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Effect of applying a teaching strategy based on brain absorption to people with intellectual disabilities

– Case Study on Students with Intellectual Disabilities and Charges Syndrome –

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Abstract: This research examined the impact of hemispheric-teaching strategy on individuals with intellectual disability. The author argues that if one of the two hemispheres is more dysfunctional by presenting poorer attributed functions than the other due to abnormal brain development and one is more functional than the other, processing and analyzing inputs and information would be manifested in the superior hemisphere thus teaching those individuals by which it meets their dominant hemisphere will increase their performance. A sample of two students with Intellectual Disabilities and CHARGE Syndrome underwent right and left-hemispheric teaching strategies and were assessed before and after the intervention to examine the argument. Both participants exhibited improvement in their performance on the assigned task, but more improvement was exhibited from the participant who underwent the left-hemispheric teaching strategy.

Keywords: Brain eclipses, dominant brain lobe, brain functions, cognitive processes, cognitive neuroscience, teaching strategies.

تأثير تطبيق استراتيجية تدريس مبنية على أفصاص الدماغ على ذوي الإعاقة الفكرية

– دراسة حالة على عينة من طلبة ذوي الإعاقة فكرية ومتلازمة تشارج –

مشعل عبد الله المقري

قسم التربية الخاصة || وزارة التعليم || المملكة العربية السعودية

الملخص: بحثت هذه الدراسة تأثير تطبيق استراتيجية تدريس مبنية على الوظائف المعرفية لكل فص دماغي- كلاً على حده- على الأفراد ذوي الإعاقة الفكرية. ويرى الكاتب أنه إذا كان أحد الفصين يعاني من خلل أكبر في القيام بالعمليات الوظيفية المعرفية المسؤول عنها بسبب النمو الغير طبيعي في الدماغ مقارنةً بنظيره؛ الفص المقابل، فإن معالجة وتحليل المدخلات والمعلومات ستتجلى أكثر تفوقاً في الفص النظير، وبالتالي تدريس أولئك الأفراد عن طريق اتباع استراتيجية تدريس مبنية على الوظائف المعرفية للفص الدماغي المهيمن سوف تحسن من الأداء المعرفي لديهم. أخضع الباحث عينة مكونة من اثنين من الطلاب ذوي الإعاقة الفكرية ومتلازمة تشارج كلاً على حده لاستراتيجية تدريس مبنية على العمليات والوظائف المعرفية لواحد من أفصاص الدماغ بشكل فردي، وجرى تقييم أدائهم قبل وبعد التدخل لاختبار أولي لنظرية الباحث. أظهر المشاركون تحسنا في أدائهم في المهمة الموكلة إليهم، ولكن أحد المشاركين أظهر المزيد من التحسن الملحوظ بالمقارنة مع نظيره الآخر في نفس عينة البحث.

الكلمات المفتاحية: أفصاص الدماغ، فص الدماغ المهيمن، وضائف الدماغ، العمليات المعرفية، علم الأعصاب الإدراكي، استراتيجيات التدريس.

1. INTRODUCTION:

With reference to cognitive science and on the subject of mental processes, there are areas in the brain that foster specific cognitive functions, and employing these areas can vary from one to another. As specific areas within the brain hemispheres underlying cognitive functions, abnormal neurophysiological processes in the structure of the brain would deteriorate these cognitive functions which can be observed in individuals with an intellectual disability where they display the phenomenon of uneven cognitive profile (Nuovo & Buono, 2009). This phenomenon is similar to splinter skills and used to refer for the performance of an individual from which performance and skills are deteriorated in particular areas but greater in different areas (Shields-Wolfe, & Gallagher, 1992). Enormous clinical evidences from brain damaged have yielded a sizable body of information about the brain lateralization, specifically, how damages in particular areas in the hemispheres affect certain functions and abilities such as the loss of speech due to damage in the left hemisphere by which speech and verbal processing are perceived and produced (Wilson, 2002). In other words, the linguistic system of human being processed in in compliance with the relevant areas to each function, mostly in Wernicke's area in the posterior section that deal with the integration and comprehension of speech as well as Broca's area in the precentral gyrus that deals with expression, articulation, and phonation; both Wernicke's and Broca's areas are usually in the left hemisphere (Tomasi, Volkow, 2012). Therefore, damage in one of these areas, or any other area in the brain will result disturbance or disorder in the functions of the affected area creating uneven performance and cognitive profile (Yang, Jong, Hsu, & Lung, 2011). Similarly, in the case of intellectual disability, genetic disorders and abnormal brain developments present analogous state of cognitive functions. Some of these cognitive functions fostered in the brain are dysfunctional as a result of biological and/or physiological disorders which impair an individual's cognitive functions (Schneider, Hagerman, & Hessl, 2009). These cognitive functions are processed in the brain hemispheres, specifically right hemisphere and left hemisphere, and each hemisphere is responsible for specific functions and tasks, as well as different cognitive style (Nuovo & Buono, 2009). In the first place, the genetic role in cognitive impairments has been recognized to be fundamentally pivotal in such a condition (Lajiness- O'Neill, 2005), and the impact of single-gene disorders on cognitive functions produced by the nervous system has been defined in many cases of intellectual disability such as Down syndrome, chromosomal rearrangements, and X-linked intellectual disability, that is, each genetic mutation varies in the severity and the extent to which the cognitive ability is influenced by the abnormal development of the brain that was triggered by the physiological and the biological defects manifested as a result of the condition itself (Flint, 2001). For example, Williams syndrome is a genetic disorder like some other genetic disorders as well, however, each syndrome differs by a deletion of genetic material from chromosome 7 that impacts their cognitive and visual-spatial ability, yet relatively superior in language and facial recognition.

(Galaburda, Holinger, Bellugi & Sherman, 2002). In contrast, another subgroup of intellectual disability manifests different cognitive profile of strengths and weaknesses that is distinct from other subgroups of intellectual disabilities when comparing two or more subgroups of intellectual disability (Martens et al. 2010). That is to say, each genetic disorder influences the brain development differently which causes the cognitive ability to reflect the anatomical and physiological integrity of specific areas in the brain and how these areas are functionally connected (Middlemiss, Barrasso-Catanzaro, & Eslinger, 2016). With this in mind, the association between a specific genetic mutation and the brain structure has been linked and harmonized with particular cognitive features (Bathelt, Astle, Barnes, Raymond, & Baker, 2016).

Single-gene theory in which mutations and their influences on specific cognitive processes isgreatly supported by a strong body of evidence as can be seen in syndromic-intellectual disabilities (Flint, 2001). Such a framework of the cognitive dysfunctions that primarily produced by genetic factors are crucial to understand.

Within this framework, this study attempted to clarify the view of the brain hemispheres and their cognitive attributes as it can be dynamically linked with the cognitive strengths and weaknesses of the subgroups under the intellectual disability classification in which some cognitive processes in one hemisphere is superior than the other, and the ability to perceive, process, and analysis inputs and information from the surrounding environment is determined by how the brain and the two hemispheres were actually developed.

Statement of the Problem

The uneven cognitive profiles of subgroups under the intellectual disability classification and the disparity of their strengths and weaknesses manifest a dynamic association within the brain hemispheres and their responsibilities and functions.

Purpose of the Study

The aim of the study was to explore the cognitive profile of the subgroups of intellectual disability classifications and examine the effectiveness and the impact of the teaching strategies that meets one side of the brain.

Hypothesis:

This study reviewed extant literature to address and deepen the understanding of problematic issues of the research problem in two main domains. The first domain was the role of the brain hemispheres in cognitive functions and its mechanism. The second domain was the pathway of uneven cognitive ability of individuals with intellectual disability by the various causes.

It is hypothesized that hemispheric-based teaching strategy will positively impact the cognitive performance of individual with intellectual disability, that is, to a great degree, individuals with intellectual disability are dependent on one hemisphere more than the other.

That is to say, if one of the two hemispheres is more dysfunctional than the other and one is more functional than the other, processing and analyzing inputs and information would be manifested in the superior hemisphere. To test this hypothesis, two individuals with intellectual disability will be undergoing two teaching strategies; where each strategy meets the attributes of one hemisphere, and then analyze the impact of the two strategies on their performance.

2. LITERATURE REVIEW:

Cognitive Profiles of Intellectual Disability

In general, a subgroup of intellectual disability classification shares aspects of phonotype that differ from other subgroups. For instance, individuals with Down syndrome are characterized as relatively social persons and less exhibitions of hyperactivity or phobias (Plomin & Defries, n.d.). In contrast for example, individuals with Fragile X and autism spectrum are characterized by their poor social interactions. Not only behavior phenotypes that differ among subgroups of intellectual disability, but also cognitive capabilities such as language abilities, visual-spatial functions, attention, executive functions, and other functions are differently presented. In Williams syndrome for example, language abilities are superior but impaired in abilities such as attention, executive functions, and visual-spatial skills (Nuovo, Buono, 2009).

Be that as it may, several studies have highlighted disparate and uneven cognitive abilities among subgroups of developmental disability and intellectual disability classifications. Another key point is that these Cognitive strengths and weaknesses can be classified accordingly to the brain hemispheres in which some skills are specialized in the right hemisphere and some are specialized in the left hemisphere. As an illustration, the reason for this uneven behavioral and cognitive profile is underlined by specific abnormal functions in the brain (Martens et al. 2010).

In essence, abnormal neuronal development may occur by genetic deficits that underlying anomalous development in the different parts of the nervous system to dysfunction, which affects the cognitive ability as a result of dysfunctional areas in these parts of the nervous system (Wilson, 2002). A view on the brain hemispheres is advantageous to comprehend the cognitive manifestations and processes of individual with intellectual disability.

The Brain Hemispheres

This hemispheric preference in processing information can influence the development of cognitive skills. That is to say, there are areas in the brain that foster specific cognitive functions, and

accessing these areas can vary from one to another, which can be explained by the IQ test. In case of intellectual disability, some of these cognitive functions, fostered in the brain, are dysfunctional as a result of biological or/and physiological disorders which impair their cognitive development (Plomin, Defries, 1997). According to Wang (2008), The right and the left hemisphere process information distinctively and each hemisphere has his own style, and below are two thinking styles of the two hemispheres:

Right hemisphere: nonverbal, holistic, spatial, concrete, responsive, visual, and casual and informal.

Left hemisphere: verbal, sequential, temporal, analytic, linear, digital, symbolic, compositional, factual, and systematic and Formal.

Teaching based on the dominant hemisphere of the brain is a strategy that was emerged from concepts in neuroscience, and research has indicated that such a strategy can increase the learning experience (Wang, 2008, pp. 5-6).

Left-Brain Teaching Strategy

The 4MAT system is research-based teaching strategy that was developed to meet the learning styles of students in the classroom, and highlights the characteristics of each style and developed a framework that educators can use to deliver their instruction in ways that allow students to acquire knowledge (Beck, 2001). The left hemisphere is the analytic mode, and processes information in a sequential fashion. This side of the brain processes information as separate parts and in a logic order. In addition, the provided information has to be in the local level. To explain, knowledge consists of parts, and these parts (local) compose a larger part (global). For example, letters in a word on a book are in the local level, and this word is in the global level. However, this word can also be in the local level if the book itself is considered as a global. The left hemisphere prefers verbal and symbolic information processing. This side of the brain recognizes letters, words, and notations. Being that, the subject should include symbols and be delivered verbally. Not only should this, but it also needs rules to follow, that is to say, instructions in how, when, and why be delivered logically. On the subject of how, when, and why, these concepts are indicative, and addressing them will result in deeper comprehension.

However, addressing these concepts must be planned in advanced. For instance, it is disadvantageous and unreasonable that a teacher tells his student when he needs to count money without telling him why he needs to count first. Not to mention, it is important that the teacher meets the logic requirements in regard to instructions. Moreover, there are some ideas and suggestions that can improve the learning process. When Left-Brain teaching strategy is being implemented, it is recommended that the teacher provide lights and well-organized and quiet environment to his student. Finally, Left-Brained Students favor to work alone instead of working in a group (McCarthy, Germain, & Lippitt, 2002).

Right-Brain Teaching Strategy

By the same token and by the 4 MAT model that was developed by McCarthy, Germain, & Lippitt (2002), the right hemisphere is the holistic mode. It recognizes patterns of relations between the component parts of an array, and combines many inputs simultaneously to draw a complete conclusion. This side of the brain sees the whole picture first, and then processes the details randomly and intuitively. Right-Brained students' process information in a global level, that is, information is processed in a whole-to-parts approach. These parts are collected based on intuition. Therefore, the teacher should provide information and items that are relevant to the subject. In addition, this side of the brain favors processing information by involving senses.

Instructions for the right hemisphere should Encompasses feelings, seeing, and touching in teaching, using pictures, videos, concrete items, colors, and imagination are ideal aids for the right hemisphere. Moreover, addressing concepts such as how, why, and when while teaching is unlike the Left-Brain teaching strategy, that is, left hemisphere processes information sequentially and logically, conversely, the right hemisphere processes information randomly and intuitively. Right-brained students prefer working in groups and in a dimmed lighting environment. Also, to achieve better outcomes, it would be helpful to have the students involved in an activity to experience what is going to be taught first, that is, they prefer to experience the subject first.

Being that, two students with CHARGE syndrome underwent separately two different teaching strategies based on the 4 MAT model of teaching, right-hemisphere strategy for one student and left-hemisphere strategy for the other student, to investigate their impact on individuals with intellectual disability.

Research Question:

Does a right or left hemisphere teaching strategy create a greater effect of task completion on students with an Intellectual Disability and Charge Syndrome?

3. METHODOLOGY:

Participants

Two male students with intellectual disability with aged of 17 and 19 were participants.

Both participants were diagnosed with Charge syndrome and attend a life skill class where instruction is provided for daily living skills and community skills. Student A is 17 years old 3rd with a mental age equivalent to grad and 51 IQ. Similarly, Student B is 19 years old with a 1st mental age equivalent to of grade and 52 IQ. Student A and student B lack of hearing and speaking difficulties. Student A communicate well by sign language and provided with an interrupter in the classroom, but student B only knows very basic sign language and no private interrupter is provided for him. Both have

the bask skills for cooking such as mixing ingredients, cutting, and can follow a recipe with a support from an instructor.

Setting

The life skill teacher conducted baseline, intervention, performance session in one-to-one format with each. Instruction took place on the life skill classroom located in a high school district at rural south-central Pennsylvania State. The classroom included three large tables with a capacity of 4 persons on two sides for each table, one table on the right back side and two in the middle of the classroom. On the left side of the classroom was located the small kitchen next to the bathroom, an on the right side was located the board. The performing of the task was conducted on the classroom table located in the middle of the classroom in front of the when student would face the board and their back to the small kitchen area. On the kitchen area, there was the bar with one sink, bottom closet, and upper closet. A life skill teacher, four additional teacher assistances, four students with special needs, and one sign language interpreter for student B were typically presented in the life skill classroom. The classroom is a typical size classroom (approximately 25x15).

Task and Materials

Each one of the students was assigned with a different sandwich to make but similar targeted skills, difficulty level, and number of steps per task analysis. Student A was assigned with the task on making a tuna bagel sandwich student B was assigned with the task on how to make a chicken wrap sandwich. Both tasks contained 20 steps that started with the same two first steps (1- can go to the kitchen, 2- collect ingredients and utensils) and ended with the same two last steps (19-wash what he uses, 20- put back everything in its place). However, each task was delivered and instructed differently but by the same life skill teacher; student A was instructed by the life skill teacher's teaching strategy but was provided with a recipe developed by the researcher. Student B was instructed by the life skill teacher and used the lesson plan and a recipe that both were developed by the researcher. Both tasks took into account the ability to initiate a step and as chained-a series of discrete steps that equated to a complex skill. Both tasks were developed and instructed for the same goal and objectives.

The goal for the two tasks was:

- The student will complete all the steps for making the instructed task (the sandwich) independently.

The objectives for both tasks were:

- The student will practice a variety of cooking skills including preparing, making, and cleaning up.
- The student will show an understanding of the three stages needed to make a sandwich. The thre stages were the criteria utilized for developing the tasks by first preparing the ingredients and the

utensils as the first steps of the tasks, and then making the sandwiches by using what was prepared, finally returning back what should be returned and cleaning the mess after the making stage. Performing the three stages was a sign of independency.

Assessment and observation instruments used for data collection were a task analysis sheet of the required step to complete the task. The same steps of the task for each one of the lesson plans were conducted as a pre-intervention assessment and after-intervention assessment to compare the participants' performance on the task of making tuna bagel and chicken wrap. Each sandwich required 20 steps to complete. Each step on the task analysis to be evaluated as the following standards by using a check mark under the appropriate column: a correct response occurred when a student begins the response within 10s of the step direction, and the students have to fully complete the step to be marked Yes. A score of not fully correct for the responses that lack of perfection or poorly preformed to be marked Not Fully. Any other response will be scored as incorrect to be marked No. This included not beginning a response soon enough after the task request, failing to complete the step, and poorly completion of the step. In cases where the student made any error, the teacher stopped the student, blocked the student's view of the task materials, and corrected or completed the step without allowing the student to see what was being done.

Research Design

The researcher utilized a case study design in order to examine the impact of hemispheric-teaching strategies on the performance of individuals with intellectual disability with the same diagnosis. The study attempted to establish a ground basis to introduce a method of teaching for individuals with intellectual disability. The ground basis linked the features that aimed to ascribe the cognitive ability and attributes of each subgroup of intellectual disabilities classifications to their genetic abnormal development. That is to say, the abnormal and uneven cognitive ability is similar among each group of intellectual disability that share the same cause, and such an ability may be classified under the two hemispheres in the brain. Being that, the researcher examined the impact of independent variable (hemispheric-teaching strategies) on a dependent variable (the cognitive performance of individuals with CHARGE syndrome), by which each one of the individuals with CHARGE syndrome underwent one of the hemispheric- teaching strategy. The impact of the independent variables (the teaching strategies) on the dependent variables (the cognitive performance) was pre-assessed before the exposer to the intervention, and a post-assessed was implemented after the intervention, the students were post-assessed on their performance on the task assigned that was associated with the intervention. The results were analyzed and compared with the pre-assessment data. The main goal of the study was to establish a starting point for future research and exploratory on the cognitive profile of the different subgroups under intellectual disability classifications in relation to one hemisphere more than the other, which can be determined by

extended scrutinizes and investigations of the cognitive ability of each subgroup and the dysfunctional parts in their brain. The main goal of the current study was to explore the impact of hemispheric-teaching strategies on the performance of individuals with intellectual disability.

Procedures and Intervention

General procedure. During each session through the research, the life skills teacher was the instructor and the only one involved directly with the students in one-to-one format. Data were collected by the researcher using the task analysis form of the instructed lesson, and he was setting on the next classroom table to observe the students. The lesson plans conducted were different for each student but steps were similar.

The pre and post-assessments took place for two weeks and were conducted as the following, in the first week, student A was pre-assessed on his performance for making the task instructed by right-hemisphere lesson plan on Thursday, and on Friday for student B. In the second week, student A was instructed the right hemisphere lesson plan on Tuesday and post- assessed on Friday, 2 days period window between the instructions and post-assessment. Student B was instructed left hemisphere lesson plan on Thursday and post-assessed on Friday, 1-day period window between the instructions and post-assessment. Baseline data were collected by a 20 steps task analysis for each lesson plan. Individually, student A and B were verbally prompted by their life skills teacher to do each step on the task analysis sheet. Data was collected by using a check mark under the appropriate column Yes, Not fully, and No for each step that the participants responded that the researcher observed during the assessment time. After collecting baseline data on both participants, student A and student B were individually instructed by the life skills teacher the lesson only for one time. Student A was instructed by using the right-hemisphere recipe on how to make a tuna bagel. Recipe for this lesson was designed by the researcher, which characterized by the right hemisphere attributions, and the teaching strategy used for the lesson was the life skills teacher's teaching strategy, which also characterized by the right hemisphere attributes (more explanation below).

The life skills teacher and student A sat cross each other on the classroom table in the middle of the life skills. The teacher did the following to teach student A how to make a tuna bagel sandwich by using her strategy of teaching and recipe developed by the researcher for the right hemisphere.

1. The teacher informed A that they were going to follow a recipe just like previous lessons and how his mother taught him how to cook with a recipe.
2. The teacher informed A that they need to prepare ingredients and the equipment to make this sandwich like what he does in home with his mother and with her in the classroom and in Timothy house.

3. The teacher presented page 1 from the recipe that includes visual representations of the ingredients and utensils, and then asked him to collect what on this page to make tuna bagel sandwich.
4. The teacher asked A what would be the next step after preparing the ingredients and utensils. The teacher explained that after step of collecting, they need to start doing the steps and follow the visual instructions on page 2 and 3 of the recipe.
5. After the sandwich was made, the teacher reviewed the lesson with student A by asking what was inside the bagel, and how the mixture was made. Then the life skills teacher continued to empathize on the ingredients and their attributions by asking to taste them and what was the color of each item.
6. After reviewing the lesson, the life skills teacher asked student A to clean-up the table and return everything in its proper place. She instructed A when he misplaced an item to where that item should be placed, and explained why and where.

During the process of preparing the sandwich, the teacher modeled by using her hands the physical movement of spooning the mayonnaise from the jar, mixing the ingredients in the bowl, removing the mixture form the bowl to the bagel, and spreading the mixture on the bagel. The teacher also modeled by using her hands physical movements to A the step of slicing the bagel from the top and the step of slicing the bagel from the side, but additional involvement for illustrating was involved in these two steps by actually holding the knife and slicing half the bagel from the side and from the top, but only half of each task was performed by the teacher, and then the student continued to do what his teacher modeled to him. In addition, when student A finished skill that included a series of steps, the life skills teacher verbally reinforced him.

The teaching strategy of the life skills teacher was observed by the researcher before, and it can be indicated that the life skills teacher's teaching strategy can be considered right hemisphere teaching strategy, that is, the life skills teacher throughout the thesis started with stimulating prior knowledge of the student by reviving memories from previous experiences that were related to the presented lesson to student A, a strategy to establish broader perspective on the lesson to enable spontaneously and intuitively make a conceptual relationship through which a holistic view and a global level of processing information could be activated. In addition, the teacher informed student A that every time he made a sandwich or cooked with the teacher or at home, he would need to collect the needed ingredients, and then instructed the step of collecting the ingredients. This step created an opportunity for A to bridge prior knowledge with the lesson and a learning set that A could initiate a personal experience with the presented lesson that activated emotions and sense. Furthermore, after each step instructed, the teacher established a theme for A to link the steps together in his preferred way of processing by asking questions of why, how, and what like why did you pick the fork, and then the teacher illustrated the reason behind a step, which may stimulate to A to reflect on the theme established by the teacher since. At the end, the

teacher reviewed the lesson by involving the senses of student A, which made the learned information more vivid for A to remember (McCarthy, Germain, Lippit, 2002).

Student B was instructed by using the left hemisphere lesson plan on how to make a wrap sandwich. The teaching strategy and recipe were designed and developed by the researcher, which characterized the left-hemisphere attributions.

Student A and B then underwent individually post-assessment evaluation to determine their performance to independently complete the required steps for making the task instructed in the lesson plans. The life skills teacher verbally asked student A and B to make the instructed task without showing them the recipe or providing any kind of instructions during the assessment period. The only case that the life skills teacher provided instruction was when a student completely failed to perform one of the steps. In that case, the life skills teacher guided the student only on the preformed step and stopped when the step was performed. The researcher used the same task analysis form and criteria in the pre-intervention for post-intervention assessment to determine the students' performance.

4. RESULT:

Over all, the participants' performance was similar on their assigned task before the intervention but relatively different after the intervention. Table 1 and Table 2 represent the task analysis, questionnaire used for each task of the two teaching strategies, right-hemisphere and left-hemisphere teaching strategies. These show the results of each student's performance pre and post intervention. Figure 1 represents the performance percentage of student A and student B before and after the intervention. Student A completed 65% of the required steps with an error percentage of 35%. He completed 13 steps out of 20 successfully and failed to uncomplete the other 7 steps of the same task with 5 not fully completed and 2 failed to complete. He failed to identify Tuna pouch, essential ingredient for the recipe, but was able to identify and collect all other ingredients when he was verbally asked to bring each item. In addition, he failed to open the tuna pouch, cut the bagel form the side, and was not fully able to cut the bagel from the top; he used his hands after using the knife. He also was not fully able to place some of the items that belong in the refrigerator. After the intervention, student A performance increased 10% with a completion of 16 steps out of 20 and made 4 errors, 1 not fully and 3 complete fail. He failed to cut the bagel from side and cut the bagel from top (essential skill for completing the task), and was not fully able to collect all the needed utensils. He forgot plate and brought unneeded ingredients. He also was not fully able to add the instructed amount of mayonnaise to the bowl.

Student B completed 55% of the required steps with an error of 45%. He completed 11 steps out of 20 steps and failed to complete the other 9 steps. He failed to identify tortilla,

hummus, and chopped tomato (Tortilla and hummus were essential); he also failed to roll Tortilla (essential skill includes 3 steps). Student A was not fully able to removing chicken from can to Tortilla

without the chicken's water in the can, and sprinkle chesses and lettuce properly with hands. After the intervention, student B performance increased 35% after the intervention with a completion of 18 steps out of the 20 and 2 errors, 1 not fully and 1 fail. He failed to initiate the step of picking up the chicken can after finishing the spread hummus on Tortilla step (an essential step for completing the step); he also was not able to fully complete the step of removing the chicken from can to Tortilla (did not use fork to remove chicken from the can).

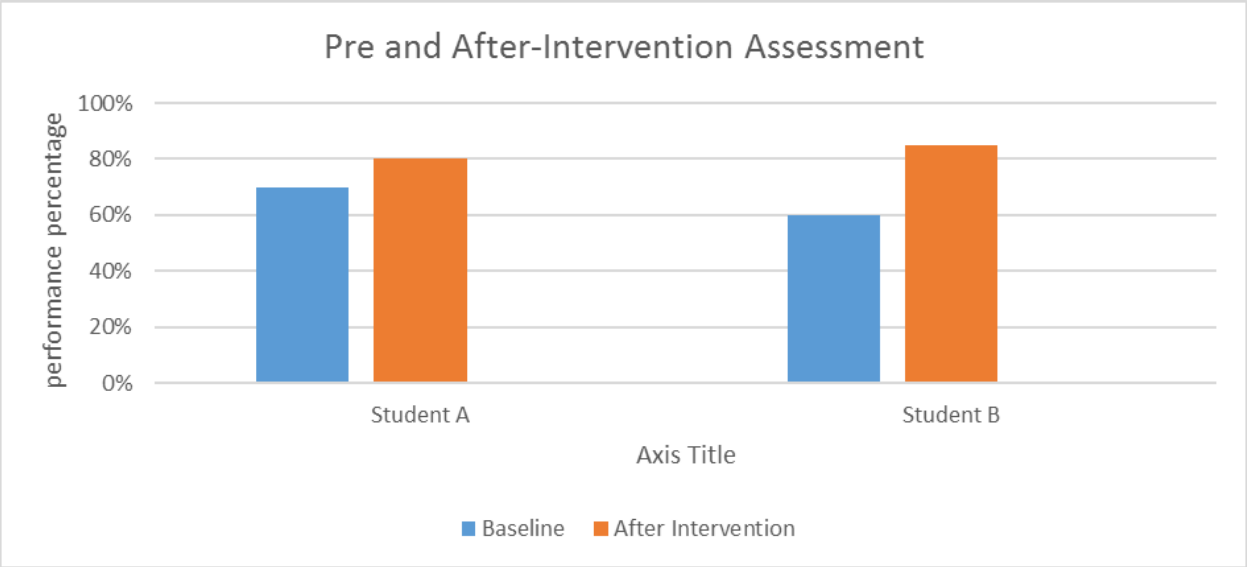

Figure (1) A column represents the performance of student A and B before the intervention and after the intervention.

Table (1) Pre and post-intervention Assessment for Right-hemisphere teaching strategy

step #	Step	No	Not fully	Yes	No2	Not fully2	Yes2
1	Can go to the kitchen			x			x
2	Can collect dish ingredients and utensils		x		x		
3	Can open the pouch of tuna	x		x			x
4	Can put tuna in the bowl		x	x			x
5	Can open the mayonnaise jar						x
6	Can pick up the spoon and take one spoon amount of mayonnaise			x		x	
7	Can add the one spoon of mayonnaise to the bowl			x			x
8	Can pick up the salt and pepper and sprinkle them in the bowl			x			x
9	Can pick up the fork			x			x
10	Can mix the ingredients with the fork		x				x
11	Can take one piece of bagel and put it on the plate			x			x
12	Can pick up the knife			x			x
13	Can cut the bagel in half	x			x		
14	Can initiate the step of taking tuna from the bowl to bagel			x			x
15	Can spread tuna mixture on the bottom half of the bagel			x			x
16	Can cover the spread half with the other bagel piece to make a sandwich			x			x
17	Can pick up the knife			x	x		
18	Can cut the sandwich in the half		x				x
19	Can wash what he uses			x			x
20	Can put back everything in its place		x				x
		2	5	14	3	1	16

Table (2) Pre and Post-intervention Assessment for Left-hemisphere Strategy

step #	Step	No	Not fully	Yes	No2	Not fully2	Yes2
1	Can go to the kitchen			x			x
2	Can collect dish ingredients and utensils		x				x
3	Can put one tortilla on plate			x			x
4	Can initiate the step of picking up the hummus			x			x
5	Can open the hummus scoop hummus		x				x
6	Can spread hummus on tortilla			x			x
7	Can initiate the step of picking the chicken can			x	x		
8	Can open the chicken can			x			x
9	Can remove the chicken from the can to the tortilla by using a fork		x			x	
10	Can sprinkle a little spices on top			x			x
11	Can initiate the step of picking the cheese bag			x			x
12	Can open the cheese bag		x				x
13	Can take a little cheese by hand and sprinkle the cheese on top			x			x
14	Can initiate the step of picking up the lettuce and put lettuce on top			x			x
15	Can open chapped tomato jar and put on top		x				x
16	Can fold one side of tortilla	x					x
17	Can fold another side of tortilla	x					x
18	Can roll up the tortilla	x					x
19	Can wash what he uses			x			x
20	Can put back everything in its place		x				x
		3	6	11	1	1	18

5. CONCLUSION AND FUTURE DIRECTION:

Both strategies improved the performance of participants. Based on the data from this study, sequential, organized, analytic, and local level were advantageous for the participants, which are left-hemisphere attributions. Right-hemisphere teaching strategy didn't not show that much of an improvement in favor of its attributions. The final analysis that can be drawn here is that tasks can be processed in both hemispheres, right and/or left, and the tendency for the participants to rely more on one hemisphere than the other hemisphere in processing the assigned task seemed to be favored in the left hemisphere. Thus, students with Charge syndrome may benefit from left-hemisphere teaching strategy. It is possible that the presentation of stimulations plays a crucial role for increasing the student achievement, and the way information is conveyed has less effects on the student. This is an area of investigation for future research. The study suggests that students with intellectual disability are to be undergone a hemispheric-teaching strategy that matches their cognitive ability, which can be determined by cognitive functions assessments. The study has narrowed the gap between the uneven cognitive profile of individual with intellectual disability and their causes. Subgroups of intellection disability classification share common behavioral and cognitive attributions, and each cause of intellectual disability determine the level in which an individual with a specific intellectual disability behaves and processes information. The mechanism in which an individual with intellectual disability perceive his world and produces cognition is still unclear, and further research on this topic is highly beneficial. It is also possible that a

classification of the cognitive ability of each subgroup of intellectual disability can be constructed by extended analysis of data from cognitive assessments from relatively a large number of studies.

References

- Bathelt, J., Astle, D., Barnes, J., Raymond, F. L., & Baker, K. (2016). Structural brain abnormalities in a single gene disorder associated with epilepsy, language impairment and intellectual disability. Neuroimage: Clinical, 12655-665. doi:10.1016/j.nicl.2016.07.016
- Beck, C. R. (2001). Matching teaching strategies to learning style preferences. The Teacher Educator, 37(1), 1-15.
- Bodenhausen, G. V., & Hugenberg, K. (2009). Attention, perception, and social cognition. Social cognition: The basis of human interaction, 1-22.
- Wilson, M. (2002). Six views of embodied cognition. Psychonomic Bulletin & Review, 9(4), 625-636. doi:10.3758/BF03196322
- Flint, J. (2001). Genetic basis of cognitive disability. Dialogues in Clinical Neuroscience, 3(1), 37–46.
- Galaburda, A. M., Holinger, D. P., Bellugi, U., & Sherman, G. F. (2002). Williams syndrome : neuronal size and neuronal-packing density in primary visual cortex. Archives Of Neurology, 59(9), 1461-1467.
- Lajiness-O'Neill, R. (2005). 22q11.2 Deletion Syndrome: Introduction. Child Neuropsychology, 11(1), 1-3. doi:10.1080/09297040590911176
- Middlemiss, W., Barrasso-Catanzaro, C., & Eslinger, P. J. (2016). Neurobiological Bases of Executive Function and Social-Emotional Development: Typical and Atypical Brain Changes. Family Relations, (1), 108. doi:10.1111/fare.12175
- McCarthy, B., Germain, C. S., & Lippitt, L. (2006). The 4MAT research guide: reviews of literature on individual differences and hemispheric specialization and their influence on learning. Wauconda, IL: About Learning.
- Muñoz. Caro Ruata, J., Martínez, E., Martinez Perez, L., & Borja, M. (2010). Visual perception and frontal lobe in intellectual disabilities: a study with evoked potentials and neuropsychology. Journal of Intellectual Disability Research, 54(12), 1116-1129.
- Nuovo, S. D., & Buono, S. (2009). Cognitive profiles of genetic syndromes with Intellectual Disability. Life Span and Disability. Retrieved from http://www.lifespan.it/client/abstract/ENG128_XII_1_2009%20pdf.2.pdf
- Plomin, R., & Craig, I. (1997). Human behavioural genetics of cognitive abilities and disabilities. BioEssays,19(12), 1117-1124. doi:10.1002/bies.950191211
- Schneider, A., Hagerman, R. J., & Hessl, D. (2009). Fragile X syndrome—From genes to cognition. Developmental Disabilities Research Reviews, 15(4), 333-342.

- Shields-Wolfe, J., & Gallagher, P. A. (1992). Functional utilization of splinter skills for the employment of a young adult with autism. Focus On Autism & Other Developmental Disabilities, 7(4), 1. doi:10.1177/108835769200700401
- Tomasi, D., & Volkow, N. (2012). Resting functional connectivity of language networks: characterization and reproducibility. Molecular Psychiatry, (8), 841.doi:10.1038/mp.2011.177
- Wang, T. (2008). Brain hemispheric preferences of fourth- and fifth-grade science teachers and students in Taiwan: an investigation of the relationships to student spatial and verbal ability, student achievement, student attitudes, and teaching practice. – doi:https://etd.ohiolink.edu/!etd.send_file?accession=osu1213169329&disposition=I line
- Yang, P., Jong, Y., Hsu, H., & Lung, F. (2011). Role of assessment tests in the stability of intelligence scoring of pre-school children with uneven/delayed cognitive profile. Journal Of Intellectual Disability Research, (5), 453.