing instances.

The difference between students' pre-treatment standard reading scores and post-treatment standard reading scores on the WRAT reading subtest was statistically significant as well ($t(28) = 6.63$; $p > .01$). An inspection of the means (pre = 79.59; post = 93.66) indicated that the scores rose an average of 14.07 standard score units.

Likewise, the difference between students' pre-treatment standard mathematics scores and post-treatment standard mathematics scores on the WRAT mathematics subtest was statistically significant ($t(28) = 7.07$; $p > .01$). An inspection of the means (pre = 77.38; post = 90.00) indicated that the scores rose an average of 12.62 standard score units.

The results obtained utilizing the present research design, although suspect due to the possible influence of variables not controlled for, suggest that the treatment may be effective in increasing mathematics and reading scores. While the present results look promising, it is recommended that the study be reconceptualized utilizing a more rigorous research design which includes a control group and additional dependent variables.

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Irvin G. Esters, Ph.D., LPC

The LEAP, Louisiana Educational Assessment Program, scores were not included in the statistical analysis but they are noteworthy to illustrate the effectiveness of this treatment. The LEAP test is given to the fourth and eighth grade students. Students must score in the approaching basic, basic, proficient or advanced range in English Language Arts (ELA) and Math to advance to the next grade.

The scores indicated improvement during the 2001-2002 school year (see appendix A fig. 1)

If the treatment was successful, an upward shift in scores would be expected. If there were no advanced scores in previous years, some should move up from proficient. The number of proficient and basic scores should also increase. The number of approaching basic and unsatisfactory scores should decrease. A review of the results shows that number of advanced scores increased from 0% in the previous years to 3.5% for the year of treatment (2001-2002). The proficient scores increased from 7.55% and 6.11% respectively to 18.9% for the treatment year. The number of scores in the basic range did not show as much of a change but did show some improvement. The scores were 37% and 45.2% for the previous years and 47.98% for the treatment year.

As stated earlier a drop in score numbers in the approaching basic and unsatisfactory ranges should be indicative of an effective program. In the approaching basic range the numbers decreased from 33.85% and 37.27% for the 1999-2000 and 2000-2001 school years to 21.56% for the treatment year. The drop in unsatisfactory scores was 21.53% and 11.38% respectfully to 7.95% for the treatment year. A complete reporting of the scores and relative charts can be found in appendix A and appendix B.

Conclusion

The practices and philosophies of the NACD have not been widely accepted in the educational world. It is this author's opinion that the unconventional methods and the Gestalt approach to treatment have created unwarranted resistance and skepticism from mainstream educational practitioners. The implementation of the NACD philosophies and programs can be done on a school wide basis within the parameters set by the Louisiana State Board of Education. The techniques targeting the at-risk population in this project were tailored for a limited number of students and would likely vary in other schools depending on personnel resources and the needs of the students. The methods utilized for the entire student body could easily be replicated and implemented in any school setting.

The results of this study, although not indisputable, are very promising. The improvement in LEAP scores and the increase in reading and math skills indicated by the PIAT and WRAT tests cannot be attributed solely to coincidence. Although the research design was somewhat flawed in reference to rigid statistical evaluation, both empirical and behavioral changes were noted in the students exposed to this program. The potential of the program implemented at Fairview School is exciting. If the promising results of future programs can withstand more rigorous statistical analysis, the methods of teaching endorsed by the NACD and modeled at Fairview School will be more efficient and empower students to achieve their cognitive potential.

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