Exploration of the Effectiveness of Tactile Methods

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Abstract

This paper introduces the tactile method and aims to explore the effectiveness of using tactile methods with students who are blind and visually impaired. Although there was limited research about using this strategy, all of the research agrees that using tactile is one of the best ways for students who are blind and visually impaired to be successful in school. Using tactile methods will help students who are blind and visually impaired to learn about the environment around them. Finally, this paper includes a suggested for teachers who begin using tactile methods with students who are blind and visually impaired to evaluate the effectiveness of this implementation.

Introduction

Currently, the teaching of students with special needs is an important issue in the education field. There are many different types of disabilities that affect students in a variety of ways. Furthermore, teaching students who are blind and visually impaired can be especially difficult, with, many of these learners studying in regular schools. These schools tend to do not adapt their physical environment, compared to private schools for the blind which are designed specifically for blind and visually impaired students. Teaching blind and visually impaired students can be challenging for all teachers; using tactile and kinesthetic learning can be extremely beneficial for students who are blind or visually impaired.

The Individual's with Disability Education Act (IDEA) law defines a visual disability as "impairment in vision that, even with correction, adversely affects a child's educational performance. The term includes both partial sight and blindness" (Turnbull, 2004, p.458). Legal blindness is defined as, "[a] person who is legally blind has a visual acuity of 20/200 or less in the best correction or a visual field that is no greater than 20" (Sacks & Silberman, 1998, p. 23). And partial sight, which is, "[a] person is considered as having partial sight when his or her visual acuity is from 20/200 to 20/70 with best correction" (Sacks & Silberman, 1998, p. 23). Finally, low vision, "[a] person is considered as having low vision when he or she has sever visual impairment after correction but has increased visual function through the use of optical aids, no optical aids, and environ visual functioning and/or techniques." (Sacks & Silberman, 1998, p. 23)

More than 600,000 children in the United States live with some degree of visual impairment. Of these, over 95,000 are unable to read newspaper print, and over 50,000 are

legally blind, meaning that their visual acuity with corrective lenses is less than 20/200 in their better eye or that their visual field spans less than 20 degrees. It is estimated that more than 1.5 million children in the world are legally blind. (Jackson, n. d. p.1)

In schools today, teachers can recognize that their students have different learning styles. For example; auditory, visual, and kinesthetic are the basic types. Some students prefer one type to another and some of them prefer to combine these three types together. "Brown (2000) defines learning styles as the manner in which individuals perceive and process information in learning situations" (Gilakjani, 2012, p. 2). Also, a good way of learning in general is using Gardner's multiple intelligences theory in education. Using multiple intelligence will help students because they will be able use their strengths to learn the material. Multiple intelligences are, "an increasingly popular approach to characterizing the ways in which learners are unique and to developing instruction to respond to this uniqueness" (Gilakjani, 2012, p. 2).

Students usually use their different senses to learn; such as, vision, hearing, touch, and taste. These senses allow students to access the new information in many different ways. They can experience the world around them using one or a combination of these senses. On the other hand, blind and visually impaired students cannot use their traditional vision as a way of learning so they lose this important piece. Thus, students must use another method to replace this.

Students who are blind and visually impaired face numerous challenges in schools today. First, becoming familiar with the environment around them poses a difficult challenge. "At home children learn to find their way around fairly quickly, to locate toys and other objects, especially if living and storage spaces are not changed around too much. Other environments such as school buildings may be much more demanding for a child with a visual impairment" (Webster & Roe, 1998, p.165). When even the slightest change is made in school, which happens frequently, these

students take a longer time to adapt and become used to the change. Since students who are blind and visually impaired do not perceive the world as we do, this poses a problem. Small changes that may seem insignificant or inconsequential to others can be difficult to navigate for these students.

One of the biggest issues these students face is learning because most of the lessons require vision. For example, in science class students need to see a cell to know what it is and how its looks. Trying to describe this would be extremely difficult and confusing. Students who are blind and visually impaired "[t]hey lack the easy access to visual learning that sighted children have. The enormous amount of learning that takes place via vision must now be achieved using other senses and methods" (National Dissention Center for Children with Disabilities, 2012, p.1). Students who are blind and visually impaired have difficulty learning specifically about, theories and concepts related to science and mathematics in particular. "Students with visual impairment have difficulty in constructing abstract concepts because of the lack of visual input" (Sahin & Yorek, 2009, p.23). Since students who are blind or visually impaired struggle with perception and critical thinking skills, learning becomes a longer process. In order to solve this problem many schools today have started to use tactile and kinesthetic methods to teach science to blind and visually impaired students.

Students who are blind and visually impaired have unique educational needs and that services are to be provided best and quick as possible (Guidelines for Working with Students Who Are Blind or Visually Impaired in Virginia Public Schools, 2010). It is very important to teach students who are blind and visually impaired all the helpful and relevant strategies that they need to overcome the challenges that they face every day (Withagen & Vervloed & Janssen & Knoors & Verhoeven, 2010, p.1). With many of the students studying in regular schools, they

face multiple tactile challenges when they try to solve the academic tasks they are given. They cannot solve these tasks by seeing, so they must solve them by touching. Although, listening to the discussion from the teacher and from peers could help students to understand the lesson, in some lessons this is not enough for them. Some lessons and concepts are too complicated and abstract to be described verbally to students. Students who are blind and visually impaired still need a method to solve the task. "Ordinary tasks that are easily performed by using vision may be complex when they are performed by using touch" (Withagen et al., 2010, p.1).

"Students that are Blind or Low Vision vary considerably. For example, some have no vision; others are able to see large forms; and still others can see print if magnified."(Office for Students with Disabilities, 2013, p.4). As a result of that, the teaching method will be different from one student to another. In some privet schools for the blind "[t] hey use a variety of accommodations, equipment, and compensatory strategies based upon their widely varying needs."(Office for Students with Disabilities, 2013, p.4). For example, braille materials, computer screen reading software, and large print books (Office for Students with Disabilities, 2013, p.4).

"The tactual-kinesthetic (touch and movement) senses are often referred to as the skin senses and may be given less significance than they deserve" (Barraga & Erin, 2001 p. 63). Tactile and kinesthetic learners learn through touch, move and by using a hands-on method. "Tactual- kinesthetic development begins with awareness and attention to differences in shapes, hardness, texture, and size, as well as temperatures, vibrating surfaces, and materials of various consistencies" (Barraga & Erin, 2001, p.66). So, when students who are blind and visually impaired hold objects using their hands they are able to recognize that these object are different. Some of them are smooth, some are rough, some are big and some are small. This difference can

be felt by the students. Also, by using tactual-kinesthetic, students who are blind and visually impaired can find the relation of parts to the whole. For example, students can use tactual-kinesthetic method in science class to learn about parts of plant. For example, when students touch the flower they will know that it is a part of a whole. The flower is on the branch and the branch connects to the stalk. They can use their hands to trace the stalk to the dirt and feel the roots. By feeling the different parts, they can gain an understanding of how the stalk looks and how the other parts of plant are connected. Using tactual-kinesthetic method in science and math class with students in middle school and high school is a good method to achieve success.

Although, a student who is blind or visually impaired may need to learn in a different way, they are still able to learn. Using tactile and kinesthetic learning can give blind and visually impaired students so much information about the subject, size and shape. Also, it gives them "the functional aspects of objects, such as the possibility that they can be used as tools. Moreover, in the everyday lives of children who are blind, haptic skills are indispensable for functioning as independently as possible" (Withagen et al., 2010, p.1). This approach is used by many different teachers, but is sometimes too narrow in its approach. If this approach could become more widely used, many other students would be able to benefit from its effects.

Literature Review

Although there was a large amount of literature found on teaching strategies for blind and visually impaired students, there is not a substantial amount of research on tactile teaching specifically. The existing literature on tactile teaching, different methods, and the effective uses of these methods with blind and visually impaired students are reviewed in this paper. This

paper is intended to be a general overview of meeting the needs of students who are blind or visually impaired.

Methods of Using Tactile

Many teachers who teach students who are blind and visually impaired are not familiar with teaching theses students through touch (Downing & Chen, 2003). Some teachers feel uncomfortable teaching students who are blind and visually impaired because they have no experience of using touch while they are teaching. Students who are blind and visually impaired need to use their sense of touch to learn about a subject (Downing & Chen, 2003). This is a method that has been proven to be effective. Tactile communications provides main sensory modalities that are basic for numerous kinds of virtual environment applications .Tactile senses are different than other senses in way of providing information to blind and visually impaired about such "[p]hysical world qualities as temperature, position, perception of texture and motion" (Chouvardas, Miliou, & Hatalis, 2005). These basic skills may lead them to be successful when new information needs to be learned.

Students who are blind and visually impaired may work together with classmates and learn cooperation skills by using tactile learning. For example, when students who are blind and visually impaired study about different animal life in a desert they will use their hands to feel the large desert tortoise. They can use one hand near the tail and the other to feel the shell that is near the tortoise's head (Downing & Chen, 2003). All these are the necessary skills that the students need to be successful in classroom.

Although there are many ways students who are blind and visually impaired can use to learn and be successful, learning by using touch is fundamental for these students. Tactile

strategies support students' learning especially when there are efforts from the education team and time. (Downing & Chen, 2003) indicate that, tactile information gets to an individual by physical contact from the object to the student. Also, it takes more time so students can touch and manipulate it so that they can understand it. This is an important consideration for teachers to take into account.

Teachers should decide which part of the lesson needs to be presented by using tactile learning to help students understand easily and to save time. Not all information during the class time can be presented in a tactile manner. Some information presented in the lesson students who are blind and visually impaired can understand by only hearing it. Also, using tactile learning for every single piece of the lesson is impractical. If the teacher used tactile learning all of the time, class would end before the lesson was over (Downing & Chen, 2003).Therefore, teachers should use a variety of methods while teaching students who are blind and visually impaired.

Some students who are blind and visually impaired have a negative reaction to tactile methods. They feel as if they do not need to use this method since they have other ways of accessing the information. These students only use the method when they feel it necessary. Even though the argument states that using tactile is the best way for these students to receive the information, this is not the case for every child. So, teachers need to be aware of this and should not force students to use tactile or even take students hands and touch something (Downing & Chen, 2003).

Tools

Dunst & Gorman (2011) explain that using tactile books will provide many benefits for students who are blind and visually impaired because these books describe personal experiences so students can read and memorize their content easily. "Tactile books that include a combination of print and Braille where the printed words have been adapted to include Braille labels will likely provide the kinds of experiences that enhance both exploration and the ability to differentiate between surfaces"(Dunst & Gorman, 2011, p.4). This is critical because it will help students who are blind and visually impaired to understand how people interact with the world around them.

Tactile Teaching in Science Class

Using tactile teaching with students who are blind and visually impaired has proven to be an effective method. This allows students to gain a highly developed understanding of the subject and will affect their learning in a positive way. Teachers should encourage students who are blind and visually impaired to use tactile methods in the classroom. Specifically in science class because science class include many complication and abstract concepts, so this method can be extremely helpful. Moreover, not just students who are visually impaired could benefit from the incorporation of tactile learning into the classroom, but also their peers.

"A teacher's instructional style certainly influences what a student learns" (Downing & Chen, 2003, p.56). Although teachers are knowledgeable in many different areas, it is impossible to know about every type of method available for all students. Unfortunately, many teachers lack the knowledge of the methods they can use to teach students who are blind and visually impaired. The result of this is the lack of accommodations for these students (Rule, 2011).

Teachers often have a dearth of knowledge about science content, curriculum and teaching but this does not necessarily prepare them to teach students with disabilities (Gail Jones et al., 2006). Moreover, teachers do not have a vast knowledge of using tactile materials and assistive technologies (Rule, 2011). This lack of information makes many educators avoid using tactile methods in the classroom.

In the study completed by Sahin & Yorek (2009), there was a gap between what the teachers' beliefs and thoughts about student's capabilities and between the instructional resources that will help students with visual impairments to realize their potential. Students with visual impairments frequently do not have the same opportunities to experience science like other students without visual impairments. Consequently, using tactile materials is an effective accommodation for students. Tactile materials will affect students' learning and help students achieve in the classroom (Sahin & Yorek, 2009).

A lack of knowledge comes from the teachers' inexperience of working with students who are blind and visually impaired. Consequently, this causes the teachers to form stereotypes about these students' abilities. Both special education and regular education teachers have this stereotype and it can lead them to believe these students do not have the same cognitive abilities as their peers. (Jones et al, 2006). This belief paired with the lack of resources available for the different content areas only causes the entire problem to get worse. Although Rule (2011) explains, "Presenting lessons through materials accessible by all students' supports the concept of universal design" this does not happen nearly often enough (p. 59).

Effectiveness of using tactile

To evaluate and test the effectiveness of using tactile learning, a study by Sahin & Yorek (2009) investigated how the teachers teach science to students with visual impairment. This study focused on teaching science to students with visual impairments, because teaching science is difficult especially for students with this disability. This difficulty comes from the fact that most science lessons depend on vision. This study also covered the challenges that are faced by students with visual impairments in school. Moreover, it covered character of students with visual impairment and adaptions required for those students. In science class teaching chemical reaction causes a problem for students with visual impairments because it requires vision in most cases. Students with visual impairments need to use touch to feel the reaction in progress (Sahin & Yorek, 2009). Also teachers organized tactile measuring implementations for students with visual impairments by "[p]hotocopying sections of a meter scale onto transparencies and pasted the cut section into a meter long scale and used staples or glue to emboss each centimeter marking" (Sahin & Yorek, 2009, p.21). Students with visual impairments used this tactile scale when they need to practice measuring objects. This study was not meant to improve instruction rather explain both descriptive and exploratory approaches.

Rule (2011) and Gail Jones et al. (2006) showed that using tactile methods with students who are blind and visually impaired is very effective and it is a good way to success in class while learning. Students enjoy science class when they use tactile learning, Gail Jones et al. (2006) reached out to students who are blind and visually impaired in hopes to get them more interested in science class when they use tactile program. Rule (2011) students attitudes related to Space Camp were positive compared to students who attend public school. In the Space Camp when students were asked if there were a lot of hands-on activities in science lessons at school,

many students answered that most science lessons in schools engaged watching films or reading books. A common idea solicited from the students was that in their public school, they did not have a chance to participate in science lessons like the other students. Sahin & Yorek (2009) explained that numerous types of science instruction require vision. Students who have visual impairments have trouble in building abstract concepts because of the dearth of vision input. Students with visual impairments need more tactile and hands-on strategies to learn and understand the lesson. Tactile materials help students who are blind and visually impaired focus their attention and it helps them to become more engaged in their activities. Also, when teachers use an accommodation of tactile materials in science and mathematics, students without disabilities can also benefit from it. Furthermore, the study of (Sahin & Yorek, 2009) was proved the importance of using tactile strategies while teaching students who are blind and visually impaired. In order to have a good understanding of the object students with visual impairments need to feel and touch it. By using these strategies students with visual impairments will need more time compared to their peers. (Sahin & Yorek, 2009)

In a study by Jones et al. (2006), tactile methods were exceptionally successful in working with middle and high school students who are blind and visually impaired. All students who attended this study agreed that they were interested when they used the program. Although some students had some difficulty discerning the morphology of each structure most of the students were highly engaged in exploring the organelles. Before the study, students who are blind and visually impaired could name an average of .91 cell parts. After the study the students who are blind and visually impaired could name average of 1.1 valid parts. In fact, not only could they name more parts, but they also were able to give more information about cells.

Students who are blind and visually impaired made important achievements from pre to post test on the amount of valid cell parts they were able to recall.

Student Achievement in Science Class

Teaching science is difficult especially for students with disabilities. This difficulty comes from the fact that most science lessons depend on vision (Sahin & Yorek, 2009). A tactile strategy is one of the best methods that teachers can use with students who are blind and visually impaired to achieve success in science class.

To discover how tactile strategies can affect students learning and lead them to be successful, Withagen, et al. (2010) and Raj (2012) apply different method with different sample. Withagen et al, (2010) examined three domains of tactile functioning (tactile sensory, tactile motor and tactile perceptual). Withagen et al, (2010) determined that children who are blind and visually impaired and have no extra impairment master roughly 94% of the tactile tasks they meeting in their lives. For children who are blind and visually impaired, tactile skills are necessary for receiving suitable information about the environment around them. Using touch will not just give blind and visually impaired information about subject, but it will give them information about the functional aspect of objects. Additionally, it is critical for children to develop tactile senses in early childhood.

The study by Raj (2012) supported the findings of Winthagen et al, (2010) specifically, on the side of environments. Students who are blind and visually impaired learn better when the environment is created with them in mind. For example, when they read and write by using braille, technology, and tactile skills they are able to gain more information. Students who are blind and visually impaired must be taught how to engage in productive group learning and

informative exploration of tactile materials; but, when this took place they were able to achieve much more. Finally, the researchers noted that these students learn better, not just by receiving information, but when they are engaged in it (Raj, 2012).

Summary

Students who are blind who are blind and visually impaired have the right to be educated the same as other students. While this may look different from the learning that teachers may be used to, it is still necessary. This right includes learning by using an effective method. As the research has shown, a tactile strategy is one of the best strategies teachers can use with students who are blind and visually impaired. Students can use their sense of touch to gain information about the subject and about the environment around them. Students will benefit from using tactile learning in many subjects, especially in science because a lot of science content is dependent on the ability to see graphs, models, experiments, etc. Although this method has proven to be effective, teachers should not rely solely on one method. Students, specifically students with disabilities need a multifaceted approach to learning.

Conclusion

Students who are blind and visually impaired have unique needs and will face a variety of challenges throughout their lives. They need special education services to help them to be successful in school. Teachers need to understand that each of these students are different and are as unique as their disability. Therefore, teachers should use variety of strategies and tools to educate students with disabilities. With that being said, using tactile methods can be extremely beneficial for students who are blind and visually impaired.

As research has shown, (Withagen et al., 2010; Downing & Chen, 2003) tactile strategies are one of the best strategies that help students achieve while they learning. Also, research has shown, there are not many teachers that utilize these strategies in the classroom while they teach students who are blind and visually impaired. To encourage and extend using tactile strategies between teachers in schools, specialist can provide professional development for those teachers. This would be a multi-faceted approach; including, workshops, conferences, and one-on-one time to gain information about tactile strategies. Teachers would be able to learn about the tactile method; what it is, how it can be used, and when it should be used.

Learning about these strategies can be overwhelming at first, and teachers may be hesitant to try them out. Rule (2011) explains in his study "[S]tudents must touch their surrounding or gather information from diagrams or description of others to form mental images to make sense of the world." This can be much different from what teachers are used to. Specialists can encourage teachers to use tactile strategies by showing them a real example of them being used appropriately. Specialist can ask teachers to shadow other teachers who uses tactile while they are teaching. The teacher will experience how using tactile strategies are helpful and beneficial for students who are blind and visually impaired. This will give them a sense of confidence when using these strategies. Thus, they would be more likely to try them out.

Rule (2011) used tactile strategies in his study to teach students about earth and space and the result was positive and enjoyable. "Students reported a statistically significant higher level of enjoyment for their participation in science lessons at Space Camp compared to those in their schools" (Rule, p.207, 2011). Specialist could use the result of this study to create a model lesson plan to give to teachers. For example, to teach students about the earth 3D objects can be

used to make the lesson come alive. Teachers will need to use materials such as a globe, stones, water, sand, and a plant. Teachers will use the globe to explain to students who are blind and visually impaired that the earth is round. Students can touch the globe and feel it to learn what round means. Also, students will use tactile learning again to discover what the earth is made of; teachers explain to the students that the earth contains water, dirt, sand, and many other minerals. Students can touch the stone, water and plant to understand what each word means, the difference between them, and how each one looks. Rule (2011) also showed that "the tactile, concrete nature of materials helped students focus their attention and become more engaged with the activities" (p.21). Tactile learning not only helps students to use their imagination, it helps them to understand and gain knowledge about the world around them.

After the teachers complete this professional development, evaluation will need to take place to see if the solution was effective. One optimal way of evaluation would take place through observation of the teacher's class. A good way to assess teachers is observe teachers teaching in classroom and then have a discussion with teachers about what going on in classroom (Glickman, Gordon & Ross-Gordon, 2007). A specialist could schedule with the teacher a day to observe them in their classroom. The observation will help the specialist to see if the teacher benefited from the professional development about using tactile strategies. If not, further investigation is needed to understand why. Regardless, after the observation specialist should conduct an interview with the teacher to discuss the strategies used in the classroom. The difference in teaching methods used previously compared to the tactile strategies should be discussed in detail. If these strategies are not being implemented, then this should be discussed as well. This discussion allows both teacher and specialist to understand the next steps of the implementation (Glickman et al., 2007).

Although many researchers have proven that using tactile is a beneficial strategy to help students who are blind and visually impaired to be successful in the classroom, we still need more research on this topic. The research found on using tactile methods are limited, so making generalizations about the effectiveness of using tactile is difficult. Educators should encourage more research to be conducted about the effectiveness of using tactile methods with students who are blind and visually impaired. More research is needed about the general use of tactile methods and not only in science class. The effects of using tactile with math, art, reading, writing and in daily life need to be determined. The small amount of research on tactile methods comes from the fact that many teachers do not use this in their classroom. Most teachers are unaware that this method exists, and if they are interested in it, they do not know how to use it effectively. This causes the population for this research to be extremely limited. Furthermore, researchers need to do more research on other effective strategies teachers can use with students, because using tactile could work with some students, but not all of them. All students have individual differences, so it is difficult to state that tactile strategies will work with every student. Even though tactile strategies are effective, teachers need a variety of methods in their

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