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School environment impacts on learning : advocating the role of occupational therapists

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Running Head: SCHOOL ENVIRONMENT IMPACT ON LEARNING

School Environment Impacts on Learning: Advocating the Role of Occupational Therapists

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Note: This document describes a Capstone Dissemination project reflecting an individually planned experience conducted under faculty and site mentorship. The goal of the Capstone experience is to provide the occupational therapy doctoral student with a unique experience whereby he/she can demonstrate leadership and autonomous decision-making in preparation for enhanced future practice as an occupational therapist. As such, the Capstone Dissemination is not formal research.

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Introduction

State the Purpose of the Paper

The purpose of this paper is to support the student learner in classroom environments by advocating for the role of occupational therapy as a consultant in classroom and school design. The product of this paper will result in a scholarly written article to be submitted in *American Educational Research Association (AERA): Educational Evaluation and Policy Analysis Journal*. In the formation of this paper, information was gathered in a needs assessment consisting of questionnaires, semi-structured interviews, and observations with key stakeholders and users of the school environment space. The information gained throughout this project revealed the direct impact a school environment can have on students' learning abilities.

Briefly describe the Policy, Issue or Professional Trend to be discussed

Lowering standardized testing scores has produced increased stress in public schools and educational system around the country. As educators feel pressure to provide additional information and more difficult concepts to students on a yearly basis, as well as a recent focus on inclusion in mainstream classroom, discrepancies exist between student expectations and student learning abilities. As reported in *The Digest of Educational Statistics*, 95 percent of 6 to 21 year old students with disabilities were served in regular schools; 3 percent were served in an exclusive school for students with disabilities; 1 percent was placed in a private school by their parents (U.S. Department of Education, 2010, Table 46). This scholarly article will discuss how the school environment has a direct impact on students' learning as well as how occupational therapists are qualified to provide consultation in the school design process.

Identify the Framework that will be Used to Analyze the Issue

The Person, Environment, and Occupation (PEO) Framework by Law et al. (1996), will be utilized in the analysis of this issue. PEO focuses on the interactions between the person, their environment, the

occupation at hand and the interwoven relationship of these three things which produce an occupational performance.

This framework recognizes that problems related to disability may be caused by the relationship between a person with a disability and the environment rather than the disability itself. Environments may often offer poor solutions to the problems of disability (Law et al., 1996). These concepts state the importance of analyzing the environment of an individual and make changes that promote the individual to perform at their greatest ability.

Framework for Policy Analysis

Explain the Framework that will be Used to Analyze the Issue

The American Occupational Therapy Association (2010), identifies occupational therapy focus in the school setting including, “(being) concerned with a person’s ability to participate in desired daily life activities or ‘occupations’... using their unique expertise to help children prepare for and perform important learning and school-related activities and to fulfill their role as students”. School based occupational therapists play a critical role in providing education to parents, students, and educational staff. The American Occupational Therapy Association identifies areas of knowledge and expertise to address, “reducing barriers that limit student participation in the school environment...observe a student engaging in an activity and provide strategies to facilitate the student’s full engagement”, as well as collaboration with, “educators and other school support staff to plan and develop activities and environments that include all students...administrators to provide training for students, staff, parents, as well as recommend equipment for schools and ways to modify existing buildings and curriculum to allow access for all”.

Law et al. (1996) identifies the (P) person being defined as a unique being who assumes a variety of roles simultaneously which are dynamic and can vary across time and context. The (E) environment is a broad definition consisting of cultural, socio-economic, institutional, physical and social considerations

of the environment. Lastly, activity, task and (O) occupation are defined together as functional tasks and activities which a person engages over the lifespan. Rigby, Stark, Letts and Ringaert (2009) write, “in this approach, modifying the environment becomes an important intervention strategy to help maintain... health conditions or improve functioning in daily life, and increase independence”. The PEO fit will occur when a person’s capacities are consistent with the demands of the occupation and environment. When the demands of the environment exceed ones abilities, there is a lack of PEO fit.

The PEO framework describes the immeasurable ways environments can be assessed. Aspects of the environment can range from environmental factors that affect individual’s performance, to a mix of physical/social elements and policies or service elements of the environment. With all of the possible variables affecting performance, occupational therapy assessment must follow a systematic process. Clients’ occupational performance and valued activities are identified, followed by analysis of their occupational performance, and finally assessment of the environment to create an optimal PEO fit.

Discuss how this Framework has been Used in the Past to Analyze Issues

Several literature sources have utilized concepts of the PEO framework; however, direct use of the PEO framework for environmental assessment has not been adequately documented. Eligson, and Traustadottir (2009), cited the PEO framework when studying the participation of Icelandic students with physical disabilities in mainstreamed schools. They stated a lack of empirical data to describe the interaction of person, task, and environment in literature in addition to a limitation in some of the research on participation of students with disabilities. From their research, they concluded an importance for occupational therapists to consider child, environmental, and task factors simultaneously rather than focusing on individual aspects.

Peloquin and Ciro (2013) examined engagement and satisfaction with occupational therapy in self-development groups with women who had substance abuse. They utilize PEO to describe how recovery themes in substance abuse programs align with the constructs of person, environment, and

occupation. Women in the recovery group overwhelmingly found occupational therapy self-development groups with a broad range of recovery themes and structures on a PEO model to be a satisfactory part of their program. Donovan and Corcoran (2010) reference PEO in describing the dynamic relationship among characteristics and occupations of caregivers and care recipient and attributes of the environment. Their study focuses on the person part of PEO when examining care-related thinking and action processes of long-term care-givers who report positive effects from caring for a spouse.

Several other literature sources have cited PEO in regards to the interaction of the three elements; however, it has not been cited as frequently in regards to being used as a tool for assessment with environments. Most of the literature found has also focused on specific groups of individuals with disabilities or similarities in contrast to this advocacy issue to create an environment inclusive of all abilities. The articles provide evidence in support of the role of occupational therapy to address different aspects of individual's occupational performances. The PEO framework is flexible and can be applied to many different populations and environments as seen in the stated articles. Although environmental factors were not exclusively examined, the Person and Occupation were assessed in the literature and are also major factors to be considered for the school environment issue. Because of the lack of information available regarding schools and environmental factors, it further supports why this advocacy issue is so important.

Describe how Occupational Therapy Practitioners can use this Framework

Occupational Therapists can utilize the PEO Framework by Law et al. (1996), to determine the best fit environment for students. Aspects of the student considered in this model consist of; personal characteristics, occupational demands in the classroom, as well as school environment characteristics both physical and social. Occupational Therapists may also utilize additional frames of reference or models of practice when determining the needs of their clients, which is left up to the expertise of the

therapist. For example, the Sensory Integration Model by Jean Ayres (1972) may be referenced for students who have many sensory needs. In regards to assessment of school environment, Rigby et al. (2009) state, "few tools are available to the occupational therapist, who needs to assess the environment for an individual student". The PEO framework can be supplemented with tools such as the School Setting Interview to assess the environment. Letts, Law, Rigby, Cooper, Stewart, & Strong, (1994) provide reference to 41 assessments for a variety of environments, which may be used when utilizing the PEO model.

The Issue

Identify and Discuss the Issue, Describing Historical Background and how the Issue has Evolved Over Time

In the United States there are over 200,000 children who have a specific learning disability that are between the ages of 3-21. These children are served in federally supported programs for the disabled (U.S. Department of Education, 2010, Table 45). In addition, developmental delay makes up for 354,000 students with disabilities, 426,000 students with intellectual disabilities, 336,000 with Autism, and 426,000 with speech or language impairments (U.S. Department of Education, 2010, Table 45). Over 48 percent of students who are diagnosed as having an intellectual disability spend more than 60 percent of their time outside of regular class and receiving special services; however in recent years, a large focus has been placed on inclusion of students into mainstreamed classrooms and the elimination of separate special education classes. With no additional classroom support, teachers are finding it difficult to meet all of their students' needs. In addition; the classroom environment has not been modified to meet the needs of this new population of students.

The U.S. Department of Education asked public school principals to report on the present environmental barriers in their buildings that may have a direct impact on learning (U.S. Department of Education, National Center for Education Statistics, 2007). Principals reported on their school facilities

current status. They were asked to describe the extent to which various environmental factors interfered with classroom instruction. A majority of schools (56%) reported various factors did not interfere with the delivery of instruction while the remainder reported at least some to moderate interference. Over 75% of principals reported having artificial lighting or fluorescent bulbs in the schools but stated they did not believe it interfered with delivering instruction. There was a minor extent of interference with acoustics or noise control reported by 27% of principals. Portable buildings had the most severe interference from physical conditions such as the ceilings, walls, and floors which affected the way instruction was given in the classroom. Configuration of rooms and furniture was reported as moderate to major interference in portable buildings by 16% of schools, and 13% of schools reported major interference of classroom configuration in permanent buildings. These numbers may not sound too bad as many schools are in aged buildings; however, if the same survey were provided to principals educated by occupational therapists on the needs of students who have learning disabilities as well as considerations for how students receive educational instruction, the percentage of schools with barriers would increase.

In recent years, students who have disabilities have been integrated into mainstream classrooms across the United States. Under law, most all schools have changed to embrace students with disabilities by eliminating physical barriers. The Individuals with Disabilities Education Act of 1994 provided each child with a disability the right to have a free public education. Before this the Americans with Disabilities Act of 1990 stated that all public places need to be accessible for anyone who has a disability. Since these have been enacted, changes in our society have been made to support the occupational needs of individuals who have a disability. As budgets are decreasing in schools, students with disabilities receive less time in special services and even more time in mainstreamed classrooms. Environmental factors beyond physical structure have an effect on learning and instruction. When given

a new survey addressing the sensory environment in classrooms, would the same principals report moderate to major interferences that affect instruction?

A change in the way information is presented to students in the classroom has occurred over the years. One way teachers have addressed the learning needs of students is by incorporating principles from Universal Design for Learning. This method of teaching was first introduced by the Center for Applied Special Technology (1998). By encouraging teachers to use various teaching techniques such as hands on learning and instruction alone, students with many different learning abilities can benefit. This strategy introduces three components for overcoming classroom barriers; representation, expression, and engagement. Representation refers to modifying classroom materials to make them more accessible for students with disabilities, expression involves using alternate methods to communicate to students with limited speech, and engagement involves encouraging all students to participate. Educators have done their part in changing the way they teach to meet all of the learning needs of their students, and as declines in student performance still exists, this advocacy issue aims toward adjusting the environment to support students' learning needs.

In the many ways education has evolved over time, trends in architecture are moving toward creating sustainable school designs. These designs incorporate creating green buildings which focus on recycling and waste management. Lieberman and Hoody (1998) compared 40 schools with more than 400 students and found that curricula that incorporated natural environmental components were linked with benefits such as increased engagement, enthusiasm for learning, and higher scores on standardized tests. By presenting information in a more natural context, students were better able to focus on tasks and enjoyed the learning process. The benefits of the natural environment can be seen in various studies and implementing these characteristics to the classroom environment provides opportunities to increase students' occupational performances especially those who already receive related services. By creating green building and energy sources within public schools, benefits include increased students'

knowledge base, better performances on testing, and decreased energy costs which may allow efforts to be focused on other important areas of school education. As changes are being made in the school education system, how can we be sure that the needs of the students are truly being met with considerations of individual differences and learning abilities? Education is not a product that each child receives, but a process which each person goes through differently. Classroom and school environments need to support the unique aspects of each student.

Identify and describe the individuals involved in the issue

In the process of learning about school environmental factors, the design process, and the demands of the educational system today, the following individuals were observed or contacted through questionnaires, personal interaction and semi-structured interviews. They consist of current educators, students, occupational therapists, and architects.

- Karen Walker, AIA, LEED AP, Architect at The Collaborative Inc. 500 Madison Ave Toledo, OH 43604. (Observations and personal communication January 2013-April 2013)
- Paul Hollenbeck, AIA, Architect and Partner at The Collaborative Inc. 500 Madison Ave Toledo, OH 43604. (Interviewed February 16, 2013)
- Dan Tabor, AIA, Architect and Partner at The Collaborative Inc. 500 Madison Ave Toledo, OH 43604. (Interviewed February 16, 2013)
- Joe Adams, Construction Administrator at The Collaborative Inc. 500 Madison Ave Toledo, OH 43604. (Interviewed February 16, 2013)
- Audie Bates, AIA, LEED, Architect at The Collaborative Inc. 500 Madison Ave Toledo, OH 43604. (Interviewed February 21, 2013)
- Sara Buhl, OTR, Occupational Therapist for the Monroe Intermediate School District, 1101 S Raisinville Rd Monroe Charter Township, MI 48161. (Interview, observation and personal communication January 2013-April 2013)

- Kim Keyer, OTR, Occupational Therapist for the Educational Service Center Lake Erie West, 2275 Collingwood Blvd., Toledo, OH, 43620. (Interviewed January 2012)
- Anonymous Occupational Therapists in the Southeast Michigan, Northwest Ohio school systems. (questionnaires January 2013)
- Anonymous student recipients of occupational therapy services for Monroe County, Michigan. (Observations January 2013-April 2013)
- Anonymous students in the public educational system for Monroe County, Michigan. (Observations January 2013-April 2013)
- Mary Carek, Kindergarten Teacher at Dundee Elementary School, 420 Ypsilanti St Dundee, MI 48131. (Interview and personal communication, January 2013-March 2013)
- Emily Ringbloom, Fourth Grade Teacher at Dundee Elementary School, 420 Ypsilanti St Dundee, MI 48131. (Interview and personal communication, January 2013-March 2013)
- Sherry Locke, Kindergarten Teacher at Ida Elementary School, 7900 Ida St Ida, MI 48140. (Interviewed and personal communication January 2013-March 2013)
- Trisha Thorne, Kindergarten Teacher at Ida Elementary School, 7900 Ida St Ida, MI 48140 (Interviewed and personal communication January 2013-March 2013)

Identify and describe the public or private organization/systems that affect the issue

Organizations involved in this issue starts with education systems. Educators and administration provide direct access to the school environment and students who will be using the classroom spaces. Educators provide knowledge as to the current problems being faced in the classroom and what difficulties they experience with current classroom environments. School administration and school boards have control when determining how schools will be built in regards to funding, design, and the committee who is appointed to oversee renovation or new design.

The issue is also affected by current laws and regulations from local, state and federal governments on the design of public schools. Grants and tax rebates from the federal government also affect schools decisions to go with a 'green' sustainable design or renovation. State and local governments have an impact on designing new schools as many require increased taxes to help fund a new building project.

The American Institution of Architects has an effect in the way the issue will be perceived by professionals across the country. The vision of the AIA is, "The American Institute of Architects: Driving positive change through the power of design" (American Institute of Architects, 2009). They support the continued knowledge of professionals to create sustainable designs that take all considerations of the uses for the building into consideration.

The American Occupational Therapy Association (AOTA) has an official statement for providing occupational therapy using sensory integration theory and methods in school based practice (Smith Roley, Bissel, & Frolek Clark, 2009). Occupational therapists measure the child's ability to adapt, organize and integrate sensory information in the environment that affects participation in academic and nonacademic activities at school. Occupational therapists have a role to address the impacts environment has into the design and implementation of occupational therapy intervention, and in understanding the child's experiences and responses in the classroom environment. Some students are more susceptible to being affected by the classroom environments such as those with learning disabilities and attention concerns.

Identify and discuss any groups or organizations that are already involved in the issue

Not many organizations are involved in the issue of school design as it directly relates to students' academic performance. Architectural associations are involved in the issue as it relates to building sustainability and function alone while occupational therapists have historically addressed student performance in academics alone in the school setting. The work done by Diana Henry, OTR, has

focused on changing the environment of schools to make modifications for students with sensory disorders. In their article, Henry, Ecker, Glennon, and Herzberg (2009) give examples of ways educators can make changes to the school environment that benefit students with sensory needs. Diana Henry's organization travels to schools that pay for her services to adjust the classroom environment to incorporate a more sensory inclusive environment.

Schools are also involved in this issue as they are constantly seeking ways to help their students learn and make positive changes in their lives. The documentary 'American Teacher' directed by Roth, (2011), describes how teaching has changed over the years and how stressful the jobs of educating have become in public school systems. Teachers often work over 40 hours a week, spend most weekends grading papers, and give up attending their own child's school functions so they can educate their students. These individuals are dedicated to teaching students, and as student success is the hopeful outcome of this advocacy issue, educators are a primary source for support. Many schools in the United States have incorporated sustainable, green designs for new buildings or had professionals such as Diana Henry make adjustments to their current buildings with the intention of supporting students' learning. By improving environmental conditions, educators hope for students to perform at their very best. As most public school funding is determined by standardized testing scores, administration has a vested interest in successful student performance as noted in Segall's study (2003), which involved teachers' perceptions of the impact state-mandated standardized tests regarding the Michigan educational assessment program (MEAP). The teachers report that as the test was first developed to help guide schools in what to teach students, it became a limiting factor for lessons teachers can provide students such as teaching only U.S. history and not world history as it was not on the MEAP testing. The author states that from teachers' perceptions, it could be said that the MEAP test serves as two functions in educators' lives; it is both an oppressor and validator simultaneously.

Identify the resources that exist related to this issue

The Center for Disease Control and Prevention (2010) analyzed studies on the relationships between physical activity and academic performance. From the nineteen studies examined, over half of the associations between physical activity and academic performance had a positive association. The other studies saw no change in performance. Their recommendations for schools support the fact that by providing breaks for students where they can be physically active and engage in sensory activities leads to increases in students' academic performance. Many educators are aware of this fact and simply do not have the classroom space to allow students to break from the routine of desk work. During semi-structured interviews with educators from a Michigan elementary school, Emily Ringbloom and Mary Carek, they identified that a lack of space in their classrooms prohibited students to be able to spread out and work in small groups or in a quiet sensory break area. Larger classrooms with designated quiet sensory areas allow students to take breaks which their brains need while allowing the teacher to maintain supervision of their students.

Occupational therapists have worked in schools for many years and advocacy for increased involvement in the school system has not been successful. Evidence, which demonstrates the success of student's performance after their sensory needs have been met, is documented in multiple research studies. One case study conducted by Schaff, Hunt and Benevides (2012), discussed the development and use of a protocol for integrating sensory techniques with a child who had autism. The protocol included ensuring safety, presenting sensory opportunities, facilitating self-regulation, promoting praxis and organization of behavior, creating a context for play, and tailoring activities to the just right challenge. Results showed increases in behavior with home, social, and family environments. The parents reported improvements in adaptive behaviors and participation. The case report provides preliminary evidence of the efficacy of occupational therapy using a manualized protocol based on the principals of sensory integration for a child with autism.

Universal design for learning (UDL) which many educators have implemented in the classroom has provided students with support for individualistic learning abilities. Recommendations from UDL include providing time for hands-on activities, physical exertion, and providing a multi-sensory environment for learning. Since the IDEA act of 1994 and No Child Left Behind Act of 2001, not much advocacy has been present in promoting inclusive environments for students learning. Educational requirements and lessons have changed over time, however; the classroom setting has not been analyzed as a contributor to difficulties students face in the classroom. Occupational therapists currently provide services to students on a one-on-one and consultation basis and should advocate extending their services to classroom environments, as they are adequately capable of providing recommendations which support students based on developmental factors, and sensory needs.

Occupational therapy has a large role in providing sensory integration techniques to children in schools. Mary Block and Barbara E. Chandler describe the role of occupational therapists to provide consultation to teachers and individual interventions with students in the school system. They also state the importance of occupational therapists to address the needs of a child with sensory modulation issues. Occupational therapists are able to address impacts the environment has on students' performance into the design of schools. Their knowledge contains an understanding of the child's experiences and responses in the classroom environment. Some students are more susceptible to being affected by the classroom environments such as those with learning disabilities and attention concerns. A cluttered classroom or bright posters can distract students from retaining attention in class. In addition, the American Occupational Therapy Association has an official statement for providing occupational therapy services using sensory integration theory and methods in school based practice (Smith, Roley, Bissel, & Frolek Clark, 2009). Occupational therapists measure the child's ability to adapt, organize and integrate sensory information in the environment that affects participation in academic and nonacademic activities at school.

Some state governments also have an impact in the way public schools are designed. The Ohio School Facilities Commission (OSFC) was developed to guide the ways in which funds could be spent in the construction of schools. Architectural firms have to follow certain 'templates' predetermined by the OSFC for classroom design. While most of the efforts of this commission are to create functional, green sustainable school environments, not much effort has been made in addressing how the environment is impacting student performance. A rural Ohio school may not need extra playground space for students to be active as their town may be provided with parks and adequate green space in comparison to an inner city school where it may be dangerous for young students to play outside. Advocacy efforts should be focused on organizations such as these to be educated in the importance of environment in schools as it will help support learning for all students regardless of abilities.

One resource which pays particular attention to design and how it can support individuals' needs is InformeDesign, provided by the University of Minnesota (2002). This is an evidence-based design tool that transforms research into an easy-to-read, easy-to-use format for architects, graphic designers, housing specialists, interior designers, landscape architects, and the public. One of the articles written by Sachs and Vincenta (2011), provides guidelines for designing an outdoor exploration area that considers the needs of children who have Autism. Some of the guidelines include; providing a soothing area for the user to escape when they feel overwhelmed or need quiet time, provide opportunities to practice using motor skills such as an exercise loop or garden to increase fine motor skills, providing a clear edge along pathways for individuals who are visually-impaired, provide orientation maps that illustrate the layout of the park for users who to know what to expect, and providing clear walkways to transition between play areas as examples. Organizations such as this are opening up the idea that environments can affect performance and can be designed to be inclusive for all individuals.

Analyze the Issue

Analyze the issue using the selected framework

In the Person Environment Occupation (PEO) framework by Law et al. (1996), modifying the environment is an important intervention strategy to improve functioning in occupations and encourage independence. To achieve optimal PEO fit, an individual's abilities must match the demands and opportunities of the environment. By utilizing this framework, occupational therapists can assess the abilities of the student, identify the occupational demands, and assess the environmental factors contributing to the student's education. The authors state that the PEO framework is meant to be paired with necessary models and assessments as determined by the occupational therapist for analysis of the person, environment, and occupation.

To appropriately provide consultation to school administrators or architectural design firms during the design and building of a school, occupational therapists must have adequate knowledge of the population to be using the space. This information is relative to the person (P) aspect of the framework. An occupational profile is a foundation of which therapists begin creating and selecting appropriate interventions for clients to achieve desired outcomes. By understanding the needs, abilities, and limitations student's encounter; as well as the important aspects of the developmental structure of students, therapists compose a holistic picture of the student role.

Attention concerns and differing sensory abilities are a large part of what therapists address and teachers experience with students in the classroom. Factors related to physical activity have been seen to improve these issues. Children with sensory needs or disorders such as attention deficit hyperactivity disorder need external stimulation to better attend in the classroom. One way to accomplish this is to include stability balls in the classroom for seating. Evidence of this success was studied by Fedewa and Erwin (2011).

Stability balls were introduced to students with attention deficits and hyperactivity concerns for in-seat tasks. Students were given the stability balls for a 12 week intervention period. Over this time

observations of time spent at their desk and time of on-task behavior markedly improved. Teachers were also impressed with the stability balls and how much they decreased students' fidgeting. The nature of stability balls requires postural control from the student to prevent falling or tipping. Also by allowing students to gently bounce on the stability balls it is providing physical movement and sensory stimulation back to the student. This is one of the ways students can increase their attention in class. Schilling and Schwartz (2004) also found similar results with therapy balls when working with individuals who had autism. Occupational therapists can consult with teachers on implementing strategies such as these in their classroom, as well as consulting with architects to create class environments which provide enough space for children to move and use different seating elements.

Occupational demands (O) of the framework refer to all of the required tasks for a student to perform in the school setting. One way to appropriately determine occupations of difficulty would be the use of the School Setting Interview by Hemmingsson, Egilson, Hoffman, and Kielhofner (2005). This assessment is used to determine where the occupations and environmental demands do not match, and modifications may need to be incorporated. By gaining an understanding of the academic requirements for students to complete, an occupational therapist will be able to determine any discrepancies between the expectations required as compared to the child's abilities.

Taylor and Kuo (2009) examined the role of environment on attention and on-task behaviors. Their study was a sample of seventeen children with attention deficit hyperactivity disorder ages 7 to 12. During the research, subjects were given a task to complete before or after completing a 20 minute walk. Each child experienced three different environments; a city park, and two other urban settings. Individuals concentrated better after the walk in the park with the more naturalistic environment than urban settings with high stimulation. The authors report their findings as consistent with the Attention Restoration Theory (ART). This theory predicts that children with attention deficits are susceptible to attentional fatigue and by exposing them to natural environments, their attention will be enhanced.

ART supports natural settings which draw on involuntary attention and provides respite from more effortful, deliberately directed modes of attention.

Individuals from this study reported that the park setting was more relaxing and fun than the busy urban settings. Because attention is an important resource for learning, there are several implications for schools. Natural environments during recess or physical activity time can provide an outlet and recharge for students with attention difficulties. However; natural spaces created indoors also may provide restoration from symptoms. This could include decreasing classroom clutter and creating calming atmospheres in the class especially for those students who have attention concerns.

Environment (E) is the focus of this issue as research has shown a direct impact environment has on performance. Principles for guiding changes made to the environment can be found with Universal Design. Created by Connell et al. (1997), basic concepts from Universal Design ensure that all students can benefit from environmental changes regardless of abilities. Some principles include modifications are; useful for all students, easily interpreted by others, require low physical maintenance, and be within the budget and policies of the building. These principles offer occupational therapists useful guidelines to use in developing interventions for clients to improve the receptivity of the environment (Rigby et al., 2009).

The importance of the environment as it relates to education has been examined in research studies. Students with an Autism Spectrum disorder have shown improvements in classroom performance when changes were made to the environment. Kinnealey, Pfeiffer, Miller, Roan, Shoener, and Ellner, (2012) studies the effects of classroom modifications on attention and engagement of students with autism or dyspraxia. This research study was designed to examine the role of occupational therapists in the school system and their ability to modify environments for students with different sensory needs. Students in this study had an Autism Spectrum Disorder which affected their ability to pay attention in the classroom. By singling out acoustics and lighting as factors that negatively

impacted the students' ability to attend in the class, researchers added padding to the walls and replaced the fluorescent lighting with halogen lighting. By using observation techniques and video playback, researchers concluded that the addition of these elements and subtraction of noise and fluorescent lights, 3 out of the 4 students had significantly different attention levels in the 2-week period.

One example of considerations made to the environment to support the occupational needs of individuals exists in skilled nursing home environments. Architects Carr (2011) and Maedo (2011), discuss the use of natural light, natural materials, and use of different textures in nursing homes. They suggest using artwork, color, appropriate residential exterior appearance, non-hospital like appearance, and exterior compatibility with surroundings when designing a nursing home. These changes in environment have been proven to improve orientation, decrease depression, and decrease anxiety in older individuals. These environmental changes help to support the needs of older individuals and the diagnoses they possess. Why should the school environment not be assessed for individuals with different needs and diagnoses in the school setting?

Making changes to the school environment benefits students with learning disabilities in many ways. Sensory modulation disorders have been found as an underlying factor in autism spectrum disorders, attention disorders, and learning disabilities. A growing number of students have learning disabilities as The American Academy of Child and Adolescent Psychiatry reports 1 in 10 children have some type of learning disability (2011). Sensory integration is a foundation for participation and provides an important foundation for learning, (Schaff, Schoen, Smith Roley, Lane, Koomar, and May-Benson, 2010). Some examples of environmental modifications which take sensory disorders into consideration include installing acoustic panels in large rooms such as cafeterias and gymnasiums. These panels decrease sound with large groups of people and allow students with auditory sensory sensitivity to be successful with occupations. Natural light through solar tubes also provides students

with attention deficits a calming effect and increased concentration on school tasks. These changes can benefit all students with increased attention and time spent on task not only those with learning disabilities.

In discussions via semi-structured interview with educators, similarities consisted of an increase in academic expectations of students. Teachers also reported a difficulty in instructing to a variety of student abilities. As inclusion of all students has become a priority, there is a larger range of learning abilities in a classroom than in the past. As these concepts converge, there is an increased need to advocate for considerations to be made to the environment as it plays an equal factor with the student and educational tasks required to achieve student success. With the skills and knowledge required to address this issue, occupational therapists are equipped to assess environmental fit through the use of the PEO framework.

Identify and discuss implications for occupational therapy

The American Occupational Therapy Association (2010) states a Centennial Vision as a roadmap for professionals for the future. They state, "...occupational therapy is a powerful, widely, recognized, science-driven, and evidence-based profession...meeting society's occupational needs". This statement includes meeting all individuals' needs which can be met by addressing the issue discussed throughout this paper. Occupational therapists consulting on a professional level to develop schools that support childhood development and education, based on research evidence, are shining examples of AOTA's Centennial Vision coming into fruition.

The Occupational Therapy Practice Framework (OTPF) (2008) identifies aspects of the occupational therapy domain. Specific areas of the domain important to this program include areas of occupation such as education, performance skills such as sensory perceptual skills and cognitive skills, context and environment such as personal, physical, and social, as well as activity demands such as space demands, social demands, and required actions. When modifying the context for where school

occupations occur, each individual's occupational needs will be addressed by completing an occupational profile. By changing the context for occupations to occur, each person will have the highest potential to achieve their desired occupational performance.

The role for occupational therapists to modify the environment is within the scope of practice. The Occupational Therapy Process, written in *Willard & Spackman's Occupational Therapy* by Rogers and Holm (2009). It is the therapeutic problem-solving method used by practitioners to help clients improve their occupational performance. They write when modifying the environment, two basic strategies can be implemented; first is to modify the present environment with minor modification, or to secondly make a recommendation to a different environment. With inclusion of all students with differing disabilities as a goal of education systems, occupational therapists are qualified to consult with professionals when designing schools that help to improve the occupational performance of students.

By promoting this advocacy issue, it could change the local community, public schools, and future building projects in the area. The way classrooms are set up could change potentially leading to more students being included in 'typical' classrooms. This may eliminate the need for special education rooms in schools. This may create tighter knit communities as children will then be able to interact and understand each other and each person's sensory needs. By changing classrooms, students can perform more successfully on state testing leading to federal funding in schools via the No Child Left Behind Act of 2001.

Harford County Public Schools participated in a sustainability program to incorporate natural lighting, refurbished furniture, recycled material carpeting which created sound buffering and created outdoor natural environment settings for lessons described in a recent webinar session by Moore, Chafin, and Cassily (2013). Cassily, the Resource Conservation Manager, Facilities Management: for Harford County Public Schools reported a 25% increase in student testing scores in the buildings which these environmental changes have been made. From increased testing scores, and sustainable school

designs which eliminate utility costs, excess funds may be available. This funding will create the opportunity for after school activities and provide a safe place for students to socialize. The way schools are built may change if occupational therapists can share their knowledge with architectural firms to consider the needs of individuals with disabilities into account. Just as nursing homes are built and designed for an elderly person to decrease depression and create a calm, home feeling environment, schools can be designed to calm students and help them focus. This advocacy issue can reach far beyond the school system alone.

Advocacy Efforts

Identify Specific Strategies that will be Used to Address this Issue

The result of this advocacy dissemination will be an article to be submitted for publication in the Educational Evaluation and Policy Analysis journal published on behalf of the American Educational Research Association. The article will be written and edited with accordance of the AERA guidelines for written submissions. If the article is not accepted by this journal other means of publications may be explored such as the American Institute of Architects (AIA) Journal or American Journal for Occupational Therapy. For this is advocacy dissemination information may also be presented at an occupational therapy conference or seminar to spread awareness. Additional conferences to attend may include educational seminars at the state organization level and local level; or present information at local chapters of the AIA organization. This is a great way to gain support from other professionals and inform them of the advocacy issue.

Additional strategies include presenting the advocacy issue to other interdisciplinary members involved in the issue such as educators, and architects through professional presentations, newsletters, or informational brochures. Because this advocacy issue reaches beyond local policies it may be opportunistic to present the advocacy issue to state government organizations such as the Ohio School Facilities Commission, or Michigan Educational Association.

On a smaller scale, this advocacy issue can be discussed with co-workers and other professionals in one on one contact and conversations. Advocacy for this issue can also be discussed with parents of students and the students themselves who have direct access to the school environment.

Identify to Whom the Advocacy Efforts would be Directed

Advocacy efforts for this issue are directed at a wide range of individuals. Occupational therapists that do and do not work in the school system will be involved. Other individuals who will be identified include; architects and interior designers who work on schools, educators and administration, and state and local governments which govern the funding for school construction.

Identify Which Level of Government, Business, And Professional Organization etc. You Would Direct Your Efforts Towards

Efforts for this advocacy issue will be initially directed toward occupational therapy organizations, architect associations and educational associations. As the issue gains advocacy support, efforts may be directed toward state government agencies that fund school construction projects.

Describe the Funding that Would be Necessary to Carry Out these Advocacy Efforts and Identify which Sources Would be Available

Advocacy efforts will not need much funding as much of the efforts will be made through professional presentations and in communication with other professionals. For attending seminars and conferences, stipends may be available for those presenting information and can be used for travel expenses and hotel stay.

Conclusion

Education in the United States over the past decade has fallen short of global standards. Standardized testing has become more difficult, at the same time students with different learning abilities have been integrated into the mainstreamed classroom. As these two factors create increased pressure on educators and students to perform, improvements in scoring has not been established.

With students spending on average 1,000 hours a school year in a classroom, by changing the classroom environment through lighting, space, seating, etc., students have increased potential for success.

Shalaway (2013) writes, environmental preferences are described as factors that affect students in different ways and are directly related to individual learning styles. Studies support the fact that when teachers adjust the environment to student preferences, each student performs better behaviorally and academically. By changing the lighting, letting students move around, providing quiet areas, and addressing room temperature, improvements in student performance occur. No two classrooms are the same and each environment should be designed to meet the needs of the students. Occupational therapists have the knowledge of children's' developing sensory systems and developmental needs to design environments which support their occupational performances.

Occupational therapists, who typically are not involved in the school design process, can fill the role of providing consultation for redefining classroom and school design as it fits well within their scope of practice. The American Occupational Therapy Association (2011) states the importance of occupational therapy in the school system articulating the position of the AOTA regarding how, across all areas of practice, occupational therapy practitioners select, create, and use environments and contexts to support clients' health and participation in desired occupations.

By utilizing the Person, Environment, Occupation framework, occupational therapists will be able to analyze school environments and make recommendations based on the needs of the students. Letts, Rigby and Stewart (2003), describe how occupational therapists can use environments to enable occupational performance. Occupational theory can shape the methods to modifying environment in order to achieve successful occupational performance. These considerations made by the occupational therapist can help to create the optimal experience where students can be successful and perform at their best abilities.

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Appendix A: Draft of AERA Advocacy Article

School Designs Impacting Student Performance

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Keywords: classrooms, performance, design, attention, sensory integration

School Environments Impact on Learning: Advocating the Role of Occupational Therapy

Introduction

Lowering standardized testing scores as reported in news stories around the country has increased stress in public schools educational systems. As educators feel pressure to provide additional information and more difficult concepts to students on a yearly basis, as well as a recent focus on inclusion in mainstream classroom, discrepancies exist between student expectations and student learning abilities. As reported in *The Digest of Educational Statistics*, 95 percent of 6 to 21 year old students with disabilities were served in regular schools (U.S. Department of Education, 2011, Table 46). This scholarly article will discuss how the school environment has a direct impact on students' learning as well as how occupational therapists are qualified to provide consultation in the school design process.

Occupational therapy is involved with aspects children's learning. In the school setting, it is often the children with considerable delays in learning who receive services. Each child has sensory needs, and by designing the classroom to meet these needs, each student will benefit. Beyond modifying classrooms, therapists can be consultants with architectural firms, who build schools, and provide education on ways they can create more inclusive structures. Occupational therapists have a wide base of knowledge on sensory disorders, and through research they understand the interventions and implementations that work best. Learning is a major part of individual's lives, and each person has a right to education. The American Occupational Therapy Association (2011) states the importance of occupational therapy in the school system articulating the position of the AOTA regarding how, across all areas of practice, occupational therapy practitioners select, create, and use environments and contexts to support clients' health and participation in desired occupations. The purpose of this paper is to support the student learner in classroom environments by describing ways teachers can modify their classrooms as well as describe the benefits of including a school-based occupational therapy as a consultant in classroom and school design.

Identifying the Need

In the United States there are over 200,000 children who have a specific learning disability that are between the ages of 3-21. These children are served in federally supported programs for the disabled (U.S. Department of Education, 2010, Table 45). In addition, developmental delay makes up for 354,000 students with disabilities, 426,000 students with intellectual disabilities, 336,000 with Autism, and 426,000 with speech or language impairments (U.S. Department of Education, 2010, Table 45). Over 48 percent of students who are diagnosed as having an intellectual disability spend more than 60 percent of their time outside of regular class and receiving special services; however in recent years, a large focus has been placed on inclusion of students into mainstreamed classrooms and the elimination of separate special education classes. With no additional classroom support, teachers are finding it difficult to meet all of their students' needs. In addition; the classroom environment has not been modified to meet the needs of this new population of students.

The U.S. Department of Education asked public school principals to report on the present environmental barriers in their buildings that may have a direct impact on learning (U.S. Department of Education, National Center for Education Statistics, 2007). Principals reported on their school facilities current status. Public school principals were asked to describe the extent to which various environmental factors interfered with classroom instruction. A majority of schools (56%) reported that various factors did not interfere with the delivery of instruction while the remainder reported at least some to moderate interference. Over 75% of principals reported having artificial lighting or fluorescent bulbs in the schools but stated they did not believe it interfered with delivering instruction. There was a minor extent of interference with acoustics or noise control reported by 27% of principals. Portable buildings had the most severe interference from physical conditions such as the ceilings, walls, and floors which affected the way instruction was given in the classroom. Configuration of rooms and furniture was reported as moderate to major interference in portable buildings by 16% of schools, and

13% of schools reported major interference of classroom configuration in permanent buildings. These numbers may not sound too bad as many schools are in aged buildings; however, if the same survey were provided to principals educated by occupational therapists on the needs of students who have learning disabilities as well as considerations for students' development and sensory needs the percentage of schools with barriers would increase.

As time has gone by, most students who have disabilities are now integrated into mainstream classrooms across the United States. Under law, most all schools have changed to embrace students with disabilities by eliminating physical barriers. The Individuals with Disabilities Education Act of 1994 provided each child with a disability the right to have a free public education. This piece of legislation stated that all schools receiving government funding must comply with standardized tests for all students to ensure that the education they received was satisfactory (*Questions and answers*, 2003). This also required that testing was completed in a similar fashion for all students. This act put pressure on schools to meet standards of learning with all students. Some states even link teachers' salaries to the success of their students in testing.

Segall (2003) examined the effects of the Michigan Educational Assessment Program (MEAP). Testing was incorporated into Michigan public schools in 1989 as a way to hold school systems accountable for the education the students received. Test scores are attached to funding and a grading system by the state government. Teachers acknowledged the purpose of the test to hold teachers accountable but stated that the test does not allow them to teach students the skills they need to be successful in life but rather force teachers to educate students how to pass a test or result in a consequence of demerit. It became a limiting factor in the lessons teachers can provide students such as teaching only U.S. history and not world history as it was not on the MEAP testing. The author states that from teachers' perceptions it can be said that the MEAP test serves as two functions in educators lives; it is both an oppressor and validator simultaneously.

Education in the United States over the past decade has fallen short of global standards. Standardized testing has become more difficult, at the same time students with different learning abilities have been integrated into the mainstreamed classroom. As these two factors create increased pressure on educators and students to perform, improvements in scoring has not been established. With students spending on average 1,000 hours a school year in a classroom, by changing the classroom environment through lighting, space, seating, etc., students have increased potential for success.

Does Environment Make a Difference?

The importance of the environment as it relates to education has been examined in several research studies. Lieberman and Hoody (1998) compared 40 schools with more than 400 students and found that curricula that incorporated natural environmental components were linked with benefits such as increased engagement, enthusiasm for learning, and higher scores on standardized tests. By presenting information in a more natural context, students were better able to focus on tasks and enjoyed the learning process. The benefits of the natural environment can be seen in various studies and implementing these characteristics to the classroom environment provides opportunities to increase students' occupational performances especially those who already receive related services.

Making changes to the school environment may benefit students with learning disabilities. Sensory modulation disorders have been found as an underlying factor in autism spectrum disorders, attention disorders, and learning disabilities. A growing number of students have learning disabilities as The American Academy of Child and Adolescent Psychiatry reports 1 in 10 children have some type of learning disability (2011). Sensory integration is a foundation for participation and provides an important foundation for learning, (Schaff, Schoen, Smith Roley, Lane, Koomar, and May-Benson, 2010). Some examples of environmental modifications which take sensory disorders into consideration include installing acoustic panels in large rooms such as cafeterias and gymnasiums. These panels can decrease sound with large groups and allow students with sensory sensitivity to be successful with occupations.

Natural light through solar tubes also provides students with attention deficits a calming effect and increase concentration on school tasks. These changes can benefit all students with increased attention and time spent on task not only those with learning disabilities.

Students with an Autism Spectrum disorder have also shown improvements in classroom performance when changes were made to the environment. Kinnealey, Pfeiffer, Miller, Roan, Shoener, and Ellner, (2012) studies the effects of classroom modifications on attention and engagement of students with autism or dyspraxia. This research study was designed to examine the role of occupational therapists in the school system and their ability to modify environments for students with different sensory needs. Students in this study had an Autism Spectrum Disorder which affected their ability to pay attention in the classroom. By singling out acoustics and lighting as factors that negatively impacted the students' ability to attend in the class, the researcher's added padding to the walls and replaced the fluorescent lighting with halogen lighting. By using observation techniques and video playback, researchers concluded that the addition of these elements and subtraction of noise and fluorescent lights, 3 out of the 4 students had significantly different attention levels in the 2-week period.

As many studies support changes being made to the environment as a way to support student performance, it becomes difficult to determine where to start and what modifications should be made.

How to Determine Which Modifications to Make

A framework or model of practice is a designed guide or protocol to follow for a particular issue. The Person Environment Occupation (PEO) framework by Law et al. (1996), describes how modifying the environment is an important intervention strategy to improve functioning in occupations and encourage independence. PEO focuses on the interactions between the person, their environment, the occupation at hand and the interwoven relationship of these three things which produce an occupational performance. To achieve optimal PEO fit, an individual's abilities must match the demands and

opportunities of the environment. This framework recognizes that problems related to disability may be caused by the relationship between a person with a disability and the environment rather than the disability itself. Environments may often offer poor solutions to the problems of disability. These concepts state the importance of analyzing the environment of an individual and make changes that promote the individual to perform at their greatest ability.

By utilizing this framework, occupational therapists can assess the abilities of the student, identify the occupational demands, and assess the environmental factors contributing to the student's education. The authors state that the PEO framework is meant to be paired with necessary models and assessments as determined by the occupational therapist for analysis of the person, environment, and occupation.

Supporting the Role of Occupational Therapy

The American Occupational Therapy Association (2010), identifies occupational therapy focus in the school setting including, "(being) concerned with a person's ability to participate in desired daily life activities or 'occupations'... using their unique expertise to help children prepare for and perform important learning and school-related activities and to fulfill their role as students". School based occupational therapists play a critical role in providing education to parents, students, and educational staff. The American Occupational Therapy Association identifies areas of knowledge and expertise to address, "reducing barriers that limit student participation in the school environment... observe a student engaging in an activity and provide strategies to facilitate the student's full engagement", as well as collaboration with, "educators and other school support staff to plan and develop activities and environments that include all students...administrators to provide training for students, staff, parents, as well as recommend equipment for schools and ways to modify existing buildings and curriculum to allow access for all".

The Occupational Therapy Practice Framework (OTPF, 2008) identifies aspects of the occupational therapy domain. Specific areas of the domain important to this program include areas of occupation such as education, performance skills such as sensory perceptual skills and cognitive skills, context and environment such as personal, physical, and social, as well as activity demands such as space demands, social demands, and required actions. When modifying the context for where school occupations occur, each individual's occupational needs will be addressed by completing an occupational profile. By changing the context for occupations to occur, each person will have the highest potential to achieve their desired occupational performance.

The role for occupational therapists to modify the environment is within the scope of practice. The Occupational Therapy Process, written in *Willard & Spackman's Occupational Therapy* by Rogers and Holm (2009). It is the therapeutic problem-solving method used by practitioners to help clients improve their occupational performance. They write when modifying the environment, two basic strategies can be implemented; first is to modify the present environment with minor modification, or to secondly make a recommendation to a different environment. With inclusion of all students with differing disabilities as a goal of education systems, occupational therapists are qualified to consult with professionals when designing schools that help to improve the occupational performance of students.

Conclusions

Shalaway (2013) writes, environmental preferences are described as factors that affect students in different ways and are directly related to individual learning styles. Studies support the fact that when teachers adjust the environment to student preferences, each student performs better behaviorally and academically. By changing the lighting, letting students move around, providing quiet areas, and addressing room temperature, improvements in student performance occur. No two classrooms are the same and each environment should be designed to meet the needs of the students.

Occupational therapists have the knowledge of children's' developing sensory systems and developmental needs to design environments which support their occupational performances.

Occupational therapists, who typically are not involved in the school design process, can fill the role of providing consultation for redefining classroom and school design as it fits well within their scope of practice. The American Occupational Therapy Association (2011) states the importance of occupational therapy in the school system articulating the position of the AOTA regarding how, across all areas of practice, occupational therapy practitioners select, create, and use environments and contexts to support clients' health and participation in desired occupations.

By utilizing the Person, Environment, Occupation framework, occupational therapists will be able to analyze school environments and make recommendations based on the needs of the students. Letts, Rigby and Stewart (2003), describe how occupational therapists can use environments to enable occupational performance. Occupational theory can shape the methods to modifying environment in order to achieve successful occupational performance. These considerations made by the occupational therapist can help to create the optimal experience where students can be successful and perform at their best abilities.

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