

Alternative Seating for Young Children: Effects on Learning

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Abstract

Classroom teachers frequently use movement and sensory integration to assist their students' learning, but little research exists to support its use. Although research is limited, it suggests that the use of alternative seating may provide students with the opportunity to move just enough to assist children in learning more effectively. This study examined the relationship between an alternative seating device and children's scores on the Get it, Got it, Go Assessment (Ohio Department of Education, 2008). It was hypothesized that there would be a significant difference in the intervention groups' Get it, Got it, Go Assessment scores compared to the non-intervention groups scores at the end of six weeks. Participating teachers reported a significant decline in the number of times instruction was interrupted due to off-task behavior. The current research provides insight into the role of sensory integration and how students pay attention while learning. The current research may potentially add to the current literature on sensory integration and learning.

Key Words: Alternative seating, early childhood, self-regulation, attention, literacy, sensory integration

Introduction

Babies are born with reflexes and senses which are vital skills for their survival. It is through these senses that they learn about the world around them. During the first few years of life, a child's brain experiences dramatic changes. Sensory stimulation is crucial for this brain development as well as maturation of the central nervous system, and the ability to attend to a task for an extended period of time. As the brain evolves through sensory stimulation, it impacts all other areas of development. Thus, social, emotional, cognitive, motor, and language development are all expanded upon when children participate in multisensory experiences. This need for sensory stimulation from the environment is not only necessary for infants, but continues to play a role in lifelong learning and is particularly influential for young children. It is imperative that a child's foundation for lifelong learning begin with early experiences that are positive and rich. Such experiences cause changes to the brain that impact later learning (Heim & Engel-Smothers, 2009).

Discoveries made by scientists and researchers about the brain and the senses have the potential to influence the ways children are educated. When senses work collectively in a learning environment, the brain is able to attend better and encode the memory more robustly (Medina, 2008). Sensory integration is the capacity to take in, sort, and make sense of information from one's surroundings. Sensory integration affects every aspect of a child's life.

Sensory integration occurs automatically on an unconscious level during normal development as children interact with the environment through their senses. Sensory systems continue to develop with exposure to sensory experiences. A child's individual need for sensory input may vary; however, if sensory experiences are provided daily, the individual child will seek the amount of input that is needed to feel organized, attend to learning tasks, modulate behavior, and participate more fully in classroom activities (Ayles, 2005). Teachers of young children often look for ways to help their students retain information and develop literacy skills that are necessary for learning. Traditional memory tricks such as mnemonic devices, graphic organizers, and role playing may help some students, but certainly not all. Some research suggests (Birsh, 2005; Lynch & Simpson, 2004) that teachers use multisensory learning techniques to help students interact with material in a more intense way enabling them to retain what they learn for longer periods of time. Birsh (2005) explains:

Multisensory teaching links listening and speaking with reading and writing. The simultaneous and alternative deployment of visual, auditory, kinesthetic, and tactile sensory modalities has traditionally been a staple of remedial and preventive intervention for students with learning disabilities and/or dyslexia.

Multisensory methods support the connection of oral language with visual language symbols and can involve the use of touch and movement to facilitate conceptual learning in all academic areas. (p. 33) Professionals and therapists in the fields of education and occupational therapy have not yet reached agreement on the value of sensory integrative approaches. A possible reason for this lack of consensus may be that the science of occupational therapy is relatively new compared to fields with longer traditions of research such as psychology and medicine (Schaff & Miller, 2005). In the typical classroom, behavior plans are put in place to assist students in increasing attention and appropriate behavior, but these plans often fail to consider the possible sensory needs of the student. A sensory processing approach to behavior provides students with an opportunity to adjust sensory input while maintaining expected behaviors within the class. Sensory based interventions do not have an empirical base of support in classroom use; however they are popular among parents and occupational therapists working in the field (Schilling & Schwartz, 2004).

The use of alternative seating has been an emerging and popular intervention within school-based occupational therapy practice (Honacker, 2008). "Studies on classroom seating suggest that sustained sitting in regular classroom chairs is unhealthy for children's bodies, particularly their backs" (Schilling & Schwartz, 2004, p. 36). Published literature and research suggest an association between attention and physical stimulation (Dunn, Saiter, & Rinner, 2002), sensory stimulation (Baker et al., 2001), exercise (Azrin, Ehle, & Beaumont, 2006), and some general movement (Mulrine, Prater & Jenkins, 2008). Literature indicates positive effects of alternative seating for children with attention-deficit hyperactivity disorder (ADHD) and pervasive developmental disorders (PDD) for attention and classroom behaviors (Schilling & Schwartz, 2004; Schilling, Washington, Billingsley, & Deitz, 2003). Although relationships between each are suggested, there have not been adequate research conducted on each topic and there is little agreement about the most significant research to conduct. Current research is inadequate regarding the possible relationship between alternative seating and young children's attention and emerging literacy skills. "Empirical support for the power of multisensory techniques remains elusive in recent studies" (Birsh, 2005, p. 11). The questions that remain unanswered regarding alternative seating and skill acquisition include whether or not an association exists between alternative seating and learning.

The theory of sensory integration was developed by A. Jean Ayres (Ayres, 1972). An occupational therapist with training in educational psychology and neuroscience, Ayers developed the theory of sensory integration to explicate potential relationships between the neural processes of receiving, modulating, and integrating sensory input and the resulting output which is adaptive behavior (Schaff & Miller, 2005). Since the focus of the theory is on functional skills and adaptive behavior, sensory integration is often employed by occupational therapists. A child's occupation is considered to be play, daily life skills, and school tasks, with the goal being to improve independence in these activities. A large part of children's play is learning and educators and parents place a heavy emphasis on learning to read.

Emergent literacy refers to the developmental precursors to successful reading and writing. Research supports the understanding that a higher level of skill tends to be associated with better reading and spelling outcomes (Cabell, Justice, Zuker, & Kilday, 2009). Literacy skills are vital for children's overall academic success. Children who are successful readers often read more and, therefore, acquire more knowledge in other domains (Masseti, 2009).

Phonological awareness is an umbrella term that includes phonemic awareness, an understanding that spoken language is composed of speech sounds, as well as breaking words into syllables, and producing rhyming words (Honig, Diamond, & Gutlohn 2000). The results of various cross-sectional and longitudinal studies suggest that phoneme awareness and rapid picture naming are related to reading ability. Rapid naming has been consistently found to be related to fluency of reading (Cardoso-Martins & Pennington, 2004).

In recent years, there has been added pressure on teachers to support their students' learning and increase test scores. Coupled with that pressure are recent research findings that suggest if something is not done to help young children who have attention and focus problems, such issues may get significantly worse in time. The greater a child's attention problems in the early grades, the more likely that child will perform poorly on tests of math and reading in the last few years of high school (Breslau et al., 2009). It may be that when students start off behind due to attention issues or other learning problems, they may never get the opportunity to catch up. Teachers of young children may be the first line of defense in assisting students in attaining academic success. Noticing that a student is having difficulties and addressing those difficulties is a very important part of an early childhood educator's job (Morrison, 2006). The pressure for better student performance has motivated teachers to examine ways to reduce distractive behavior that interferes with student learning in the classroom.

Occupational therapy practices, as a whole, have revealed that alternative seating such as the use of a therapy ball can reduce disruptive behavior and increase production in students with attention deficit hyperactivity disorder (Schilling, Washington, Billingsly, & Deitz, 2003). Examining the use of alternative seating in the classroom may help to develop strategies for all students, with and without special needs, to focus better and be more productive in the classroom.

Past research suggests that the attention of children may be improved by physical stimulation within the classroom (Fertal-Daley, Bedell, & Hinojosa, 2001). Although the practice is widespread use among occupational therapists and parents (Watling, Deitz, Kanny, & McLaughlin, 1999), providing movement through the use of sensory-based interventions has limited empirical support with classroom use (Dawson & Watling, 2000). Previous research (Murray, Baker, Murray-Slutsky, & Paris, 2009; Schilling & Schwartz, 2004; Mangeot, Miller, McIntosh & McGrath-Clarke, et.al, 2001) focuses on special needs populations. Such a focus does not adequately permit generalizations to larger, more diverse populations.

Compared to the body of behavioral literature, the literature on experiments involving sensory integration treatments is sparse and the reported results of those experiments are mixed (Cox, Gast, Luscre, & Ayres, 2009). The fields of occupational therapy and education could both benefit from learning more about such a connection. Whether a connection exists between alternative seating and learning is investigated in this research. Also investigated, is how alternative seating could be used in the classroom and whether the seating can benefit the student.

Most caregivers and teachers of young children are familiar with a child's five senses, but they may not be aware that there are two additional senses: the proprioceptive and vestibular senses (Lynch & Simpson, 2004). Proprioceptive sensors are found in joints and tendons and send information to the brain about the positioning of each body part. Vestibular sensors are found in the inner ear and send information to the brain about balance and how the body is positioned in relation to the environment. The body and brain work together using all seven of these senses to take in information and process it.

Sensory integration is an invisible process that takes place behind the scenes, within the peripheral and central nervous system (Lynch & Simpson, 2004). This process encompasses how the brain organizes and responds to sensory input. Sensory modulation is the capacity to regulate and organize the degree, intensity, and nature of responses in a graded and adaptive manner, so that an optimal range of performance can be maintained (Mangeot, Miller, McIntosh, McGrath-Clarke, et.al, 2001). This allows students to attend to the important stimuli and ignore whatever is not relevant. Alternative seating may provide students with an opportunity to move just enough to provide sensory modulation. With the amount of movement provided by alternative seating, students may be able to reach a level of optimal arousal for learning and therefore learn more effectively.

The brain and the body work in conjunction while learning. For students to learn they must be paying attention and have a certain level of arousal. The body experiences less proprioceptive and kinesthetic feedback when it does not move, possibly decreasing attention causing a state of underarousal (Pfeiffer, Henry, Miller, & Witherell, 2008). Sitting for long periods of time may cause students to lose focus.

A common mistake of classroom teachers is to assume that misconduct is a behavioral issue without first considering the possibility that there may be a sensory need of the child that is not being met. Honaker (2008) states that "most behavior can be attributed to communication problems, performance expectations beyond the child's capability, or sensory issues" (p.15). Students' sensory needs must be met before learning can take place.

Lastly, it is important to consider the effect of ergonomics on children's learning. Poor posture can significantly decrease lung capacity and impair circulation to nerves, muscles, and the brain (Milanese & Grimmer, 2004). The use of an alternative form of seating can ensure proper positioning, in turn affecting a student's ability to focus. Students who are able to focus better and for longer periods of time will be able to learn more efficiently in all academic areas, including reading and language arts.

Materials and Methods

The purpose of this study was to determine, within the context of the classroom, whether the use of alternative seating had a positive effect on children's ability to learn and acquire early literacy skills. The study attempted to determine if a relationship exists between the use of alternative seating during reading instruction and preschool pre-reading skills and if a relationship exists between the use of alternative and preschool students on task behavior as reported by the classroom teacher.

The quantitative data collection contained an experimental design with random assignment. Baseline scores on the *Get it, Got it, Go Assessment* (Ohio Department of Education, 2008) were collected followed by six weeks of intervention to the treatment group A. A post-test was given to each group after the completion of the intervention phase. An Off Task Recording Sheet was designed as another data collection instrument used in the study. This sheet was modeled after a standard behavioral observation sheet used in public schools to collect data based on measureable and observable behaviors.

A two group pretest-posttest control-group design (Gall, Gall, & Borg, 2003), with one intervention was used to examine the relationship between the use of an alternative seating and scores on the *Get it, Got it, Go Assessment* (Ohio Department of Education, 2008). The use of a control group and a treatment group and the process of collecting pretest and posttest data during the same period of time for each group helped to assess the effects of any extraneous factors on the students' posttest performance. Although the intervention took place with the treatment group only, the curriculum and instruction remained the same for both groups of students. The posttest served to determine if the two groups had different scores after the intervention had been administered to one group.

Outcomes from this study were measured by comparing the observational data collection sheets from the intervention and nonintervention groups. Observational data was collected for two weeks prior to the intervention phase for both groups and for the last two weeks of the intervention phase for both groups. The purpose was to determine if the teachers needed to stop instruction less to assist with off task behavior. Data collected from pre and post-test using the *Get it, Got it, Go Assessment* (Ohio Department of Education, 2008) was analyzed to determine if the cushion assisted in improving scores. The population sample in this study included preschool students in two classrooms. This program is designed to meet the unique needs of young children between the ages of three and six throughout a large urban/rural public school district

The intervention group included two of the morning preschool classrooms with a total participation of twenty six children. The ethnicities of the participants are Caucasian, Hispanic, or African American. Sixteen students, eight within each morning classroom, have been given educational disability label of either developmental delay, autism, or language delay. The remaining ten students included in the intervention group had been screened as part of the enrollment process, and it has been determined that they are typically developing. The afternoon classes had similar make up with the total participation of children being twenty five students. Fifteen of the participants had been assessed and given either an educational label of a developmental delay, autism, or a language delay. Also included in the non-intervention group were sixteen typically developing children. Both the intervention and non-intervention group were taught the same lessons each day by their same classroom teacher.

Results

Data analysis included examining the *Get it, Got it, Go Assessment* (Ohio Department of Education, 2008) using as a pre and post-test. The *Get it, Got it, Go Assessment* is a formal standardized assessment tool that is used by all state funded preschools throughout the state of Ohio (Ohio Department of Education, 2008). This assessment was administered before the intervention phase and upon completion of the intervention. The *Get it, Got it, Go Assessment* (Ohio Department of Education, 2008) was designed to quickly measure each child's critical early literacy skills giving direction in selecting educational strategies students need at all levels of literacy learning (ODE, 2008). A research team at the University of Minnesota created the assessment after determining that it embodies a set of assessments and an approach that relies on the direct assessment of child performance on a standard task with a measure of growth that can be collected over a period of time. Missall & McConnell (2004) explain, general outcome measures are reliable, valid, and efficient procedures for obtaining child performance data to evaluate intervention programs (p.3).

The assessment includes three subtests used as predictors of reading success. Each subtest examines areas that are expected to be learned during the preschool years. Repeated use of the *Get it, Got it, Go Assessment* (Ohio Department of Education, 2008) is planned and scores in each of the subtests are intended to indicate growth in that area. To determine if a relationship exist between the use of alternative seating during reading instruction and preschool students' picture naming, rhyming, and alliteration skills as measured on the *Get it, Got it, Go Assessment* (Ohio Department of Education, 2008), analysis was completed through the use of Stata®, a software package for general statistical analysis.

Stata® assisted by establishing the homogeneity of the two groups' baseline *GGG Assessment* scores. For this analysis, t-tests were conducted to evaluate the intervention and non-intervention groups. The results of the independent samples t-test were not significant. This demonstrated that there were no pre-existing, significant differences in baseline scores between the intervention and non-intervention groups. These results showed that the groups were equivalent prior to intervention. The mean difference on each of the pre-tests was 2.16 or less for each subtest.

T-test scores for each subtest in the study were each greater than .05 showing there was no significant difference in the pre- and post-test of either group. A paired t- test was used to establish whether the intervention and non-intervention group scores were significantly different after the intervention was used. This test can compare the means of two variables to determine if the average difference is significantly different. This test determined there was not a significant difference between pre- and post-test scores; therefore the groups were equivalent upon completion of the intervention.

Each pre- and post-test score represented the average number of flashcards each group correctly named during the allotted time. For example, the students in the non-intervention group identified an average of 18.08 flashcards in one minute they identified an average of 3.32 pictures started with the same sound, alliteration, in two minutes; and identified an average of 5.56 pictures that rhyme within two minutes during the pre-testing phase of the study. It was expected that each group should increase the number of flashcards from the beginning of the study as represented in the pre-test scores compared to the post-test scores taken six weeks later. This is based on the reasoning that with or without the intervention all of the students should be learning. When comparing scores, it is important to note that the groups' pre-test scores are within one flashcard of each other indicating that the intervention group and non-intervention group are approximately equal.

Each group's mean score increased slightly from pre- to post-test which would be expected for all children after attending school for six weeks, as their early reading skills should increase if they are learning. Upon the start and the completion of the study, both groups' scores were similar with t-test scores that are not significant.

To examine if a relationship exists between the use of alternative seating during reading instruction and preschool students on-task behavior, Table A shows the average times per lesson that teachers reported stopping instruction to assist a student with off-task behavior. Data collection for this research question was only used for the intervention group. The table shows a significant decline in the number of times the teachers had to stop instruction due to off-task behavior. See table 1.

Discussion

The aim of this study was to determine if a relationship exists between the use of alternative seating during reading instruction and preschool students' picture naming, rhyming, and alliteration. The study also attempted to examine use of alternative seating during reading instruction and preschool students' on-task behavior. This study did not clearly determine whether a relationship exists between alternative seating and literacy skills. It is possible that with further research using a larger sample size that teachers and therapist of young children and researchers may establish a connection between providing alternative seating for young children and their ability to learn. However, the study did show a significant drop in the number of times each teacher had to interrupt instruction to address off-task behavior. Further research will need to be conducted before being considered significant to research and the educational community.

It was shown that there were no significant differences in the intervention and non-intervention groups scores on the *Get it, Got it, Go Assessment* (Ohio Department of Education, 2008). No significant differences were found for each group when examined by gender, as well. Therefore findings cannot support or refute that alternative seating can assist students with learning early literacy skills or remaining on-task. The off-task behavior data shows a significant drop in interruptions to teaching. This data was collected as a baseline with the intervention group before the actual intervention took place and again during the last two weeks of intervention for comparison. Teachers did report that they had to stop instruction due to off-task behavior less often with the use of the intervention.

Conclusion

The study and its findings are unable to support the professional literature regarding, attention, movement and practices within the classroom.

Although there is literature to suggest a relationship may exist between alternative seating and classroom performance, there clearly is not enough research to date. Miller (2003) states that knowledge from research in the field of sensory integration is in its infancy. Further, substantial research is needed to provide rigorous empirical data before deciding upon its effectiveness. The findings of this study are not explicit enough to aid in this decision.

Some researchers have reported that the use of an air filled cushion can help some students to focus and learn (Pfeiffer, Henry, Miller & Witherall, (2008). This study attempted to pull the pieces together to determine if the use of a common sensory integration strategy, an air filled cushion, could assist young children in learning more efficiently. Kimball (1999) explains that using an alternative seating device may provide the movement needed within the classroom to improve a child's sensory modulation and attention. Within this study, there is not a significant difference between pre- and post-test scores to either support or refute the suggestions of such a relationship. However, teachers in the current study reported that they had to stop instruction less often to address misbehavior or off-task behavior while using the alternative seating. This supports the idea of using alternative seating to provide students with movement during lessons and potentially improve student performance (Mulrine, Prater & Jenkins, 2008). Most notably, this study creates opportunity for additional research to investigate the relationship between alternative seating and learning within the classroom or other settings. Because findings are inconclusive, it will be necessary for additional research to build upon the ground work that has already been laid.

The implication of the current study in the field of teaching could be significant. It challenges the idea of traditional teaching and classrooms where children are required to sit quietly for long periods of time and adds to the growing body of research related to movement and learning. Marzano (2010) states that there is a growing body evidence that suggests getting students to engage in movement routinely will likely increase their engagement, in turn, support their learning.

Although more meaningful research needs to be completed on the effectiveness of alternative seating devices, the potential practical application of this study is to encourage alternative seating in the classroom to improve the attention of students. If further research determines that alternative seating devices improve attention within the classroom, this could impact student learning as well. Alternative seating may also assist teachers in behavior management and on-task behavior of their students.

Acknowledgements

Margaret Clark, Ph.D provided much needed guidance and encouragement through the entire research project

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Table 1: Off-task Behavior

Before intervention:		After Intervention:	
Day Average		Day Average	
1	9.5		9
2	6.5		4
3	8.5		1
4	3		2.5
5	8		3
6	6.5		4
7	6.5		4
Total Average	48.5		27.5