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Closing the Gap Brain Based Teaching and Learning Techniques

Cheryl Newton
St. John Fisher College

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Brain based teaching and learning strategies have been presenting themselves at an increasing rate within our school systems. Educators need to focus on at-risk and special education students and identify strategies that are effective with these populations. Two African American special education students attending school at an urban school within the Rochester City School District participated in using brain based learning techniques. students'' learning. Movement and discussion proved to have a positive impact on the Changes in the appearance of the classroom may have also had a positive effect on student learning. Activities including movement and discussion should be utilized when working with special education and at-risk student populations.

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By

Cheryl Newton

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Martha Murray

School of Arts and Sciences

St. John Fisher College

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Abstract

Brain based teaching and learning strategies have been presenting themselves at an increasing rate within our school systems. Educators need to focus on at-risk and special education students and identify strategies that are effective with these populations. Two African American special education students attending school at an urban school within the Rochester City School District participated in using brain based learning techniques. Movement and discussion proved to have a positive impact on the students' learning. Changes in the appearance of the classroom may have also had a positive effect on student learning. Activities including movement and discussion should be utilized when working with special education and at-risk student populations.

Introduction

With the growing amount of research stating that brain based learning is essential for our students and supporting the use of brain based teaching and learning methods within the classroom, brain based methods of teaching and learning are thought to be necessary in all classrooms. Not all students come from the same mold nor do they require the same instructional techniques to be successful or to learn in the same ways. Varying instructional techniques is effective with the majority of this population of students. Teacher focus needs to be directed towards meeting the needs of those students who are at risk in classrooms. In many cases, this includes students who have been classified as special education students.

Brain based learning techniques have been researched and identified and, as presented from the researchers' point of view, seem to be effective for all students. Brain based learning could be effective for all students, but the question arises if each of the techniques would be effective for all students? Would the same brain based learning and teaching techniques be effective for the population of students labeled as "at risk" and especially for students classified as special education students? If so, what methods of brain based learning and teaching would be most effective for these students?

At risk students require more specialized instruction that will allow them to receive quality instruction resulting in quality learning. Identifying which brain based learning and teaching techniques that will be most effective for special education students will then guide the instructional techniques used within special education classrooms.

Theoretical Framework

Larson & Marsh (2005), Gee (2001), Wissman (2007), and Dyson (2008) share the arena of subjective social thought that student interactions are considered a brain based learning technique. These researchers take the stand that the world is understood through multiple perspectives. With interactions being critical within the classroom, Larson & Marsh (2005) and Gee(2001) view educators as social reformers. These researchers view social thought as a critical theory or a radical humanism angle. Critical theory is the examination and critique of society and culture, drawing from knowledge across the social sciences and humanities. Theorists who view social thought with a radical humanism angle focus on releasing social constraints that limit human potential. As social thought is utilized in our classrooms, these researchers view social thought as being in conflict. Larson & Marsh (2005), Gee (2001), Wissman (2007), and Dyson (2008) base their findings upon the sociocultural foundational theory; they believe that higher order functions of literacy develop through social interactions. Gee (2001) states that secondary discourse is built upon primary Discourse and that primary Discourse is built upon social interaction with family friends, and other communication with those around us. Wissman (2007) views secondary discourse as being built upon further through social interaction with peers.

The acquisition of literacy occurs through social interactions and oral language. The acquisition of literacy is accomplished through the communication with those around us and the habits that are learned as a result of this communication. Sociocultural theory is enacted through all of the interactions that students have with any person with whom they come in contact and converse.

Sociocultural-historical theory presents itself within brain based learning and instruction as well. Larson and Marsh (2005) argue that interactions and everyday life is based upon the

culture that encapsulates it. Luke and Freebody (1999) agree that learning would need to be

based upon the expectations and demands of society and this should shape the approach and

practices used.

Oral language is an example of learning occurring and becoming a well learned and

understood aspect of people's lives. Oral language is acquired from the communication with

those around us and the habits that are learned as a result of this communication, creating models

of the functions of language being defined through their uses (Halliday 1969, Heath 1982.)

Halliday (1969) introduces us to the thinking that a child's awareness of language needs to be in

tune with his/her view of language function or learning becomes educationally irrelevant to

him/her. If a child's learning is irrelevant to him/her, he/she will never utilize it or will fail to on

a regular basis and the learning will be lost from lack of use. Heath (1982) is in agreement with

Halliday (1969) but adds that focusing on the acquisition of oral language being dependent on

the experiences that children have with communication therefore further language learning in

school must be in sync with and dependent on the experience a student has had thus far with oral

language and the people around his/her. Without connections being made between what a child

has already learned through scaffolding upon primary Discourse (Gee, 2001) with regards to oral

language, what he/she is currently learning, and opportunities to apply his/her learning at the

current time and in the future, oral language that is newly learned is lost and therefore non

effective.

Research Question

Sociocultural theory suggests that in order for higher level learning to take place and for

learning to be highly effective, interaction between students and the students and teacher need to

occur. This creates an arena allowing students to be actively involved with their learning.

Different students and different populations of students require varying techniques how they

acquire new information. When dealing with the at-risk population that includes special

education students, we must be even more diligent in selecting brain based techniques to ensure

that teaching and learning is highly effective. This research poses the question, "How does brain

based learning impact instruction for elementary special education students?"

<div align="center">**Literature Review**</div>

Introduction

When considering how the students within classroom learn, it would be neglectful of us

to not consider the child as a whole along with the world in which they are learning and living.

The environmental stimulants and challenges that surround our students can both positively and

negatively influence their learning. Brain research has encouraged us, as educators, to consider

the whole child, the learning environment, the living environment, and the environmental

stimulants and challenges and has provided the research to support our doing so. This has

proven to be even more important when working with special education students and leads us to

question how brain based learning impacts instruction for elementary special education students.

The Learning Environment

Madrazo, Jr. & Motz (2004), Gabriel (1999), and Smith (2007) value the characteristics

of a classroom to be either encouraging or detrimental to the success of our students. These

researchers view a content rich, pleasant, colorful, and welcoming environment as being the

difference between a successful learning day and a wasted one.

Gabriel (1999) focuses on the odors that welcome students in the room. In a study conducted in two eighth grade classrooms, Gabriel (1999) found that a pleasantly fragrant environment made a large difference between the need for redirection within the classroom. There was a 54% reduction in the need to redirect the students within the classes when a pleasant odor was added to the classroom. This was not influenced by the scent that was added but simply that there was a pleasant odor present.

Smith (2007) observed several different classrooms at the middle school and high school levels. Similar to Gabriel, Smith (2007) determined that classrooms that were considered great or excellent on her observation scales were also pleasant to the learners. Unlike Gabriel, the scent of the classroom was not considered but rather the appearance of the classrooms. The classrooms that earned a great to excellent score displayed student work and posters that contributed to student learning. While being present, the displays did not interfere with too much stimuli. The classrooms that earned lower ratings included nothing on the walls but the classroom rules or motivational posters to the point that it was difficult to focus on the lessons.

Madrazo, Jr. and Motz (2004) agree with Smith that the appearance of the classroom can greatly influence the students' learning within the classroom. They focused on the colors and materials being used on the classroom walls. Madrazo, Jr. and Motz (2004) encourage careful consideration when choosing the colors making sure that rich colors are used for the most part. They also prefer classrooms that incorporate many textures within the classroom itself. Most of all, they encourage the students to have ownership of the knowledge within the classroom through the student work that is displayed within the classroom. The sensory information provided and the overall atmosphere of the classroom has a great affect on how students learn within each given classroom.

Displaying student work allows students to reflect more readily on their work and to make connections as well. Pauwels and Hess (2001) found that connections were made through engaged learning when working with four first grade girls within a resource room. They recognized that patterns, connections, and meaning assisted the brain in learning. They employed constructive learning to ensure that their students were growing with the connections that they were making. Their goal was to show growth in the students' abilities to identify beginning sounds and recognize high frequency sight words. The students were able to do this when seeing words displayed that they had learned through other means other than the resources that they were reading the words from currently. Through the connections being made from the students' natural curiosity, the reading became more meaningful to them.

Meaningful Learning

Madrazo, Jr. and Motz (2004) agree with Pauwels and Hess (2001) on the necessity of making connections within learning. They go a step further and use connections and pattern constructions as identification of learning stages and development of children. Through making connections, students are actively utilizing learning and assisting students to more readily retain the information learned. Students' learning is more meaningful when using strategies such as reviewing and/or reflecting on their own work (Madrazo, Jr. & Motz 2004).

Making connections allows students to review background knowledge or previously learned classroom information. Smith (2007) values this review as well as repeating information as a memory tool. Madrazo, Jr. and Motz (2004) also recognize the need for students to utilize brain-based strategies in order to retain information learned. Rather than relying solely on connections being made, they also value strategies that are more "hands on." These strategies

include teaching each other or peer teaching where students automatically review and repeat information that they have learned in the process. They also encourage the technique of practicing by doing or active learning where students review and repeat material on an individual basis.

Interaction and Discussion

Finally, Madrazo, Jr. and Motz (2004) encourage discussion of material covered and also allowing students to repeat and review information on a social level. Through this discussion, students process the information that they have learned on a deeper level. They are then able to challenge each other or the information provided with the support of their classmates. Through the personal discovery being experienced, students connect to the material learned on a greater level and creating a greater level of meaning making for themselves.

Smith (2007) encourages teachers to tie learning to the lives of their students being taught when possible. If material cannot be tied to the students' lives within a class, material should be connected to other subjects being studied. At the very least, material being taught should be taught utilizing real world examples. These methods encouraged intrinsic motivation for the students being taught due to the opportunity being presented to make text to self, text to text, or text to world connections.

Motivation

Madrazo, Jr. and Motz (2004) recognize motivation as being essential for students to learn. They tie learning to positive emotional experiences and they believe that when these experiences are present, students are motivated to learn. When motivated, Madrazo, Jr. and Motz (2004) believe that students generate new thought on an individual basis. Jensen (1998)

also holds the view that experiences generate emotions. As a result of these emotions, students

experience relevancy in the information being learned and they also create meaning.

Smith (2007) and Madrazo, Jr. & Motz (2004) see the importance in challenging

students, and teachers utilizing critical thinking in order to promote a higher level of learning.

This not only assists in strengthening the students' learning, but it also assists in behavior

management. Madrazo, Jr. and Motz (2004) connect active learning as a way to challenge

students, meet the needs of the student, and include brain-based education within the classroom.

They state, "Teachers must promote active learning through incorporation of research on brain-

based education and the corresponding academic needs of the student" (Madrazo, Jr. and Motz,

2004, p 58).

Movement

Movement is thought to be positive to the learning taking place within our classrooms.

This is a result of scientific findings that support that the brain benefits from activity (Stevens-

Smith 2004, Stevens-Smith 2006, and Pica 2008). Stevens-Smith (2004) found that movement

increases neural stimulation within the brain and thus increases the synaptic nerve

interconnections present, resulting in the capacity to learn to grow.

Stevens-Smith (2006) provides a greater level of understanding   by further explaining

that a child's ability to learn is dependent on movement through the stimulation of neurons and

electrical wiring within the brain. Through her understanding of the effects of movement on the

synaptic nerve interconnections within the brain, Stevens-Smith explains that the same part of

the brain processes both learning and movement. Not only does this affect the capacity to learn

but also allows students to use information faster and better. This assists students in thinking and

solving problems. Stevens-Smith (2006) concluded that "exercise activity increases neuronal

growth, which positively correlates with improved learning" (p 19).

Similarly, Pica (2008) recognizes that movement has a positive effect on the brain. Pica

(2008) explains that movement provides essential elements in order to optimize the functioning

of the brain. When the elements, oxygen, water, and glucose are readily available to the brain,

the brain's performance level increases greatly (Pica, 2008).

In earlier research, the effects of movement on brain functioning, Stevens-Smith (2004)

found many other correlations between movement and student success. It was found that

students who are presented with the opportunity to learn and move simultaneously benefited

from this activity (Stevens-Smith, 2004). In fact, Stevens-Smith indicated that the research

children were positively affected by physical activity. This is possibly a result of King (2000)

and Payne's (1999) other findings that physical activity increased both alertness and energy to

learn. As a result, Stevens-Smith (2004) states that "physical movements not only strengthen the

body, but are crucial to brain and nervous system development" (p 10).

Brain Functions

Stevens-Smith (2006) further explains more understanding in how the brain works and

assists us in learning. Stevens-Smith (2006) refers to the work of Rhodes and Courneya (2003)

which recognized that neuronal growth occurred from exercise. Neural connections are

increased further by using both sides of the brain together within tasks. This also increases the

neural connections that are needed for learning. When both sides of the brain are not working in

succession, Stevens-Smith (2006) refers to this as a "roadblock to learning" (p 20). Hannaford's

(1995) research, when it was found that the same neural connections used and strengthened with

physical activity also are the same neural connections necessary to be successful in reading, writing, and math. When these neural connections are stimulated, they are stimulated for all activities that they are involved in.

To further gain understanding in the functioning of the brain in regards to the left verses right brain, or rather left brain working together with the right brain, Stevens-Smith (2006) provides us with explanation of "Dennison and Dennison's Three Dimensions of Brain Functioning." The dimensions of laterality, centering, and focus and are:

1. Laterality refers to the ability to coordinate the left and right sides of the brain.

   - The brain function of laterality is fundamental to a child's ability to read, write, listen, and speak.

2. Centering refers to the ability to coordinate the top and bottom areas of the brain.

   - The brain functioning of centering is related to feelings and the expression of emotions, clear responses, and organization.

3. Focus refers to the ability to coordinate the back and front areas of the brain.

   - The brain functioning of focus affects comprehension, including the ability to blend details so that children have meaning and the ability to understand new information in terms of previous experience.

(Dennison & Dennison, 1994, p 34)

Mind and Body: Working Together

Pica (2008) simply states that "the mind and body are not separate entities" (p 52), supporting what has been found thus far in brain research. Rather than focusing on exercising and other physical activity, strengthening neural networks as Stevens-Smith had, Pica (2008)

supports Hannaford (2005) in her research, suggesting that neural networks can be created in the

brain by "learning by doing" (p 52). She refers to this idea as "making the entire body a tool for

learning" (p 52). Pica (2008) suggests utilizing learning strategies such as having students act

out words in order to increase immediate word comprehension and to ensure that word

comprehension is long lasting.

Peebles (2007) also views the need for movement within education as essential and

recognizes that movement can serve as a motivator. Her research in both general education and

special needs literacy classroom grades 2-6 focused on whether movement would assist and

strengthen the fluency abilities of reluctant readers. Peebles was well aware that if a student

having difficulty with fluency repeatedly read a text and/or had the reading modeled for the

student with the correct fluency, there would be a positive influence on the student's fluency.

The difficulty was that reluctant readers within her classes did not understand or believe this to

be true. To assist in convincing students to practice their reading fluency with these strategies,

Peebles incorporated movement. She used two movement strategies, Readers Theatre and

Rhythm Walks (Peebles, 2007) and defined the strategies as:

- Readers Theatre – This practice consists of rehearsing a passage, incorporating

  movements such as actions, gestures, and facial expressions, and presenting it to an

  audience with script in hand.

  -This was described by Tyler and Chard in 2000 as "an authentic venue for rereading the
  same text several times while motivating the most reluctant of readers"

- Rhythm Walks – The purpose is to draw attention to the natural breaks and phrasing of

  text through purposeful "steps" or movements.

  (p 578).

Differing View

Educators are eager to have their teaching practices validated through brain research findings (Jorgenson, 2003). According to Jorgenson (2003), this desire has caused educators to adopt brain-based methods on a regular basis and has resulted in an entire brain based industry. Unfortunately, it is educators who are spreading the idea of brain based research guiding brain based learning and teaching, not scientists proving these methods to be effective (Jorgenson, 2003). Bruer (1999) states "brain-research movement's 'scientific' foundation as 'a popular mix of fact, misinterpretation, and speculation' that may be 'intriguing but not always informative'" (p 657).

Kluger and Park (2001) explain how the critical period for learning in a child's life has been proven to be fact. Jorgenson explains how this research has been "embellished far beyond its original research findings" (p 365). The research of Kluger and Park (2001) explain, "At birth, babies have the potential to learn any language with equal ease, but by six months, they have begun to focus on the one tongue they hear most frequently (p 54). Jorgenson (2003) shares that Kluger and Park (2001) explain further that "this period does indeed appear to be a 'window' for language acquisition; but, 'when it comes to other skills, such as math or music, there is virtually no evidence for learning windows at all'" (p 365).

Other "brain based research" that appears to be simply speculation involves the brain's laterality. This left brain verses right brain is thought to "explain differences in aptitudes depending on which hemisphere in the brain is 'dominant' in a person" (Jorgenson, 2003, p 365). Jorgenson (2003) includes that two decades of research concludes that there are subsystems in both sides or hemispheres of the brain that are needed to complete complex mental processes and

therefore a claim of people having strength in their left brain or right brain making them successful in certain arenas verses others has been dismissed.

Methods

Context

The study took place at an urban school in the Rochester City School District. The school has four self-contained classrooms and five integrated classrooms. One participant met with me, as the researcher, after school during two sessions over a two week period and the other participant met with us during the first after school session.

Participants

The students who participated in the study were a male and a female African-American, intermediate elementary special education students. The students have tested with IQ scores of 78 and have been classified as mentally retarded. Both students read at a first grade level due to their comprehension skills and both are able to decode at a late third to early fourth grade level. Both of the students have difficulty staying focused on tasks and also experience difficulty with remembering previous lessons and skills learned.

Both names are pseudonyms to protect the identities of the participating students.

Researcher Stance

I worked with the participants as their teacher and observed their activities in conjunction with teaching them. The students felt at ease working with me as I was their classroom teacher and they were well aware that their work within the study will not negatively affect their grades.

In fact, I completed their report cards prior to beginning my research and made them aware of this so that they would work with me freely and not feel pressured.

Method

The participants and I worked together after school on two different afternoons for approximately two hours each session. We used brain-based methods to learn vocabulary at one session and to learn a math process in which math vocabulary was essential during the second session. These methods included movement and discussion. The work environment was altered with the removal of wall posters and student work during the second session. During the first session, I worked part of the time with the participants in a small group and the remainder of the time I worked one on one with each of the participants. Due to only one of the participants being present for the second session, I worked one on one with that participant for the duration of the work session.

I worked to meet the criteria of credibility in order to ensure validity of qualitative research. The criteria of credibility is "the researcher's ability to take into account the complexities that present themselves in a study and to deal with patterns that are not easily explained" (Mills, 2011, p 105). I used strategies such as prolonged participation at the study site through working with the participants at length during each of the work sessions.

I worked to meet the criteria of transferability in order to ensure validity of qualitative research. The criteria of transferability is "the researcher's belief that everything is context-bound" (Mills, 2011, p 105). I collected detailed descriptive data through detailed note taken through each work session in order to work towards the criteria of transferability.

The criteria of dependability or "the stability of the data" (Mills, 2011, p 105) was also met to ensure the validity of qualitative research. This was accomplished through the strategy of overlapping methods. The participants had several different strategies introduced to them through the acquisition of the vocabulary words being studied. They then had the opportunity to utilize the strategy that they understood the most and felt most comfortable with during the assessment portion of the research.

Finally, to ensure the validity of qualitative research, I met the criteria of confirmability. Confirmability can be defined as "the neutrality or objectivity of the data collected" (Mills, 2011, p 105). This was accomplished through the practices of triangulation or "a variety of data sources and different methods are compared with one another to cross-check data" (Mills, 2011, p 105). I used several different methods to introduce and teach the students the vocabulary words being studied. These methods included simply telling what the definition was, using the vocabulary in a sentence, the students using the vocabulary in a sentence, my direction in the students acting out what the vocabulary word means, and the students acting out the meaning of the vocabulary words on their own.

 Data Collection

I actively observed the participants throughout the work periods that we had together. I introduced several brain based strategies of learning vocabulary and a math process. I also used basic non brain based methods of introducing the vocabulary in order to compare the differences between when brain based methods were and were not used. In addition, I took field notes throughout the sessions to preserve details of the work accomplished with the participants. These notes included what methods were used to introduce vocabulary studied to the

participants, assessment results, and the methods that the students chose to use when being

assessed. I also made note of what a student shared with me on a day following our second work

session.

Findings

Procedure

I worked with Sara and Matt (both pseudonyms) with learning vocabulary. During this

meeting time, the room appeared as a typical classroom with no alterations made to the walls or

fragrances within the classroom.

We worked on learning the vocabulary words associated with a reading program already

used within the classroom. The program uses a scripted lesson of reading the word with the

students repeating the word, the teacher providing the meaning of the word, and then the teacher

also providing a sentence in which the word is used. The students then used the word in a

sentence of their own. During the research learning time, we used several different strategies in

which to associate the meaning of the word with the use of the word.

I began the study of each word by stating the word and having the students repeat back

the word. The words were introduced to the students one at a time, not as a group of words.

Each word was introduced with a different strategy or with a variation in a strategy used more

than once.

In order to see how the students retained the information about each of the words, I gave

the students a break and allowed them to choose a fun activity for approximately 30 minutes.

When each student was individually assessed, he/she had the choice of how to demonstrate the

meaning of the given word. He/she could act it out, state the definition, or use the word in a sentence. I advised the students to define the words using the strategy that they felt most comfortable using.

After all of the assessments were complete with both students we discussed any words that were causing difficulty for either student. Although Matt had the most difficulty with the words that were presented, Sara was included in the discussion in order to meet any needs that she had and to not alienate Matt.

Definition Given

I introduced the word convince. After the students repeated the word, I provided the definition of convince. I simply asked if the students if they had any questions about the word convince and its meaning. The students answered, " No," and we moved on to the next word. This word was presented by simply telling the definition in order to have a base of the most basic form of vocabulary introduction. There was no usage of the word and no discussion of the meaning of the word.

When assessing if the students had success with learning what the word convince meant neither student chose to simply state the definition of the word as it had been presented to them. Both Sara and Matt chose to use the word convince within a sentence when being assessed. Sara was able to use the word convince in a sentence correctly. She stated, "My mom convinced me to take out the trash." Matt had more difficulty, stating the sentence, "I convince doing work." It was obvious that Matt knew that convince was something that someone did but he was not able to understand the meaning of the word enough to use it correctly within a sentence.

Although there didn't seem to be a great deal of difficulty with defining or using the word convince, we reviewed this word as a group along with the rest of the words. I asked each student to try to convince me to do something. Sara answered first stating, "Pretty please, take us outside." Matt then replied, "Can you walk me down the hall, please?" This indicated to me that Matt knew the definition of the word convince but had difficulty forming a sentence when using the word.

Word Usage

I introduced the word expert and then used expert in the following sentence: "I am an expert at driving." I then asked each of the students to tell me what they knew about me if I am an expert at driving. Matt responded, "If you are an expert at driving, you're great at driving." Sara responded, "It means you drive your car really, really good." The definition was never explicitly given; the students simply gave correct explanations of what my sentence meant when using the word expert.

When assessing if the students had success with learning what the word expert meant, again, neither student chose to simply state the definition of the word. This was possibly because the definition of the word was never stated for them. Both Sara and Matt chose to use the word expert within a sentence when being assessed. Sara was able to use the word expert in a sentence correctly. She had stated, "I am an expert of helping my brother and sister with their homework." Again, Matt had more difficulty stating the sentence, "We can make a poster out of experts."   His usage of the word showed that he either thought the word was about something that you could use to build things or that he simply had difficulty forming a sentence stating that you may have a poster in which a picture of an expert would be displayed.

Because it was not clear where Matt's difficulty with using the word expert in a sentence lay, I asked each student to tell me something at which they were an expert during the review of each word as a group. Again, Sara answered first saying, "Playing UNO." Then Matt answered, "Doing math because I'm smart." With Matt's added explanation of "because I'm smart," he was not only successful because he had heard Sara's answer but that he understood that he was an expert at doing math because he was smart and fulfilled the requirements of being an expert.

Discussion

I then introduced the third word, pressure, and provided the definition of the word. I then asked the students to each use pressure in a sentence. Sara responded, "I have a lot of pressure of doing math." Matt then responded, "I am pressure doing work." We discussed how the students have the right idea about what pressure means but after I repeated the sentences back to them, they each decided that their sentences required some clean up. Together we discussed that pressure is something that we feel so we can't become pressure and changed Matt's sentence to "I feel pressure when doing work." I then repeated Sara's sentence again and I asked the students to discuss what they thought was not sounding correct in the sentence when I read it back to them. After several minutes of the students talking, they decided that they did not like the word "of" in Sara's sentence. They could not decide what to change the word of to in order to correct the sentence. I had Matt write his sentence on chart paper and asked the students if there was a word that we used in that sentence that could also be used in Sara's sentence to make it correct. After a few more minutes of discussion between the students, they decided that the word "of" replaced with the word "when" and "feel" replaced with the word "have" would sound better to them.

When assessing if the students had success with learning what the word pressure meant, once again, neither student chose to simply state the definition of the word although the definition had been stated for them during this word's introduction. Again, both Sara and Matt chose to use the word pressure within a sentence when being assessed. Each student had the correct idea of what pressure meant but had difficulty with correct sentence structure when stating their sentences. Sara stated, "I have a lot of pressure doing my homework." Matt stated, "It is so hard to be pressured." Sara showed that she understood that homework was an activity which would cause a feeling of pressure. Matt showed that pressure was something that is not enjoyable. Although neither sentence was perfect, the students showed that they definitely had a basic idea of what pressure is.

I included pressure in the words that we reviewed as a group in the end.   I asked the students, "What makes you feel pressured?" Matt answered first for this word and answered, "My medicine, it makes my head hurt." I asked Matt to further explain what he meant. He explained, "The medicine causes pressure in my head and that makes my head hurt." Sara then answered, "Running in the gym room from it getting hot." I again asked Sara to explain what she meant further. She explained, "This causes pressure because I don't like it." The students were able to show me that they understood what pressure meant with added explanation.

Teacher Guided Movement

When introducing the word unite, I provided the definition and then asked the students to follow my directions to act out the definition of the word.   I asked each student to go to opposite corners of the classroom. I then asked them to walk toward each other and to stop when they reached each other. I then asked the students to discuss what they had just done to act out the

definition and to give me a definition of their own. After just about a minute, the students told

me that unite meant to bring things or people that are separate together.

When assessing if the students had success with learning what the word unite meant,

neither student chose to simply state the definition of the word although the definition had been

stated for them during this word's introduction. Sara chose to use the word unite within a

sentence when being assessed. She seemed to have the correct idea of what unite meant but her

sentence did not assure me of her having definite understanding of the word unite. Sara stated,

"Me and my mom unite together."

Matt decided to act out the word unite. He asked for Sara's assistance and explained to

her what he wanted done. The students then walked to opposite corners of the room and walked

toward each other when Matt gave the cue to do so. He had used the same example as I had

instructed the students to do to learn the meaning of the word. This showed me that he was

possibly remembering the movement involved explanations of the words better, I was not

convinced that he knew what the word unite meant.

During our further discussion of the words I asked the students what was in the room that

we could unite. Matt answered immediately, "a desk." I then asked Matt what unite meant. He

answered bringing things together. We talked about how you needed "things," not one "thing"

like a desk. He then explained to me, "If we have several desks and put them together in a

square, then we have united the desks." I then asked Sara if she could think of anything else in

the room that we could unite. She answered, "I could unite books on a shelf." Their

explanations indicated that the students had an understanding of what unite meant.

Movement & Discussion

The final word to be introduced was struggle. I again provided the definition and then asked the students to act it out. I gave them the choice to work together to act it out or to act it out individually. Matt and Sara chose to work together and demonstrated struggle by picking up a box together pretending to have a lot of difficulty doing so.   I then asked them to tell me what struggle meant in their own words and they decided together that it meant to have trouble doing something.

 When assessing if the students had success with learning what the word struggle meant, once again, neither student chose to simply state the definition of the word although the definition had been stated for them during this word's introduction. Both students chose to use the word struggle in a sentence. Sara stated, "I have a little struggle helping my little brother ride his bike." When Matt was assessed, he stated, "I get mad when my brother struggle me." Both students were seeming to have a great deal of difficulty with using the word struggle even though they were able to act the word out without assistance and provide a definition in their own words through discussion with each other.

Struggle was included in our discussion after assessment and asked the students to tell me something with which they struggle. Sara immediately answered, "Multiplication." Matt did not answer immediately. After giving him some time to think with no answer given, Matt asked if I could give the definition again. After providing the definition, Matt answered, "I struggle when carrying the TV." It seemed to me that Sara had a much better grasp of what struggle meant without added assistance than Matt did even though her first use of the word during assessment did not seem correct.

The students needed to be redirected eleven times during this 2 ½ hours session.

Individual Instruction & Guided Movement

On the second day of research, both students were absent, limiting the amount of time available to working with the students involved. On the third day of research, Matt was again absent, therefore I worked one on one with Sara. Also I adjusted the planned activity to focus on long division, an area that Sara had been experiencing difficulty with for quite some time through the school year.

Because it was close to the end of the school year, most of the walls in the room were blank. No adjustments were made concerning the fragrances within the room.

I completed a long division problem on the board and after each individual step that I completed, we created a hand or body movement to represent what I had done. For instance, when I multiplied the number placed on the line by the divisor we crossed our arms in a multiplication sign and when we needed to bring the next number down from the dividend we held our hands parallel to each other and bent our knees.

We ended up with movements to each of the steps taken to complete a long division problem. We then acted out each of the motions in succession and practiced them while stating what they stood for. After being able to display the steps through our movements fluently, we then completed several long division problems with Sara walking me through the steps and telling me what to do. She then completed several on her own.

Sara came in the next morning and announced to me that she showed her mom all of the motions and explained what each meant. She had then practiced a lot of long division problems at home and had brought them in to show me. Out of the ten that she had completed and brought in, seven were correct. Of the incorrect problems, none were because of completing the steps

incorrectly but rather were wrong because of errors in her dividing and multiplying. All of the steps were completed in the correct order.

Sara needed to be redirected back to the work four times during this 2 hour work session.

Implications

My research shows that learning activities such as movement and discussion had a positive impact on the learning success of special education and assisted in making their learning more concrete and meaningful. These activities assisted one of my students in a greater understanding of what she was learning. Although my other student did not have a similar success record with any of the learning strategies implemented, he did experience growth in learning 3 of the 5 vocabulary words through the learning strategies. The learning activities of discussion and movement assisted in making learning more concrete and meaningful for both students.

I would like to have had more time in order to measure the success of the students in a long term learning environment or allow the participants additional practice. I am left with the following questions: Consider a student who has difficulty taking the meaning of a word known through movement and being able to transfer his new knowledge to a definition. What if he/she also had learned the word through the use of it within a sentence? Would this student now be successful in transferring his/her knowledge to producing a definition? Also, what would have been the impact on his/her understanding if he/she had been exposed to relearning the vocabulary word using a brain based learning strategy on a daily basis for at least a week?

Because I had a student who was very successful in her ability to learn the vocabulary words and steps to complete a math problem through discussion and movement, I would like to

know if this student is still able to successfully reproduce the original findings. In other words, did these learning strategies and practices allow the newly learned words and concepts to enter her long term vocabulary? If not, would they have if additional practice with brain based learning strategies was available?

The learning environment has an impact on the learning that takes place within a classroom for any student. My research indicated that the appearance of a room or the fragrances within a room can affect the students' learning success. I had more success keeping my student focused on the task when the room had an absence of posters and student work. With a drop from 11 redirections in a 2 ½ hour period of time to 4 redirections in a 2 hour period of time, I concluded that blank walls were better for my students in a one to one setting.

While it may be true that overly busy walls may distract a special education student or any student, we cannot say that blank walls are better than filled walls. As there was only one student working with me during the second work session as opposed to two during the first work session, my findings are inconclusive due to the unexpected change in student number from session to session. No clear conclusion can be drawn as to whether the students would be better off with or without student work and posters being on the walls of the learning environment, however there did not seem to be a negative impact on the students' learning.

Additionally, because of absences and time limitations in the last work session, the changing of the fragrance in the room was not able to be completed with either of the students. Therefore, I can draw no conclusions as to whether different fragrances within the room would have a positive or negative effect on the students' learning.

Conclusion

How does brain based learning impact instruction for elementary special education students? Brain based learning had a positive impact on my special education students' ability to learn and therefore should be supported and used in the instruction of all special education students or by any teacher of at-risk students. My research indicated that brain based learning techniques did have a positive impact in the initial learning of vocabulary and vocabulary concepts for the participants in the study. Further research is warranted as to whether these strategies assisted the students in learning vocabulary and concepts for long term use and understanding.

Special education instruction should be guided by strategies that have a positive effect on the learning of their students and should be guided by brain based theories and learning techniques. Based on my findings, I will carefully choose what will be posted on my classroom walls in order to ensure that the environment is not overloaded and distracting. I will also try using movement and discussion within my teaching and students' practice. I will continue using the practices that prove to be beneficial to my students.

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