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Editorial Team

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Introduction

Tiffany Wilson, Editor

This Fall issue provides readers with an array of information that includes challenges of Covid-19 and instructional practices that support diverse student populations. The IJWC continues to be committed to promoting holistic learning and the development of children.

Article #1:

Designing Clothing Patterns to Promote Fine Motor Skills: A Research and Development Project

Usep Kustiawan, Rosyi Damayani T. Maningtyas, Arda Purnama Putra, Ayu Asmah

This article discusses the importance of children in their early childhood to learn and engage in activities that develop their fine motor skills. The specific activity presented in this article is designing clothing patterns. This activity allows students to experience sewing as an effective instructional medium for developing their fine motor skills. Further, this article discusses the importance of product development and methods when designing these types of experiences for young children.

Article #2:

Developing Children's Resilience to Overcome Recent Challenges

Mona Moshen Alzahrani

This article discusses the topic of resilience and the importance of resilience within individuals' lives. Mona Moshen Alzahrani examines the construct of resilience and strategies for building resilience in young children. These strategies include social interactions, problem solving, sharing, positive care/interaction, and spiritual life. Further, the article discusses risk factors and protective factors, research on the topic of resilience, and how to improve children's resilience in and outside of the school setting through activities such as building strong relationships with children, learning from experience, discussing the bright side of experiences, self-enhancement, and labeling emotions and laughter.

Tech Talk Manuscript

eLearning for K-12: Challenges and Solutions

Lori Vinson, Nancy Caukin

In the Tech Talk article, "eLearning for K-12: Challenges and Solutions," Nancy Caukin and Lori Vinson discuss the technology challenges of the Covid-19 pandemic that many teachers and parents experienced when teaching and learning transitioned to remote options due to school closures. The article details the lack of teaching knowledge, inequity of technology and materials, and misbehavior and explores suggested solutions while considering the whole-child approach of integrating social and emotional learning and mindfulness.

Children & Families: Health and Wellness

The Intersection of Trauma, Mental Health, and Academic Performance among School-Aged Youth

Quiteya Walker, Nykeisha Grant, Chantel Johnson, Carolyn Rollins

In the Children & Families: Health and Wellness article, "The Intersection of Trauma, Mental Health, and Academic Performance among School-Aged Youth, Quiteya Walker, Nykeisha Grant, Chantel Johnson, Carolyn Rollins detail the negative impact the Covid-19 pandemic has inflicted upon school-aged youth. This article explores how school-age youth are experiencing mental health issues and increased violence. Moreover, this article further discusses the need for K-12 schools to understand how poor mental health and increased violence is having a negative effect on the academic performance of school-age youth.

Education by the Numbers

Donald Snead

The data provided by Donald Snead in "Education by the Numbers" discusses the importance of teachers and their role in public schools. He further addresses the characteristics of public-school teachers by instructional level and on the basis of sex.

STEAM Manuscript

STEM Content vs. A Sense of Wonder and Joy of Learning: It Shouldn't Have to be a Choice

William Stone

William Stone wrote a reflective article about how STEM programs should include traits such as creativity, wonder, curiosity, and imagination when it comes to scientific processes over the typical rigid structure. He gives examples of scientists and inventors that went above this ridged structure and dared to use their creative curiosity and imagination to explore the world with wonder. Some of these scientists and inventors include Richard Feynman, Leonardo da Vinci, and Lonnie Johnson. Further, Stone discusses the Genius Hour and ideas for encouraging creativity, wonder, and imagination in STEM programs for students.

Page Turners: Books for Children

Katrina Bartow, Carla K. Meyer, Michelle Sobolak, Patricia Crawford, and Maria T. Genest

In this article, different children's books are listed with descriptive summaries on each one. The books include *Bonaparte Plays Ball, Facing Fear, Here We Are: Book of Numbers, If You Come to Earth, Me and My Sister, Moon Camp, No Reading Allowed: The WORST read-aloud book ever, Ship in a Bottle, and Rules of Wolves.*

Emerging Scholar

The Utilization of Instructional Coaches on the Impact of Student Achievement and Teacher Instructional Practices in Reading and Math in Grades Three through Eight

Laurie Offutt and Donald Snead

Laurie Offutt and Donald Snead conduct a study on how instructional coaches and teacher instructional practices can help to increase student achievement in subjects such as reading and math for third through eighth grade students. They define instructional coaching and discuss professional development and student achievement before introducing the study. They detail the proposed research question, theoretical framework, methods, participants, data collection, data analysis, and the summary of findings within their article. The study results revealed that the utilization of instructional coaches increased scores in all sub-groups one year after the implementation, however, they found that the increase was not maintained in all subgroups such as English Language Learners and students with disabilities. Lastly, they discuss future implications and limitations of utilizing instructional coaches.

"Productive Struggle" as an Effective Strategy in Elementary Math Classrooms
Sara R. Daily

Sara R. Daily's article discusses an instructional strategy called Productive Struggle. This strategy helps students to gain a deeper understanding of mathematics through their own thinking and reasoning. One of the purposes of this strategy is to help students who find math difficult to work towards developing a deeper understanding to where they become more confident in their abilities to think deeply, gain understanding, and be independent problem solvers. Further, she includes a discussion of different theories such as Lev Vygotsky's theory of zone of proximal development and Brousseau's theory of didactical situations that are found within the productive struggle research. She closes out her article with information on the benefits, ways to teach it, what it looks like in the classroom, and the potential challenges this strategy faces.

Multiple Intelligence in a Center Based Environment
Kaitlyn M. Arns

Kaitlyn M. Arns's article goes in depth about Howard Gardner's Theory of Multiple Intelligences and describes the nine main multiple intelligences that exist in humans. Further, Arns describes how to use the Theory of Multiple Intelligences in the Classroom, Self-Determination Theory, and the importance of play and inquiry to activate multiple intelligences. To close out the article Arns presents how to incorporate Multiple Intelligence Theory into Classroom Practice through the creation of student-centered environments and using centers in the classroom. She also provides effective methods of assessment teachers can use in incorporating this theory into their teaching practices.

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Designing Clothing Patterns to Promote Fine Motor Skills: A Research and Development Project

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Abstract

Early childhood provides an opportunity for teachers to stimulate, guide, nurture, and plan learning experiences that are helpful in supporting children's abilities and skills. Presently, there is a need for more and varied experiences that are attractive and engaging for children. In this project, teachers provide learning experiences to nurture children's emerging abilities in fine motor skills. The purpose of this exploratory research and development project is to effectively design clothing patterns in order for children to engage in simple sewing experiences as an effective instructional medium for developing children's fine motor skills. In addition, it is important to consider the *product development* as well as the *method* when designing experiences for young children.

Keywords: Clothing Patterns, Simple Sewing, Early Childhood Fine Motor Skills

Introduction

Early childhood educators plan strategies to stimulate, guide, nurture, and provide young children with learning experiences to promote their developing abilities and skills. The age of birth-through-eight years is referred to as the golden age where all areas of development lead to children's maturity, one of which is the area of physical motor development (Barnett et. al., 2016; Febrianta, 2016).

The early childhood years provide important opportunities for children to grow in all areas of child development (Kustiawan, 2017). Children's developmental areas include religious and moral values, socio-emotional dimensions, cognitive abilities, physical-motor skills (gross and fine motor, physical health capacities), and language and artistic aspects. The many aspects of child development, however, cannot be separated out as independent because these areas influence one another.

For example, the development of children's body muscles appears when they perform various activities that hone their motor skills. In the early years, children evidence improved skills such as bouncing a ball, jumping on one and two legs, and going up and down stairs (Febrianta, 2016). Yet, the combination of children's physical activity as well as a physical skill set contributes to children's intellectual abilities such as creativity and imagination (Sujiono et.al., 2014).

Thus, children remain complex individuals. Every aspect of a child's development is interconnected. Motor skills become a component of the developmental aspect. Every aspect of development affects other aspects to form an individual entity, so that developments that occur in the motor aspect automatically affect other areas of development, including creativity which is part of mental development. The existing literature indicates a positive and significant correlation between perceptual motor development and individual creativity; motor activity can be a means to stimulate creativity (Shahbazia & Tahmasebi, 2011).

In addition to fostering intellectual capacity, linearly, the increase in physical abilities in kindergarten children can increase physical motor activity. For example, when a child develops the skill to jump, he or she proceeds to jump more often. The consequences of learning to jump increases a child's jumping activity. In addition, jumping more frequently optimizes the child to become a better and more skilled jumper. Children's physical motor development cannot be understated or ignored as it affects children's later lives as adults.

Physical motor development is also closely related to motor intelligence in children. Early childhood physical motor development is defined as the development of elements of maturity and control of body movements in children (Larson et al., 2014). Physical motor development affects children's lives directly and indirectly. Fitriani (2007) describes physical development as growth and changes occurring in the human body. Human physical development occurs following the cephalocaudal principle, namely that the head and upper part of the body develop first so that the upper part appears larger than the lower part (Merriam-Webster, 2021). According to Aghnaita (2014), physical development is the growth and changes that occur in a person's body across time. It is the foundation for progress to the next developmental level. When the physical body is developing well, it allows children to further develop their physical

skills and enables children to explore the environment without adult help. Physical development also determines a child's skills in movement.

Physical motor development is divided into gross and fine motor skills. Yamin and Sanan (2010) believe children's gross motor skills develop according to the child's age. This means adults cannot compel children's motor growth. For example, children, age six months, cannot sit alone and, therefore, the child is not obliged to sit independently in a chair. Some activities clearly support children's gross motor skills development including walking up and down stairs as well as playing in tunnels.

Meanwhile, fine motor skills represent the ability to develop the motion of the fingers, especially the index and thumb (holding, grasping, tearing, and cutting). Additionally, fine motor skills include the use of tools for work and the incorporation of small objects or control of results (such as typing and sewing) (Surianti, 2012). Thus, children's physical development including gross and fine motor skills evidence different characteristics.

The use of appropriate learning methods in kindergarten can support children's progressive motor development. However, the opposite can occur. If children find the methods and materials provided by the teacher less attractive, they may quickly become bored and lose interest in the learning experience. The appearance of symptoms of children's boredom can be caused by different factors. In order to invite and engage children's interest, it is critical teachers vary methods/materials and create attractive instructional theory/models. Additionally, if a teacher's implementation is passive, not allowing for active involvement, children become less likely to participate.

Alternatively, learning methods/materials that engage children's interest and involve playfulness develop children's imagination and thinking; children experience the freedom to think and explore. It is important for teachers to showcase creative and innovative learning methods. Teachers often choose enjoyable instructional methods around a specific learning theme (Purnamasari et al., 2014). Kustiawan (2013) argues in learning activities, children enjoy repetition, so teachers often intentionally plan learning that uses materials that involve repetitive movement. Learning materials that are theme related, such as sewing clothing, support and stimulate children's sustained interest and engaged attention. Thus, students, motivated by their thoughts and feelings in the process, become better able to achieve learning goals (Kustiawan, 2017).

The choice of particular learning methods and materials become integral in children expressing and creating unique ideas as well as using their imaginations in works that are meaningful and personally relevant (Rismayanti, 2013). Therefore, it becomes critical for early childhood practitioners to intentionally plan motivating and engaging instruction as well as support children's use of learning methods and materials that promote their physical development, including fine motor skills.

The Research and Development Project

In order to investigate the viability of the method and materials for sewing clothing as an interest engagement for children, thus impacting their fine motor development, authors initiated this current Research and Development (R&D) project. The authors developed a clothing pattern design to be used by children in three kindergartens in the Bandulan village, Sukun district, Malang city, Indonesia during the Covid-19 pandemic. The purpose of the project was to create a workable and interesting clothing design that was easy to use and would support children's emerging fine motor skillset.

This research and development project resulted in the product "Learning Methods Design for Clothing Patterns" to be used in simple sewing experiences that can develop fine motor skills for young children. Clothing pattern design learning methods is the development of clothing patterns which are usually made of thick yellow cartons (deluang) and typically the size of human clothing.

For this project, the design was modified and reduced in size. Mini dress patterns were made from duplex paper, decorated using wrapping paper and sewn together using ribbon as thread. The result of this activity is the formation of mini-sized 2-dimensional clothes made of paper.

This action research demonstrates the process of developing clothing patterns and the methods adapted to create usable tools to meet children's individual needs. The products developed include clothing patterns in the form of shirt and trouser as well as hat, bag, and shoe patterns made of thick duplex paper covered with wrapping paper. The decorative motifs are adjusted to the shape of the clothing pattern. The tools for sewing are cloth ribbons of various colors and threading ribbon adjusted for differently sized patterns. This clothing pattern is two-dimensional in shape which is used as a medium for learning how to sew simple clothes according to the learning themes in kindergarten institutions. This is in line with the opinion of Sudjana and Rivai (2010) who suggest learning methods are not an additional function, but a tool to create effective learning.

Thus, instructional methods are an integral part of the overall learning context. This means, it is important for teachers to consider learning methods/materials as a critical element in effective instruction. Learning methods/materials are designed and made to be used as an attractive and interactive early childhood tool.

Simple sewing methods/materials support the development of children's fine motor skills. This is in accordance with Hasanah (2019) who believes educational experience is a form of a learning activity as carried out using particular methods or tools. Children's educational experiences become strategically designed for the purpose of improving a developmental aspect. Sukmaningrum (2015) describes how the increase in fine motor skills of children improve when sewing activities are implemented. Schools and teachers can provide a crucial role in promoting children's physical development (Sukmawati, 2018).

The authors field tested the clothing product with young children, and made changes as needed. The Research and Development (R&D) protocols (Borg & Gall, 1983; Rahimah &

Izzaty, 2018) were used to measure the product effectiveness. The authors identified the steps that were most appropriate for the Covid-19 pandemic parameters. The steps included: 1) reviewing literature and classroom observations; 2) planning, which included defining skills, goals, and determining teaching sequences; 3) developing forms for the initial dress pattern product which would be evaluated by experts; 4) conducting a small group trial with a class of four to six children due to the pandemic; 5) Revising the initial sewing product according to experts' suggestions during the first trial group; 6) implementing a larger group trial with six to ten children; 7) making product revisions based on suggestions from the second field test.

Results

The clothing pattern product developed in this research and development (R&D) project was designed to support fine motor skills in young children by using the method and materials of children engaged in simple sewing skills. The following summarizes the findings and indicates the experts' evaluation, results of small group trials, and findings of field trials (large groups).

First, reviews from the experts were used as the basis for making an initial revision to the pattern design of the clothing product. The review was conducted by three experts, namely one early childhood learning expert, one early childhood learning media expert, and one early childhood physical-motoric expert. The purpose of the expert reviews determined the suitability of the product being developed with existing needs in the field.

Experts' Evaluation. From the overall response from the experts' evaluation of the eligibility criteria, 86.80% concluded that the simple sewing pattern was determined to be "very" valid or suitable for use.

Small Group Trial. The results of the small group trials on the initial product clothing patterns for learning simple sewing were obtained from observations regarding aspects of convenience, attractiveness, and child safety. Classroom teachers implemented the trial using a clothing pattern for simple sewing learning. The participants consisted of four to six children.

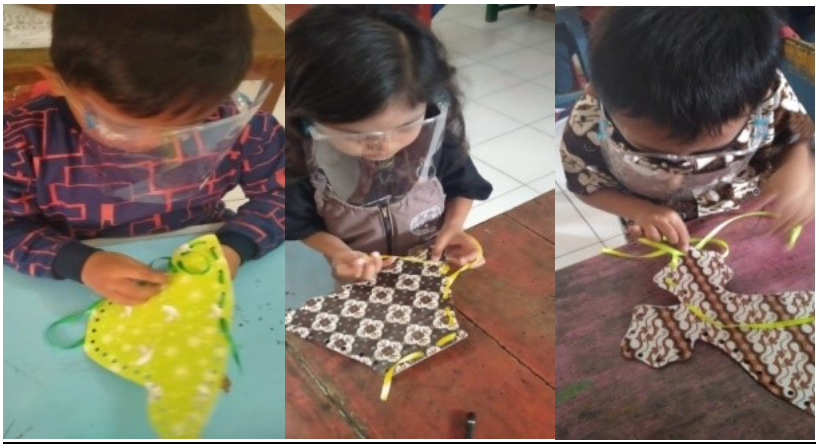

Figure 1 Small Group Trial Activities in Kindergarten Class B, Bandulan Village, Sukun District, Malang City

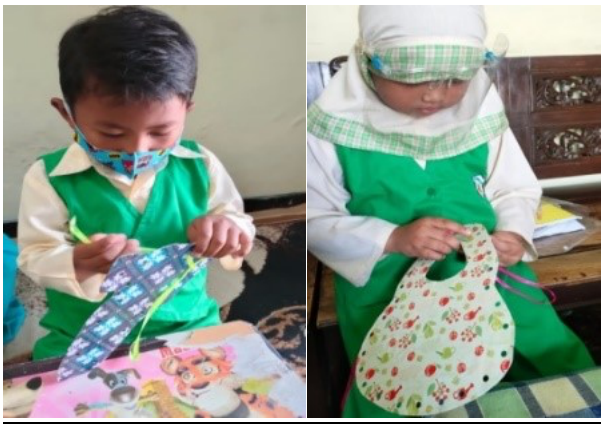

Figure 2 Small Group Trial Activities in Kindergarten Class B, Bandulan Village, Sukun District, Malang City

Based on observational data, 77.33% of the children using the clothing pattern design appeared to be able to easily use the pattern; it was convenient for the children to use. For the attractiveness aspect, 80% of children indicated interest in using the clothing pattern design. For the safety aspect, 100% of children were able to safely use the clothing pattern design. Based on the overall data from the small group trial results, 84.44% of the children appeared to find the clothing pattern design suitable for use by young children. Thus, it can be said that the clothing pattern in learning simple sewing is suitable for developing the fine motor skills of young children, and researchers can proceed to the field trial stage (large group).

Field Trials. The results of field trials (large groups) on the initial product of clothing patterns for learning simple sewing were obtained from observations about aspects of convenience, attractiveness, and child safety by the class teacher in three groups of children which consisted of six to ten children in each group of young children in the Bandulan sub-district, Sukun sub-district, Malang City.

In the attractiveness aspect, 93.33% of children were interested in using the clothing pattern design. In the safety aspect, 100% of children were found to safely use the clothing design when sewing. Based on the overall data from the results of field trials (large groups) 91.10% of the children sewing with the clothing pattern met the criteria to indicate that the clothing pattern design was “very” valid or “very” suitable for use in developing fine motor skills in early childhood.

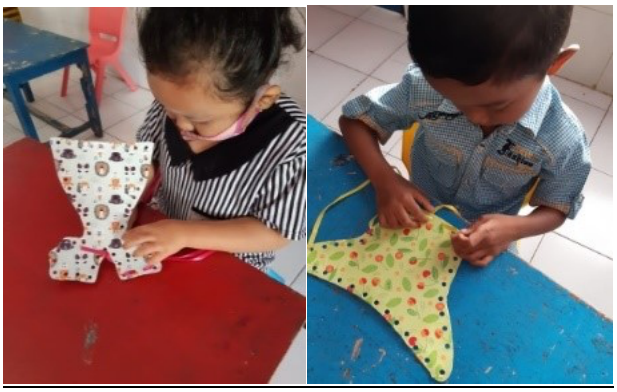

Figure 3 Field Trial Activities in Kindergarten Class B, Bandulan Village, Sukun District, Malang City

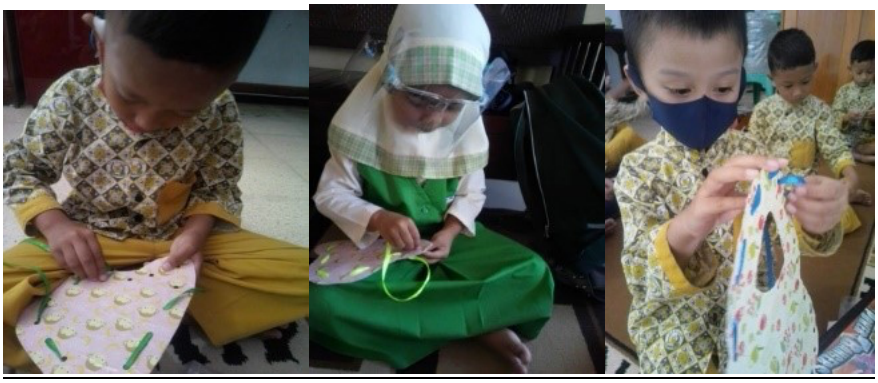

Figure 4 Field Trial Activities in Kindergarten Class B, Bandulan Village, Sukun District, Malang City

Discussion

For the purposes of this Research and Development (R&D) project, the product in the form of clothing pattern design learning methods demonstrates a fairly long process. The process begins from initial research, making product designs until the final product is completed which requires several revisions from early childhood experts and then followed through by both small and large group field trials.

This process is critically important because each step will determine the validity of the research findings in the planning process and provide direction and guidance in the product development process. Accuracy in product design is a determinant of effectiveness in developing fine motor skills in early childhood. Every revision given by the experts is the basis for the high quality of the product being developed. Each of these research processes is important to be thoroughly followed in order to ensure the quality of the final product. Based on the results of preliminary research, a product design for the development of children's fine motor skills in learning simple sewing was compiled in the form of a learning method for clothing pattern design.

Early childhood expert data provided the following suggestions including: minimize the size of the clothing pattern design in order to lessen completion time; check the distance between holes

in clothing pattern (allow for the ease with which the child can insert the cloth ribbon into the hole in the edge of the clothing pattern); modify ribbon as a substitute for needle/thread; adjust the types of decorative paper motifs that cover the clothing pattern (the paper decorative motifs to coat the dress patterns become distinguished from the paper motifs for coating pants, bag, hat, or shoe patterns), and facilitate the child's movement by inserting the cloth ribbon into the hole so that the end of the cloth tape is wrapped (Fabric ribbon is loose and easy to fold).

The sewing process, which is achieved by inserting a ribbon into the holes on each edge of the pattern, is a form of eye-hand coordination exercise for children. Eye-hand coordination exercise is one form of stimulation of fine motor development. The child needs to coordinate the movement of the eyeball to look right at the hole and the movement of his or her fingers to be precise in inserting the ribbon string into the hole in the paper pattern. The repetition of this movement until all the pattern holes are sewn by the ribbon is most effective in training the eye-hand coordination ability, an aspect of fine motor development.

Not only in the sewing process, the process of making patterns is also important to note. The experience of making a personal pattern design provides children with a sense of self-confidence, which positively frames aspects of social and emotional development. The experience of making one's own clothing pattern design can also support children's personal creativity. This is because in the process of making patterns, children develop their own ideas about what clothing patterns to make, how to decorate them to make them look beautiful, then eventually create their ideas in the form of pattern design drawings to become pattern images that are ready to be sewn. All these processes become important toward stimulating creativity.

Future Research and Development

Generating from the results of the current small group trials, several revisions for future R&D projects include modifying the expected pattern so it is not too large and difficult, checking the number and spacing of holes, adjusting the position of the cloth ribbon, and finally, tidying the edges of the pattern. For the sewing pattern of the garment, tie the ribbon at the end of the stitch because it may still require teacher guidance.

This clothing sewing project is safe, enjoyable, and developmentally appropriate, and is offered as a choice activity for children's engagement with fine motor skills to support their continued physical development. Furthermore, authors provide this sewing experience as an example of the processes they followed as a Research and Development project in order to ensure a quality product in both the material and the process. When teachers choose various materials and particular instruction, it is important children's learning outcomes are of primary regard. In addition, it is important to consider the *product development* as well as the *method* when designing experiences for young children. This R&D project becomes a tool to create effective learning for young children with the instructional method becoming an integral part of the overall learning context, interconnecting with a child's varied aspects of development including small motor development and creativity.

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Developing Children's Resilience and Overcome Recent Challenges

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Abstract

This conceptual paper begins by clarifying what resilience is, and the importance of resilience for young children. Next, the resilience concept is explored from different views of scholars in the current literature along with ways to use intervention strategies, how to construct resilience in children's lives, defined both of risk factors and protective factors, and a definition of resilience research is discussed. Lastly, implications for practitioners and future challenges in the area of resilience are explored.

Keywords: Resilience, Child Development, Early Childhood, Resilience Research

Introduction

The world is changing rapidly. People face many difficulties such as natural disasters, varied epidemics, and issues related to poverty; children continue to be the most often affected. For example, due to the challenges of the COVID-19 pandemic, children were the most impacted, where the schools closed, and children studied at home, leading to the loss of socialization and learning from others beyond their homes (Yoshikawa et al.,2020). Furthermore, the playtime became less than before, where families are reducing the interactions with friends and others to avoid the prevalence COVID-19; all these things influence children's resilience and their behavior (Yoshikawa et al., 2020).

Research on children's resilience has increased during the last two decades. In the past, resilience research has focused on stresses, psychology, and mental health (Southwick et al., 2014). Childhood is the most important time stage in life. Also, it is a memorable period in a person's

life, impacting the future. For instance, there are over one billion children that are affected by wars, and the older children may show more impact, because they are more aware about the negative impact of war in the short or long term (Werner, 2012; Yoshikawa et al., 2020). Werner (2012) stated children who experience war commonly remember traumatic events as images, are less focused, experience insomnia, and increased nightmares. Additionally, early childhood policy makers and practitioners indicate an increased interest regarding resilience as an important area of research for the benefit of children. Early childhood professionals believe early intervention to help children develop resilience is a significant investment toward children's lives as they prepare for adult life. That is, an effort to identify and intervene risks in early childhood will limit the possibility to negatively undermine both a youth's future health and resilience. Hence, children's lives are very important in many countries around the world because they relate to the economic and social well-being of families (Caspi et al., 2016). In addition, the policy makers and practitioners also have an interest in child resilience to aid children to development in full and appropriate ways (Caspi et al., 2016). That led resilience researchers to focus on protective factors to understand it and find treatments to disease prevention (Kalisch et al., 2017). Additionally, resilience research focuses on how children maintain their health in early years until they become healthy adults.

Resilience is very important for children's wellness, and mental health. Resilience is instinctive reaction to stress that can be found during one's existence. As it affects teenagers, youth, seniors, and the elderly on an individual basis, it is now better understood than ever before. Human resilience, as we now know, is entrenched in functioning and healthy connections, it does not occur in a vacuum. Human resilience takes on multidimensional aspects and interpretations as ecological processes and other systems pose fear to human. Resilience promotes and improves children's wellness in the future, where they are able to manage stress, face difficult problems, anxiety, and depression in their life (Bonanno, 2004). Resilience reflects the ability of the child to maintain a continuous balance (Bonanno, 2004). Resilience helps children to reduce the negative impact of the traumatic events on the physical, emotional, and behavioral health that could be develop and appear in adulthood.

The purpose of this paper is to give teachers and practitioners an overview about the concept of resilience, and describe interventions strategies, how to construct children's resilience, strategies to build young children's resilience, risk factors and protective factors, and describe how teachers and practitioners in early childhood could support children to improve their resilience.

Defining Resilience

Resilience is a complex concept and evolves with time. Resilience is when the child is capable to deal with challenges and stresses. Resilience is the ability to overcome traumas by being able to balance between the negative emotion of the traumas and calm down. Resilience is a skill that children develop during the process of growth. The child can be flexible and bounce back from traumas when they develop this skill. The child has strength to withstand the traumas because children are curious, brave, and they follow their instincts. However, resilience is a relative and varied concept because it is defined differently based on differences among people. Resilience is a combination of both risk factors and protective factors that influence individual people's lives,

resilience influences people differently. Therefore, different definitions of resilience exist. Each definition focuses on an important element in the resilience construct.

Southwick et al. (2014) stated resilience may indicate many different meanings that depend on various perspectives, peoples, cultures, and societies. Most definitions agree on several facets, such as health, adaptation, or positive attitude across a difficult time (Southwick et al., 2014). Research defines resilience as a stable line of health behaviour after some difficult events occur; resilient people demonstrate the ability to learn from past negative experiences, indicate a flexible capacity to adopt successful strategies, and show innovation to use varied resources to balance their life and well-being (Southwick et al., 2014).

Leipold and Greve (2009) revealed that resilience means overcoming of the challenges if that does not happen it would not be considered resilience. However, these definitions lead to the idea that resilience is not characterized by the lack of sickness or psychopathology issues, but it relates to how the person overcome the traumas (Southwick et al., 2014). Southwick et al. (2014) believe developing resilience requires a variety of resources in order to enhance the capacity within each person for resilience. Such potential resources may include families, schools, cultures, and communities. Therefore, resilience might be enhanced in several stages such as individual, family, community, and culture (Southwick et al., 2014)

Luthar et al. (2000) define resilience as a dynamic system of adaptation to meet difficulties in context. Luthar et al. (2000) indicate resilience research is vital because it provides understanding toward developing intervention strategies that lead to enhance resilience. Luther et al. (2000) discuss important factors in describing a child's evolving capacity for resilience. Critically, a child uses experience to adapt and enhance new events in life. For example, children can learn multiple skills that help them to adapt with the hardship and challenges around them (Yoshikawa et al., 2020). There are many intervention strategies for young children. Early childhood practitioners could build a program that includes many elements of intervention strategies, such as free play, relaxing, learning new skills, spending more time with their parents, teaching children multiple social skills, including negotiation and interaction skills while they play, self-control, problem-solving, and emotional awareness (Alvord & Grados, 2005; Smokowski, 1998).

Resilience Construct

Southwick et al. (2014) describe how many aspects including mental aptitude, cultural background, genetic coding, demographic factors, and social influence determine resilience. These determinants aid researchers in their further understanding of the resilience construct but remain as a small part of the resilience research (Southwick et al., 2014). Moreover, determinants of resilience can be different based on the challenges and the environments confronted by each person (Southwick et al., 2014). For example, consider the determinants differently influencing a child’s capacity for resilience as contrasted between a child who is homeless with a child who had a positive environment and lost their parents. The capacity of a homeless child is less than a child who had lived in a positive environment. The homeless child is missing safety, self-reinforcement, relationship with adult, and less adaption, while the other child has a higher

capacity for resilience because they developed many social skills by interactions with other adults, their parents, siblings, and peers (Cutuli & Herbers, 2014). Additionally, the evidence associated by resilience shows that using varied abilities and incorporating different strategies to mediate challenges indicate developing resilience (Southwick et al., 2014). For example, when the person is able to be flexible and uses problem solving strategies to face challenges incorporates two abilities to face challenges and overcome it.

Studies state the capacity for resilience is filtered through different factors; an emerging capacity to evidence resilient behaviour builds across time through experiencing life events and interacting with family and diverse others. Ungar et al. (2013) describe how Bronfenbrenner's biosocial ecological systems of human development may aid researchers to understand the development of resilience. Bronfenbrenner's biosocial ecological system is a set of complex interactions that occur between the individual, the environment, and a particular society (Ungar et al., 2013).

Bronfenbrenner's ecological model helps researchers to predict children's social and physical ecologies and understand their unique challenges (Ungar et al., 2013). Practitioners and teachers realize how this system can help to construct the children's capacity for resilience, especially the individual resilience. The intricate multipart biosocial ecological systems support the development of resilience. Bronfenbrenner's ecological model includes many systems. For instance, microsystems represent relations and roles and meso-systems include interactions, such as families, schools, and religious communities. Exo-systems include social interactions that influence child development indirectly such as through the environment (the place of parents' job). Macro-system includes social and cultural values and Chrono-system cover the change over time (Ungar et al., 2013). Bronfenbrenner's ecological theory is helping us to understand the processes that contribute to build children's resilience (Ungar et al., 2013).

Strategies for Building Resilience in Young Children

Social Interaction. Werner (1995) describes how resilience can be built through children's interaction with their teachers and friends. Teachers play an important role in supporting children to develop resilience. For example, teachers can be great models for children, where they teach children to control their emotions, discuss ways to manage their emotions, give children opportunity to choose, share and discuss their good and bad experiences with peers, express their feelings, and opinions (Nolan et al., 2014).

Problem Solving. Werner (1995) highlights how the ability to be resilient can be fostered through problem-solving as having children interpret and apply their past experiences and talents. For example, in 1966, there were six boys who went on a fishing trip, then suddenly met a huge storm which shipwrecked their ship and pulled them to a deserted island located in the Pacific Ocean (Bregman, 2020). These six boys were using their past experiences to survive. They worked in two groups, and they drew up a list for garden, kitchen, and guard duty (Bregman, 2020). They also started their day with prayer, singing, and one of these boys called "Kolo" created a guitar, and he played it to help his friends raise their spirits (Bregman, 2020, p. 5). They were eating fish, coconuts, and some birds in the beginning, then they were drinking the

blood and eating the meat, all these skills where learned it from their old experiences had helped them to survive (Bregman, 2020).

Sharing. Werner (1995) declares that using individual talents and sharing with friends their interests and hobbies lead children to raise their capacity for resilience. For instance, the example of the lost children on the deserted island highlights sharing talents and interests, such as singing and praying together. Both are simple interactions; however, the children felt more connected with one another and consequently, raised their well-being (Bregman, 2020).

Positive Care/Interaction. Additionally, Werner (1995) believes positive care and the proactive interaction between children and adults evidence a significant aspect to assist children toward building resilience. Therefore, children who live in positive environments with supportive and caring interactions build capacities for resilience as contrasted with children who confront challenges without support, resulting in a diminished ability to demonstrate resilience.

Spiritual Life. Supporting the spiritual aspect of life is important for children and adults. Bregman (2020) describes children spending time singing and praying. Werner (1995) believes that in addition to children interacting with people, spirituality/religion enrich their balance between hope and reality.

It is crucial for children to face varied challenges; this requires suitable and adequate coping reactions (Leipold & Greve, 2009). Leipold and Greve (2009) discuss how the development of resilience varies and depends on how children manage stress and overcome challenges. The successful mediation of difficulties and the management of stress depend on a child's abilities to adapt and successfully navigate new problems in life.

Risk Factors and Protective Factors

Southwick et al. (2014) describe children possessing different abilities and protective factors at each developmental level. Southwick et al. (2014) indicate children start their first interaction with family, school, friends, or other people, generating from these complexities relationships with others in the whole ecological system. That means we could not study resilience of an individual, without the study of the family, community, and culture which belong to it. Therefore, Southwick et al. (2014) confirm the resilience must be studied through the collaborative efforts of many experts who study resilience from different domains such as, "engineering, ecological, biological, individual, family, organizational and cultural resilience" (Southwick et al., 2014, p. 11).

Southwick et al. (2014) believe children recognize problems and difficulties. As they grow older, children become more aware and understanding of different events (Southwick et al., 2014). In a diminished social environment, Werner (1993) cautions *risk factors* arise. Werner (1993) identifies one or more risk factors including stress, parental alcoholism, poverty, chronic disagreement, parents with mental health issues, and mental illness. Therefore, these children experiencing a range of risk factors remain more likely to face problems in their life especially if they grow up in negative environments. In contrast, the *protective factors* include positive relationships with parents or caregivers, positive interactions with other people, positive self-

control behaviours, ability to assume responsibility, resourcefulness to solve-problems, capacity to share interests with friends or family members, willingness to participate in activities with friends, and ability to adopt healthy habits (Werner, 1993). These protective factors assist children to develop their resilience, and they become supplementary to support children's ability to overcome future challenges. This means, children are more apt to recover after experiencing hardships (Werner, 1993).

Resilience Research

In the recent years, the resilience inquiry was focused on three important aspects: what are resilience qualities, how does resilience process, and when does innate resilience appear (Richardson, 2002). Resilience research went through several stages (Fleming & Ledogar, 2008). The first focus of resilience research was on the individual. After that, the psychologists recognized that there are many outside factors that might affect a child's resilience (Fleming & Ledogar, 2008). Next, the psychologists were starting to study whole communities, such as family, culture, and social economy (Fleming & Ledogar, 2008). The psychologists and researchers were paying attention to understand how risk factors and protective factors interact together to support relative resilience in children (Fleming & Ledogar, 2008). Researchers realize that resilience is considered as different because each case has an especial setting, age, and domain (Fleming & Ledogar, 2008). The work on determinates of resilience in empirical studies enriched children's resilience; also, it supported children to enhance their resilience in many aspects (Southwick et al., 2014).

Improve Children's Resilience Inside and Outside the School

Teachers and early childhood practitioners can support children's capacity toward resilience during learning whether inside or outside the school. However, parents play an important role in supporting children's capacity of resilience.

Build a Strong Relationship with Children. Children need to be interactive with others. Teachers must spend enough time with each child. Also, they must show care about children by supporting them while they pass through difficult times and ask them if they need help. Children need to feel they are surrounded by a strong connection from the adult. Positive relationships with adults helps children to learn and develop their resilience skills (Ungar et al., 2013). Southwick et al. (2014) mentioned parents have an important role to foster children's resilience in the early years.

Learn From Experience. Teachers can encourage children to think about their negative and positive experiences as important moments that teach them, even if those experiences happened inside or outside the classroom (Bonanno, 2004).

Discuss the Bright Side in Each Experience. Teachers can discuss what is the positive side in each experience, whether it negative or positive (Bonanno, 2004).

Self-enhancement. Teachers can support children to improve their resilience by self-enhancement by giving them an opportunity to express their feelings, reduce negative emotions, and calm down in stressful moments by mindfulness practice (Bonanno, 2004).

Label Emotions, and Laughter: Teacher and parents can tell the child that people can pass through different experiences and feel different emotions, such as sadness, anxiety, stress, jealousy, and frustration. Teachers and parents can also tell the child that it is normal to feel one of them as reactions to the events, but you have to learn how to calm down and control it (Bonanno, 2004). Bonanno (2004) mentioned that a person who laughs and smiles while they are talking, show more resilience toward traumas in the next few years after a tragedy.

Conclusion

In sum**,** resilience is a relative concept. This means, the capacity for developing resilience varies among children. Influenced by culture, economy level, and community, it is important for both researchers and practitioners to consider the child in a holistic perspective. Resilience research shows various views (Luthar et al., 2000). The resilience research presents a different interpretation based on the different perspectives. There is no global validity to follow through in interpreting the resilience research (Luthar et al., 2000) However, what is known is that in order to develop a capacity for resilience, it is critical that adults provide children with trusting and caring interactions and help those children have numerous risk-free opportunities to rehearse adaptations, use different resources, and practice problem-solving (Southwick et al., 2014).

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Tech Talk
eLearning for K-12: Challenges and Solutions

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Abstract

Lack of teaching knowledge, inequity of technology and materials, and misbehavior during eLearning are three challenges that are faced during remote online learning. These three challenges and suggested solutions are explored, as well as how to take a whole-child approach integrating social and emotional learning and mindfulness.

Due to the coronavirus pandemic, the 2020-2021 school year experienced hardships like none other. In a matter of days, school administrators were faced with making some of the most challenging decisions ever regarding closing schools and pivoting to teaching and learning remotely. Distance learning became the norm and eLearning quickly became the most efficient way to deliver content with a myriad of edtech options and the challenges that followed (Boyland, 2020; Richards, 2020; Sean, 2020). The rapid transition from face-to-face instruction to remote online learning left teachers and parents alike scrambling. While teachers were charged with the task of teaching online, parents were challenged with the task of helping to educate their children at home. Many parents adapted to these changes and new expectations with trepidation. Three challenges of eLearning became immediately obvious. Among the challenges that affected eLearning were lack of teaching knowledge, equity of technology and materials, and student misbehavior during remote learning sessions.

Challenge: Lack of Teaching Knowledge

The shift to teaching remotely has been challenging to teachers and parents. Successful teaching and learning in a face-to-face setting do not always equate to success in online or remote teaching and learning. Most teachers have not had the training with equipment, software platforms, or pedagogies associated with effective online teaching and learning (English, 2020; Farmer & West, 2019). This problem is compounded with the lack of knowledge and experience that parents/guardians have with technologies and pedagogies to support the learning of their children. Many parents feel ill-equipped to teach from home, especially when they are trying to work from home themselves (English, 2020). And while parents may do well in parenting, many lack teaching skills needed to help make online learning a success for their children, and many feel overwhelmed by the prospect.

Solutions: Lack of Teaching Knowledge

It is important that teachers and parents collaborate to provide the best possible experience for the learner. Communication is a good first step. By assessing the parents' needs through conversation, teachers can advise parents on how to help their child navigate eLearning (Johnson, 2020). Technologies allow for various types of communication such as emails, texts, virtual meetings, and even Remind.com, which allows for two-way text communication without knowledge of personal cell phone numbers. Communication allows parents and teachers to help one another by guiding and providing feedback about the students' eLearning experiences.

A positive online learning environment is essential for success. Co-creating this space allows for input from the teacher, parent, and student. Finding a location where distractions are minimal is essential as is providing a structure and routine to the learning time, whether learning is synchronous or asynchronous. Also, making sure that students know how to navigate the internet safely and know how to use the learning management system the school is using will ensure a smoother and more successful experience.

A few things to keep in mind when helping students with eLearning are to build in brain breaks for students and encourage physical activity to boost cognition. Be aware of high levels of stress and be ready to help students when they need it. Stay connected with the teachers as they are the best resource (ASC International School, 2020; Elgersma, 2020; Zalets & Loehrke, 2020).

Techniques to motivate children to do their assignments and to learn the content often require special skills. Teachers can help parents by breaking down the progression of learning into manageable tasks and provide them with resources to better understand the concepts (Johnson, 2020), for example, the use of videos that teach content, like Khan Academy.
Parents need to see the big picture for learning goals, a framework to help them know the direction their children will need to take and what to aim for. Sharing "I can" statements with parents and students will help them understand the learning targets (Johnson, 2020).

There are resources available to parents to assist with eLearning. The teacher is the best source for the knowledge and skills students are expected to master and potentially for effective methodologies. Other sources for parental help are: *Distance Learning Resource Center*

(Education Reimagined), *Virtual and Hybrid Learning Resources* (K-12 Blueprint), *Parent Support for Online Learning* (Facebook groups), remote learning tips for parents (YouTube), resources for content (Khan Academy), and blogs like *Working Parent's Guide to Online Learning During the Pandemic* (Kids Academy), *5 Things Parents Can Do to Support Students Learning Online* (Edmentum), *Virtual Learning Tips for Parents* (iD Tech), *Remote Learning Resources* (Trying Together), and *Keeping Kids Motivated for Online Learning* (Common Sense Media).

Challenge: Equity of Technology and Materials

eLearning platforms offer a variety of features, some rather complex. Teachers can provide instruction in real time (synchronous) via live stream or group meetings using various software programs, or they can use recorded (asynchronous) lessons and strategies. In addition to online learning platforms, learning management systems (LMS) provide a repository for student work and can assist teachers in keeping track of learning outcomes. While eLearning platforms and learning management systems can be great resources for eLearning, difficulties arise when there is a lack of needed technology and training to make these platforms viable. For example, some families lack access to a computer and to broadband and even some teachers lack the needed technology in their home to present instructional content. Not having the proper equipment and wifi access needed makes online teaching and eLearning impossible (English, 2020; Vander Ark, 2021).

In addition to a lack of accessible technologies, challenges arise when content is presented in new ways which can limit or prohibit student accessibility. For example, lessons presented in a video platform may cause students with hearing challenges to struggle with processing auditory information; students who need visual support may struggle with text-heavy documents; and English language learners may struggle without the support they are accustomed to in traditional education (Morin, nd).

Solutions: Equity of Technology and Materials

Solving the issue of lack of technology and materials is not easy to overcome. Pre-pandemic, some districts went one-to-one and provided a Chromebook to each student. During the pandemic, schools began to scramble to provide the needed technology and materials to students so they could learn remotely online. Even devices relegated to charging carts for classroom use were deployed to teachers and families. A suburban school district in New Jersey partnered with an internet company to offer low-cost internet access to families. A rural Alabama school district provided students internet access by installing a town wireless network in 2011, using a federal E-rate grant and has since provided MiFi devices to insure uninterrupted internet service. A district in rural Virginia deployed wireless mobile units (WOW - Wireless On Wheels) around the county that are solar powered, have a radius of about 150 feet and cost about $3,000 each. They are placed in church parking lots, fire departments, and even at a Dairy Queen all for download and upload of assignments; it is not, however, useful for videoconferencing or telecasting (Anderson, 2019; English, 2020; Samuels, 2020; Vander Ark, 2021). A solution, according to Justin Reicher (2021) in his article *Schooling in the Fifth Season*, is for the federal

government to provide access to broadband nationwide, just as electricity was in the early part of the twentieth century.

Challenge: Misbehavior During eLearning

While managing behavior in a traditional classroom is challenging, imagine managing behavior of students through a computer screen. Misbehaviors can be many but tend towards cheating, aggressiveness, and cyberbullying, going AWOL, and slacking/multitasking (Heim & Strauss, 2020; Jones, 2020; Mooiman, 2020). Most of the literature on cheating points to the occurrences happening during online courses in higher education with some literature reporting on K-12 schools (Dey, 2021; Jones, 2020; Mooiman, 2020). Cheating/academic misconduct includes texting answers, plagiarism, and turning in work not completed by the student.

eLearning has increased online aggressive behaviors and the accessibility of cyberbullies to victimize. Hate speech is up 70% and online toxicity is up 40% between students on online platforms. 37% of students ages 12-17 report having experienced cyberbullying and 30% say it has happened more than once. 60% say they have witnessed cyberbullying (Boyland, 2020). When students do not physically have a teacher present, they tend to think that what they are doing or not doing cannot be seen. The feeling of being anonymous behind a computer screen, hidden from sight, presents an opportunity to make poor choices. Students say it is hard to stay focused when the camera is not on. As a result of perceived anonymity during online learning, students are more likely to abandon accountability that typically aids in keeping their behavior in check (Moore, 2020; Richards, 2020). According to Josh Loso, an intermediate school principal and online K-12 administrator in Spartanburg, South Carolina, one major obstacle that both teachers and students faced in the 2020-2021 school year was the absence of a physical presence of the teacher. Students participating in online learning often felt as though teachers could not, or did not, monitor their progress. Similarly, barriers to immediate feedback and communication made it hard for instant notification to students and parents of the lack of student participation. According to Dr. Lori Vinson, former Technology Integration Specialist and online K-12 administrator and current teacher educator, students not only felt like teachers could not or did not monitor their progress, but students also felt they could hide behind their computer screens and pretend they were completing their assignments when in reality they were spending time doing other things unrelated to their schoolwork. This feeling of anonymity led to students thinking they were hiding what they were doing or not doing from their teachers and parents.

Other issues that occur during remote learning include students recording themselves then using the video for their synchronous online classes and Zoombombing or zoom raiding. These unwanted interruptions from internet intruders have become problematic (Craig, 2020). Even dress code violations are an issue as some students wear their pajamas during synchronous online learning (Jones, 2020).

Solutions: Misbehavior During eLearning

Cheating can be minimized by designing assessments that require students to produce responses and presentations that utilize inquiry and critical thinking; creating a culture that discourages cheating; having students engage in peer feedback; and having students turn on their cameras during quizzes and tests as well as turning off the chat feature (Klein, 2020). Some ways to

prevent cyberbullying include establishing a positive learning environment, developing strong stakeholder relationships (parents and community), promoting classroom awareness of cyberbullying, establishing an anonymous reporting of cyberbullying, and instilling hope (Hindaju & Patchin, 2020). Online safety and digital citizenship can be promoted by learning what tools are built into the platforms that are being used, for example, filters and tools that allow teacher approval before posting. Google provides a digital safety tool called Be Internet Awesome that is an interactive learning game that aligns with the International Society for Technology in Education (ISTE) standards (Boyland, 2020). Parents and teachers can help students stay on task during remote learning by sharing the editable digital learning pledge in English and Spanish (Common Sense Education, n.d.). Zoombombing can be prevented by following the steps in the link (Craig, 2020).

More Ways to Overcome eLearning Difficulties

There are other ways to help students overcome eLearning difficulties that can also prove helpful in the regular classroom. Some examples include encouraging students to become self-regulated, independent learners, teaching the whole child by incorporating social and emotional learning (SEL) into the curriculum, and facilitating mindfulness.

Encouraging students to be independent learners, not only has tremendous benefits for the student, but it is also a proven high impact, low-cost way to improve student progress (Mullings, 2019). According to Zimmerman (1990), self-regulated learners set goals, tackle problems, monitor their progress, persist during learning, and are intrinsically motivated. To truly be successful in eLearning, self-regulation is essential. Parents and teachers can help students develop into self-regulated, independent learners by facilitating goal setting and by teaching them how to track their progress and reflect on their learning (Larkins, 2021). It is also important to teach students how to manage time, effort, and emotions (The Learning Accelerator, n.d.).

Many students are experiencing uncertainty and change in their lives that are creating hardships in their school life and home life during this pandemic. They need strategies to deal with stress, anxiety, fear, anger, and loneliness. Incorporating social and emotional learning (SEL) into the curriculum can help students identify and deal with their emotions and the emotions of others. SEL is the process through which we learn to recognize and manage emotions, care about others, make good decisions, behave ethically and responsibly, develop positive relationships, and avoid negative behaviors (Elias, 1997). There is also evidence that SEL programs facilitate better academic learning and can promote success for students in both school and life in general (Goleman et al., 2004). Because students are experiencing social emotional challenges which disrupt their performance in school, the need to address these challenges is extremely important. Problems such as discipline, disaffection, lack of commitment, alienation, and dropping out of school are examples of behaviors that frequently limit success in school and often lead to failure (Zins, J. E., Bloodworth, M. R., Weissberg, R. P., & Walberg, H. J., 2004). By addressing SEL, student behaviors can be addressed and hopefully circumvented. Parents and teachers can utilize the Collaborative for Academic and Social and Emotional Learning (CASEL) framework and 5 core competencies to assist students in becoming self-aware, to self-manage, to engage in responsible decision-making, develop relationship skills, and build social awareness (CASEL, 2019).

Dr. Ilana Nankin, founder of Breathe For Change addresses social and emotional wellbeing for students in her Breathe For Change curriculum. She encourages teachers to implement Social Emotional Learning support by providing mindfulness activities including movement. Meditation and activities addressing feelings are just a few of the activities that can be incorporated to help students adapt to emotional needs. Her program empowers educators as champions of well-being in their lives, classrooms, and school communities. Breathe For Change aligned the learning objectives of their SEL*F curriculum to the five core competencies of CASEL. Breathe For Change is guided by their work to ensure that educators gain tools to effectively embody and teach social-emotional learning in their lives, classrooms, and communities. According to Dr. Nankin (n.d), educational transformation must come from within school communities. Her theory of change is to train educators as wellness experts and support them in being champions of well-being in their lives, classrooms, and school communities. Her theory and curriculum correspond with the CASEL framework. Like many similar frameworks, CASEL's integrated framework promotes intrapersonal, interpersonal, and cognitive competence. The five core competencies can be taught in many ways across many settings. The interactive activities provided in the Breathe For Change curriculum can be used by eLearning teachers to incorporate SEL skills and to make connections with students with the aim to negate some of the attitude and behavior patterns and replace them with positive outcomes during eLearning.

Conclusion

eLearning has been one of the top challenges in education during the last two school years, making it difficult for many parents, teachers, and students to experience success during remote online learning. Lack of teaching knowledge, equity of technology and materials, and misbehavior of students during online classes are just three issues that are faced by teachers, parents, and students. Strategies are needed to navigate the learning space and the living space of eLearning. As the journey of eLearning continues, parents and teachers will need to work together to implement strategies such as those suggested that will effectively impart the skills, knowledge, and dispositions for students to be successful learners.

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Children and Families: Health and Wellness
The Intersection of Trauma, Mental Health, and Academic Performance Among School-Aged Youth

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Abstract

As the adults battle the COVID-19 pandemic's effects, children are also dealing with its fallout. In addition to the health effects, since March 2020, the pandemic has caused long-term school closure, which forced school-aged youth to deal with the stress of social isolation; moreover, since youth have returned to school, there has been an uptick in school violence (Maxwell et al., 2021). These experiences have produced trauma that has affected youth mental health and academic performance. Consequently, educational systems need a better understanding of the intersecting effects of these traumatic events on the youth's mental health and academic performance to implement evidence-based interventions to mitigate the negative impacts of youth trauma.

Keywords: Trauma, Mental Health, Academic Performance, COVID-19, School Violence

The prevalence of youth exposure to trauma is significant (Dorsey et al., 2017; Mclaughlin et al., 2013; Overstreet & Chafouleas, 2016; Porche et al., 2016). Two out of every three school-age children will experience trauma by 17 (Perfect et al., 2016). Trauma and adverse childhood experiences can significantly impact a child's development, and the effects can last well into adulthood (Merrick et al., 2017; Schiavo, 2020). Early childhood is critical for brain development and nurturing and responsive relationships; trauma can affect youth cognitive, academic, and social-emotional behaviors (Schiavo, 2020; Perfect et al., 2016).

Youth express their traumatic experiences differently, and the developmental impact can occur as early as preschool (SAMHSA, 2021b). Preschool youth might cry or scream, eat less, or have nightmares. Elementary-aged youth may feel guilt, be anxious or fearful, and have difficulty concentrating or sleeping. Middle and high school youth may be more sexually active, manifest depression, isolation, self-harming behaviors, eating disorders, or substance abuse (SAMHSA, 2021b). Porche et al. (2016) study found that youth who experienced higher levels of trauma were more likely to have a mental health diagnosis, less likely to be engaged in school, and more likely to be retained. SAMHSA (2021b) notes that youth who experience traumatic stress are more likely to have lower grades, more suspensions, and expulsions, utilize mental health services, have increased involvement with juvenile justice, and experience long-term health problems.

Specific populations may be more at risk for trauma or repeated traumatic exposure, specifically homeless youth (Wong et al., 2016), refugee youth (Grasser et al., 2021), Latino youth (Cleary et al., 2018), LGBTQ youth (Yun et al., 2021), youth diagnosed with intellectual and developmental disabilities (NCTSN, 2021), and youth in foster care. Cleary et al. (2018) investigated the relationship between trauma and mental health amongst Latino youth aged 12-17 and found that 44% of the youth had experienced at least one traumatic event, and 23% had experienced two or more traumatic events. Their results showed that youth exposure to traumatic events is associated with differential health outcomes. Wong et al.'s (2016) investigation of the impact of traumatic experiences of homeless youth on depressive symptoms revealed that youth who are homeless and who have experienced sexual trauma were more likely to show posttraumatic stress disorder (PTSD) symptoms. Youth living with disabilities are more likely to be exposed to trauma than their non-disabled peers, and they have an increased risk for physical, sexual, and emotional abuse (NCTSN, 2021). Youths in schools are affected by three prominent issues; decreased academic performance (Phelps & Sperry, 2020), increased risk for school violence (DHS, 2021), and increased mental health concerns (Abraham et al., 2021). Because of the complexity of these issues, schools will find it challenging to address a cure for issues youth face in schools (Stein et al., 2011). Still, they can be more successful in focusing on a plan of intervention.

COVID-19 and the Educational Setting

In the United States, schools are noteworthy contributors to youth development, and the school building is symbolic of success. Children gain the educational, social, and emotional skills needed to live independent and successful lives in school. Consequently, the effects of the intersection of COVID-19's impact on educational systems and the trauma experiences of schoolchildren are important considerations for student learning and success, particularly as schools search for effective tools for mitigating these effects (Gewertz, 2020). In March 2020, the World Health Organization declared COVID-19 a pandemic. All public-school buildings in the United States were closed to limit exposure to the virus, and schools began remote learning. According to Education Week (2020), students began to feel the impact of the school closures and missed school as early as May 2020. The school closures during 2020 and 2021 severely reduced children's opportunities for peer socialization in classes and through participation in sports and other group activities. Amid school closures, some children experienced the additional stressors of social isolation, social unrest, and food insecurities (Prothero, 2020). Prothero noted that children were grieving the loss of stability, safety, and graduation. At the same time, many parents were dealing with health concerns, job loss, food insecurity, and conflicting priorities (He et al., 2021). He et al. (2021) note for economically disadvantaged parents, these stressors influenced the quality and levels of nurturing and family interactions. When the schools reopened, children continued trying to cope with the ramifications of their trauma experiences (Stratford, 2020). The continuing trauma effects, heightened by COVID 19, make it necessary for schools to help children navigate the academic and mental health challenges confronting them.

School Violence

Perceived school safety is a significant indicator of students' academic success and the image of schools as safe learning environments was challenged before COVID 19. Milam et al. (2010) investigated the effect of the school and neighborhood climate on academic achievement among 3rd – 5th-grade students; they found that students' academic performance decreased in schools and communities where more violence occurred compared to neighborhoods where students' safety is not compromised.

The Trauma and Learning Policy Initiative (2017) notes that traumatic experiences can affect youth learning, behavior, and relationships at school. Porche et al. (2016) indicated that students who were impacted by trauma had issues with school engagement and grade retention. Between 2009 and 2019, incidents of gun violence occurred at over 177 American schools. When the infection rate dropped and schools reopened, incidents of school violence soared, totaling 14 school shootings between March and October 2021 (Cox & Rich, 2021). School shootings have occurred in elementary, middle, and high schools in rural, urban, and suburban settings. The time of the day is not constant, and students have witnessed shootings at the sound of the morning bell, at midday, and after school. Most school shootings happen on Fridays and during the afternoon. Indeed, the variety of times makes it more difficult to pinpoint a trend line. As students return to school after COVID-19, their adjustment period may add another layer of uncertainty to the time factor. It will be noteworthy to discover if there is any correlation between the time of day, school settings, and race.

Walker (2019) found that race plays a factor in when school shootings are likely to occur. In African American schools, more shootings happen after schools are dismissed as compared to predominantly non-African American schools, where this type of violence happens at school arrival or dismissal time. School violence has extended beyond the school building itself. Decades ago, students could feel safe at football games, homecoming dances, and other extracurricular activities too. However, violence at these events is becoming more prevalent. Since August 2021, there have been seven shootings at football games (Maxwell et al., 2021).

Gun violence in schools and school shootings have created anxiety for students. Interestingly, some students who live in high crime areas look to school for safe havens. However, this safety net has been interrupted by gun violence (Everytown Research & Policy, 2021). When children see school shootings on television or social media, they worry about their schools and safety (Graff, 2018). Students return to school searching for a sense of normalcy, and some with heavy hearts due to grief.

After school shootings (2019) are reported, these incidents leave students emotionally scarred and struggling to stay focused on academics. Levine and McKnight (2020) reported school shootings had increased students' absenteeism and suicides. In addition, they found that boys are more negatively impacted as compared to girls. Wang (2019) highlighted fatal school shootings that had increased students' use of antidepressants. Furthermore, school-aged students have lower grades and miss more school when exposed to gun violence with no intervention. High school students who experience the same type of violence have lower test scores and are less likely to graduate from high school (Everytown Research and Policy, 2021). Louis-Phillips and Kim

(2016) further discussed how low-test scores would affect a students' ability to get into college and their future career incomes. The research found that students are often left feeling scared and confused. Bailey (2020) explained how students who experience school shootings are more susceptible to posttraumatic stress disorder. The impact can have a lasting influence on the student's development for days, months, or even years. Survivors have told ABC News that they are often haunted by flashbacks, anxiety, and survivor's guilt (Kellermar, 2019).

Although COVID-19 has positively affected the number of school shootings, receiving a phone call from their children's school provokes anxiety in most parents. Their concern is validated by the twenty-four school shootings since August 1, 2021, resulting in injuries and death (Maxwell et al., 2021). As explained above, there is no race, gender, age group, or community spared from school shootings. In the judicial system, teenage shooters are sentenced as adults meaning that many of these children become felons before their 18th birthday; however, their actions traumatize their peers, parents, schools, and communities. Ironically, no universal database compiles vital statistics, e.g., the frequency, trends, and rationale, for these crimes in schools (Walker, 2019; Frederique, 2020). School violence is perpetuated by intruders and students, increasing security as another area in which schools must focus, resulting in time and resources diverted from teaching and learning and making it harder for schools to sustain their image as a haven for learning and growth.

Academic and Mental Health Impacts

COVID-19 related school closures have significantly affected children's academic performance and achievement (Kuhfeld et al., 2020; Phelps & Sperry, 2020). The rise of COVID-19 initiated a wave of school closures that displaced millions of students from their traditional learning environments (Savitz-Romer et al., 2021). When students were removed from the educational environment, they were removed from their friends, and they were not allowed to interact in their daily social activities. Being removed from the general classroom setting and placed in a virtual learning setting can result in a child feeling alone due to being removed from their familiar daily social activities; this effect of the COVID-19 pandemic was evident. Moreover, families across the nations were dealing with job loss, financial stress, domestic violence, and socioemotional stress (Phelps & Sperry, 2020). These various stressors experienced by the family made it particularly difficult for students in the homes to focus on academic tasks. Kuhfeld (2020) noted that historically out-of-school closures have negatively affected a student's academic achievement, specifically, summer breaks, weather-related absences, and student absenteeism. Specific areas of concern for a child's academic success during the pandemic were (1) the teacher's ability to provide remote learning instruction, (2) family access to remote learning, and (3) family access to technology. Remote learning posed a significant problem for teachers and students during the COVID-19 pandemic. Teachers in the traditional K-12 setting were not trained to provide remote learning instruction (Hash, 2021).

Families were not prepared to receive remote learning instruction. Bonella et al. (2020) highlighted issues with access to technology and the internet, particularly in remote areas. There were many cases where the teacher could not contact students during the remote learning period (Lieberman, 2020; Kurtz, 2020). Teachers reported minimal interactions (Kurtz, 2020) with students or no contact with them (Lieberman, 2020). This resulted in students spending half as

much time learning as they did before COVID-19 (Gewertz, 2020). Several families, particularly those that lived in rural areas, low-income families, and families of color, had issues with access to technology devices and the internet (Bonella et al., 2020; Education Trust, 2020).

Trauma affects youth mental health (Abraham et al., 2021; Cleary et al., 2018; Perfect et al., 2016). Youth who experience multiple traumatic events are more likely to exhibit depression, anxiety, and PTSD symptoms. Furthermore, these symptoms are more likely to persist into adulthood (Mullen, 2018; Wong et al., 2016), particularly in youth who have experienced sexual trauma (Abraham et al., 2021). Studies of trauma and children's mental health issues are informative. Perfect et al. (2016) found that children with higher numbers of adverse family experiences were more likely to have higher numbers of mental health diagnoses and those with higher numbers of diagnoses were less likely to be engaged in school and more likely to be retained in grade or on an IEP. Abraham et al. (2021) found that trauma exposure could affect the psychological adjustment of youth. For example, among their sample of 8 to 17-year-olds, multiple exposures to trauma were a predictor of higher anxiety in female participants and indicated higher levels of depression for females and younger males.

London and Ingram (2018) reported that elementary school students had high loneliness and increased depressive symptoms. Chadi and Gagnon (2021) stated that children between the ages of five and twelve appear to have an increase in mental health problems, suggesting that they have been significantly impacted by the COVID 19 pandemic. Dealing with depression, sleep deprivation, anxiety, and psychosocial adaptation problems can result in students struggling academically. Allowing students to discuss the issues they are facing can help promote resilience by understanding that it is okay to admit that they have emotional, mental, and physical struggles.

The current COVID-19 pandemic has taken a toll on both students and parents and has significantly affected the learning environment. Children's experiences with the COVID-19 pandemic have revealed themselves in the rising rates of infection in children and decreased academic performance, increased episodes of school violence, and increased mental health issues. The most common need regarding our students is the need to strengthen our student’s mental health. Parents and Counselors play an essential role in enhancing students' mental health and their needs. Students went from spending most of their day within the general classroom setting to doing virtual learning at home from their computer screens. The pandemic took away students' normalcy. Students moved from the general classroom setting and were forced to adapt to virtual learning. COVID 19 has shaken the nation's security in many ways, raising uncertainty about things that were formerly taken for granted. For example, the constancy of the educational system and the value of social interaction with others are not considered "a given." The resulting uncertainty can affect various mental health issues, such as depression, sleep deprivation, and anxiety (London & Ingram, 2018; Talmus, 2019). Counselors need to have conversations with their students on the impact that COVID-19 has had on their overall mental health.

Interventions to Combat Traumatic Experiences in Schools

It is pertinent to focus on interventions that can take place in schools to lessen the impact of trauma on youth. The Substance Abuse and Mental Health Services Administration (SAMHSA)

has emphasized the importance of effective treatment and services for youth and families who experience traumatic events (SAMHSA, 2021a). The Assistant Secretary for Mental Health and Substance Use, Dr. Rittmon, further stressed the importance in a statement, "providing appropriate trauma-informed treatment and service responses for our nation's children, adolescents and their families continues to be a SAMHSA priority and is needed more now than ever as we begin emerging from the pandemic" (SAMHSA, 2021a).

Research has supported the need for services to address trauma exposure (Gonzalez et al., 2016; Woodbridge et al., 2016). In the Gonzalez et al. (2016) study of elementary school students, they found that 9.5% of students experienced significant levels of traumatic stress symptoms, with 26% reporting moderately elevated symptoms. Similarly, in the Woodbridge et al. (2016) study of middle school students, 13.5% of out reported traumatic stress symptoms. The Substance Abuse and Mental Health Services Administration (SAMHSA, 2014b) suggests the Three E's when considering trauma. The E's of trauma are events, experiences, and effects. Trauma results from an Event (or events) experienced as harmful or life-threatening, lasting adverse effects on individuals' functioning across domains. The events and circumstances may include actual or extreme physical or psychological harm; primary examples include natural disasters and violence. Not everyone will experience trauma the same. The experience of traumatic events helps to determine whether it is a traumatic event. For example, if a child who is removed from an abusive home will experience this differently than their sibling, that event may not be traumatic for the other sibling; this scenario is a primary example used (SAMHSA, 2014b) when discussing the Three E's of trauma.

The literature has called for school-based trauma-specific treatments to prevent the negative impact of youth exposure to trauma. This research suggests four specific school-based approaches that can be implemented: (a) utilize trauma-informed approaches, (b) utilize emotional response, (c) teach mindfulness, and (d) provide education centered on trauma in youth, staff, and students. Trauma-focused training builds knowledge, changes attitudes, and fosters practices favorable to trauma-informed approaches (Overstreet & Chafouleas, 2016). The more school personnel knowledgeable about trauma and its impact, the more prevention and intervention efforts are available to students.

Trauma-Informed Schools

SAMHSA (2014a) identifies four justifications for trauma-informed intervention: (a) a realization of the widespread prevalence and impact of trauma, (b) a recognition of the signs of traumatic exposure, and (c) a response grounded in evidence-based practices that (d) resists re-traumatization of individuals. Overstreet and Chafouleas (2016) state, trauma-informed schools "respond to the needs of trauma-exposed students by integrating effective practices, programs, and procedures into all aspects of the organization and culture (p. 2)." Schools that utilize trauma-informed approaches emphasize student support, academic enrichment, and training school personnel (Prewitt, 2016). Personnel in trauma-informed schools have basic knowledge about trauma and understand how trauma affects students' learning and behaviors (Overstreet & Chafouleas, 2016). It is imperative for faculty, staff, teachers, students, and parents to be well informed about the prevalence of trauma and its effects on student learning and behavior (SAMHSA, 2014a). Trauma-informed schools also recognize the signs of traumatic exposure

and respond to those students using evidence-based practices and procedures. Implementing trauma-informed schools can prevent re-traumatization and prevent adverse outcomes of exposure to trauma.

Trauma Focused-Cognitive Behavioral Therapy

Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) is one of the most widely used psychosocial treatment interventions to treat children and youth who have experienced trauma (McGuire et al., 2021). TF-CBT is a highly structured, conjoint parent/child intervention, consisting of sequential 90-minute weekly sessions for about 12 to 16 weeks. A trained clinician moves the client through a series of eight components, summarized by the P.R.A.C.T.I.C.E. acronym. The components include psychoeducation and parenting skills (P), relaxation (R), affective expression and regulation (A), cognitive coping (C), trauma narrative development and processing (T), in vivo exposure (I), conjoint parent/child sessions (C) and enhancing personal safety and future growth (E) (CWIG, 2018). Numerous researchers have investigated the effectiveness of TF-CBT with youths (Cohen & Mannarina, 2017; Lenz & Hollenbaugh, 2015; Peters et al., 2021). Lenz and Hollenbaugh (2015) conducted a meta-analysis on studies which investigated the effectiveness of TF-CBT among children and adolescents. Lenz and Hollenbaugh's study found that TF-CBT was effective in decreasing symptoms of PTSD and depression. Similarly, Peters et al., (2021) study participants reported significant improvement in their PTSD. anxiety, and depression symptoms. Based on the results of prior research, TF-CBT can be used to facilitate a supportive response for youths and families who have experienced trauma.

Social-Emotional Learning

According to the American School Counselor Association's (ASCA) National Model, school counselors help students return to the general education setting; provide counseling to students exhibiting behavioral problems and extreme tardiness. School counselors can also provide students with both long and/or short-term counseling to ensure students are emotionally and mentally stable after returning to the general education setting (Pincus et al., 2020). Since many students were out of school for an extended period during the COVID-19 pandemic, counselors must first examine the impacts of social and emotional learning and its role in strengthening the child's mental health. Incorporating high-quality social-emotional learning in the day-to-day classroom allows students to integrate their feelings and think to master different tasks within the academic setting. Teaching social and emotional skills gains particular importance in the context of rising mental health issues, behavioral problems, and substance use, which jeopardize young individual's development (Centers for Disease Control & Prevention, 2013). By examining social and emotional learning, students become educated on mental health while also understanding how to address their emotions. Focusing on social and emotional learning can increase students' awareness of their feelings or moods and potential symptoms of depression, anxiety, and other social-emotional problems (Gueldner et al., 2020). Through students learning to connect their thoughts between emotions and behaviors, they will monitor their behavior (Gueldner et al., 2020). By implementing social and social-emotional learning, students will become educated on their overall mental health, essential to their development.

Utilizing a Mindfulness Approach with Youth

An additional intervention, which can help strengthen students' mental health and academic performance, is teaching mindfulness. Mindfulness-based practices can be used to foster mental health in an elementary school setting. Malboeuf-Hurtubise et al. (2021) examined the interventions in which children were invited to reflect on their moral issues and personal values. Research conducted (Malboeuf-Hurtubise et al., 2021) concluded that mindfulness-based-interventions could be helpful to stratify students' psychological needs. "Focusing on mental health in schools provides both natural and formal opportunities for promoting anti-stigma messages related to mental health" (Stephan et al., 2007, p. 1331). By addressing mental health and mental health disorders through advocacy and education and working on ways to remove the stigma surrounding mental health, counselors can begin strengthening students' mental health. It is also imperative the simultaneous roles of both parents and counselors must be strengthened to aid students' mental health and wellness.

Provide Education

The educational system must educate students, teachers, and parents on mental health to strengthen students' mental health. The school counselor can communicate with multiple entities, including school districts, parents, and mental health organizations. Pincus et al. (2020) highlighted that school counselors were often the only mental health provider identifying, managing, and providing interventions for at-risk students. Educating students on mental health disorders will allow them to gain a deeper insight into mental health. Pincus et al. (2020) state that counselors are uniquely trained and are qualified to serve as key components in the success of the "whole child." Through school, counselors utilize their skills to educate students on mental health disorders, such as anxiety and depression, which will enable students to recognize when they are experiencing these mental health disorders within their own lives. Informing students about their mental health at a young age will better identify mental health issues as they arise.

Parental Involvement

During these challenging times, students need a support system. Their biggest allies are often parents, teachers, counselors, or the community in which all parties must understand the feelings children face when experiencing disruption at their respective schools. There is a strong connection between the child and the parent's mental health (Centers for Disease Control & Prevention, 2021). The Centers for Disease Control and Prevention (2021) states the parent's mental health significantly affects a child's mental health. Parents can foster an accepting environment that allows children to discuss their mental health needs with their parents. Coronavirus disease (COVID-19) has affected children emotionally, mentally, and physically. Beyond getting sick, the pandemic has influenced many young people's social, emotional, and mental well-being (Centers for Disease Control & Prevention, 2021). Due to the trauma faced during the COVID-19 pandemic, parents must provide their children with a safe space within their home, which allows them to listen and respect their child's feelings while also helping their children work through their problems. Parents play a vital role in educating their children on mental health as they affect how children express and experience their emotions, which essentially affects their viewpoint on mental health.

Parents are often anxious during these events, especially now. Popular news outlets show clips of parents describing their anxiety as they wait to confirm their children's safety. Parents can go hours without any information as they often linger in alternate waiting areas for the next update. Research has found parents fear for their child's safety at school (Spector, 2018). Parents have reported that they find comfort in each other. A few parents may receive confirmation from their children as they called for their cellphones; however, others do not have the privilege and must wait for hours with no answers. Spector (2018) highlighted advice for parents, which encourages them to put things into perspective. It is recommended that parents think of all the good days that their children will enjoy, use positive self-talk, and have these conversations with their children.

Furthermore, parents should build relationships with schools and attend school meetings to inform local protocols and procedures. In addition, research recommends parents discuss with their children the difference between snitching and seeking help to prevent violence and the threat of violence (Lorenzo, 2012). Blair (2018) encourages parents to be incredibly involved in their children's lives, including monitoring the activities of their children's social media accounts and being educated on warning signs of school shooters. Parents cannot do this alone and depend heavily on the schools.

Counselor Involvement

The counselor's overall role is to educate and provide a safe space for those students to come when they need it while also providing the students with the tools to succeed within and outside the school setting while also creating ways to reduce stigma surrounding mental health (Pincus et al., 2020). School counselors can facilitate groups to help students deal with school stressors. In addition, school counselors can be involved in this process to help develop a safe climate, meaning having a zero-tolerance policy for inappropriate behavior (Paolini, 2015).

It is important schools have an action plan to support students after the shootings have occurred by being prepared for the aftermath. Everly (2018) also recommends schools have crisis intervention plans, ongoing training, and rehearsals to deal with such crises and identified resources within the school and districts. Because school shootings continue, all involved parties must become equipped to protect children who attend school to learn and build lasting relationships. Schools are often not authorized to provide mental health treatment services and are considered educational settings rather than clinical settings (Paolini, 2015). Nevertheless, school counselors play an integral role in students' success by providing resources to help youth emotionally, mentally, and physically.

Implications for Research and Practice

Karalis (2020) noted that the COVID-19 effects experienced by schools were due not to a crisis of the education system but from a secondary crisis in education resulting from a major crisis in another level of public life. The COVID-19 pandemic differed from previous pandemics in its scope and intensity as its impact was worldwide and simultaneous. Given the importance of the school as a stabilizing factor in society, schools must examine the dynamics of the pandemic's

effect and develop contingency plans that, at a minimum, address those areas that directly affect children's success and well-being.

While evidence-based strategies have been presented to help address students' mental health needs, educators are also mindful of their ethical responsibilities to their communities. In a technology-based society, access to technology is crucial for all citizens. Neither poverty nor rural residency should act as barriers that hinder teachers from delivering instruction or students from participating in education. The Statement of Ethics for Educational Leaders asserts the educational leader's commitment to serving the school and community by providing equal educational opportunities to every child (American Association of School Administrators, n.d.). Further, the first statement in the Statement of Standards requires that educational leaders hold the education and well-being of students as the fundamental value of all decision-making. Likewise, Principle I of the National Education Association's Code of Ethics commits every educator to help each student realize their potential as a worthy and influential member of society (NEA, 2020). The Parent Teacher Organization (PTA) (n.d.) mission is to make every child's potential a reality by engaging and empowering families and communities to advocate for all children.

The inequities that pervade American society were glaring in their impact on the ability of families and students to adapt to school outside the walls of the school building. As professionals and as citizens, educators must diligently advocate for all children to access education and engage in the activities necessary to ensure access for all students. As the PTA's mission demonstrates, the will to protect access to education is supported within the school's community, particularly by parents. While for some, advocacy may bring visions of demonstrations and political activism, educators and stakeholders in the education community understand that advocacy engages collaboration and partnerships to build resilience, identify solutions, formulate policy, and bring resources to the school.

It seems inevitable that schools will build on their former instructional practices and increase their capability for remote instruction. COVID-19 has clarified that the" long haul" approach to implementing online learning may not be the best approach for education. While instant change is also not recommended, teacher education and continuing education strategies need to embrace a new pedagogy that builds and enhances teachers' ability to integrate technology into their instruction regularly and teach remotely when needed or desirable. Therefore, teachers must incorporate asynchronous learning into their instructional arsenal along with their real-time, face-to-face teaching strategies. School and community leaders must support these changes by assuring that the technology infrastructure within the community functions and that access to the technology and the devices for using it are available to everyone. Taking these steps before the crisis can assure the educational system is ready to cope.

Promoting safety is another area in which to support students. By integrating safety concepts and practices into instructional units, teachers and counselors help reassure students and parents of the school's concern for their welfare, encourage safe practices, and help to restore a sense of safety at school. Developing effective strategies calls for an adequate knowledge base. As schools maintain and catalog data about factors influencing and promoting students' achievements and strengthening their mental health, the efficacy of evidence-based practices can

be tested and refined. It would also be helpful for researchers to have a database that records and provides access to data from incidents of school violence nationwide, including the safety practices in place and perpetrators, school, and student demographics. Such a database could help to identify youth at risk better and develop effective prevention strategies.

Conclusion

Children are experiencing significant trauma. The influx of traumatic experiences has presented itself as a significant challenge for the educational system and highlighted the need for systemic changes. This has further highlighted the need for flexible ways to deliver instruction and address student social and emotional needs. With the increase in school violence and the experience of living through the COVID-19 pandemic, teachers, counselors, and family members must be vigilant in addressing the child's mental health and academic concerns. According to the U.S. Department of Homeland Security (2021), prevention should be the primary goal. Children's exposure to violence is a public health problem that has implications for students' academic success (Milam et al., 2010).

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Education by the Numbers

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It is not difficult to hear or engage in a debate on the influence that a celebrity, politician, or an athlete have in society. However, outside of the immediate home environment, a teacher is the most influential person in the life of a person. They act as role models and offer guidance to our children. Teachers are the backbone of society. Teachers are the people responsible for social and economic development of a society.

What do we know about teachers in our public schools? According to the most reliable data, there are approximately 3.7 million (3.2 million public and 0.5 million private) full-time and part-time elementary and secondary school teachers in the United States. Teacher characteristics are often associated with other variables related to students' success.

Characteristics of Public-School Teachers

The United States culture has long held that women are more nurturing than men. Historically, this has been the leading factor creating the notion that women are the ideal candidates for teaching. Additionally, prior to the passage of Title IX in 1972, women admitted to higher education institutions were encouraged to enroll in teacher training programs instead of other majors. These factors were effective in creating a female dominated profession. Based on the most recent data, it appears that teaching as a woman's profession remains engrained in the American culture.

Percentage of Public-School Teachers by Instructional Level and Sex

	Female	Female	Female	Male	Male	Male	LGBT
	2000	2018	2021	2000	2018	2021	2021
Elementary	88%	89%	75%	12%	11%	21%	13%
Secondary	59%	64%	50%	41%	36%	45%	14%
Total	75%	76%	74%	25%	24%	26%	4.8%

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STEAM
STEM Content vs. A Sense of Wonder and Joy of Learning: It Shouldn't Have to be a Choice

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Abstract

The purpose of this reflective article is to examine how structured STEM programs often fail to promote key traits that are crucial to the scientific process including creativity, wonder, curiosity, and imagination. Typical STEM programs are content-driven, outcome-oriented, and scripted in a curriculum-centered, teacher-directed manner. Because of their rigidity, these programs often preclude more open-ended explorations that foster creative explorations in STEM. The article gives examples of scientists and inventors who dared to imagine and explored the world with a sense of wonder in non-scripted, active ways. The article discusses programs like Genius Hour and provides suggestions for promoting creativity in STEM programs.

Key Words: STEM, STEAM, Creativity, Wonder, Curiosity, Imagination

Introduction

During 39 years of a career in education at both the elementary and university levels, I have discovered a significant dichotomy in science-teaching philosophy. On the one hand, science teachers have been diligently following a standardized curriculum, arguably arbitrarily set by federal, state, or local officials in order to help students cope with "an ever-changing, increasingly complex world . . ." (U.S. Department of Education: Science, Technology, Engineering, and Math, including Computer Science, n.d., para. 1).

The compulsory standardized program was developed in 1996 by the National Research Council, simply known as the "National Science Education Standards," but eventually was expanded to

include technology, engineering, and math (STEM) in 2005. In recent years, officials have added the Arts and Computer Science to the program, now recognized, unofficially, as STEM/CS. According to the United States Department of Education, the program is designed to prepare students to "bring knowledge and skills to solve problems, make sense of information, and know how to gather and evaluate evidence to make decisions" (U.S. Department of Education: Science, Technology, Engineering, and Math, including Computer Science, n.d., para. 1).

Although the compulsory curriculum has been designed to help students to become more efficient in the academic areas covered by STEM/CS, some educators are concerned that the standardized curriculum does not take into consideration such non-quantitative areas such as curiosity, creativity, imagination, and a sense of wonder, and how those areas are vital for the cultivation of new ideas, as well as the implementation and development of those ideas. Even adding the arts (STEAM) does not foster these characteristics in any meaningful way, as STEAM programs often are scripted, and teacher directed.

Science, technology, engineering, math, and computer science depend on the ability to imagine, be creative, and think outside the box to come up with hypotheses, methods of inquiry, and possible paths to solutions.

In a sense, the two approaches to the teaching of STEM/CS are at opposite ends of the thought spectrum: one representing a more structured approach with desired outcomes that can be identified and measured, while the other approach represents a more open-ended method that values curiosity and imagination. Some educators are concerned that one approach is more focused on the content of material being taught, while others place more emphasis on the importance of developing a sense of wonder, allowing the student to dream, imagine, and be curious – not only to come up with new ideas, but also to be creative in how to solve problems and find solutions. Sir Ken Robinson (2015) emphasizes that "a lifelong sense of curiosity is one of the greatest gifts that schools can give their students" (p. 136). Can we provide this gift for our students?

As a faculty member in the College of Education at a state university, my goals for teaching science methods courses were three-fold: 1) To recapture the JOY of learning; 2) To develop a sense of wonder; and 3) coming in a far distant third place was the content. Yes, to some, placing the science content that far below the other two goals may seem to be irresponsible. Let me explain.

Scientists and Inventors who Dared to Imagine

I have had several "heroes" in education who have greatly influenced me in my teaching career. Among those are Lt. Col. Francis Parker (1837-1902); Research Professor and author, Dr. Peter Gray; Sir Ken Robinson; and Alfie Kohn. Perhaps most influential in my career was Jerome Bruner (1915-2016). Jerome Bruner was a prolific researcher in the area of Cognitive Psychology and published many books relating to psychology and education. During WWII, he served on the Psychological Warfare Division of the Supreme Headquarters Allied Expeditionary Force Committee under the command of General Dwight D. Eisenhower. Furthermore, Jerome Bruner was one of the brightest scientific and educational minds who were

chosen to participate at the Woods Hole Conference in 1959 (Smith, 2002). The Woods Hole Conference was formed in response to the Soviet Union's launch of Sputnik (1957), a small, artificial satellite, which orbited the Earth for three weeks before its batteries died, and then falling back to Earth. Among the 35 people who participated at the Woods Hole Conference were Robert Gagne, B.F. Skinner, Jerome Bruner, and many other educators, scientists, corporate officers, medical doctors, and mathematicians. The Woods Hole Conference led to the beginning of educational changes and social science reforms and was the inspiration for Bruner's 1960 book, *The Process of Education* (Evans, 2011). Bruner's ideas, born out the Woods Hole Conference, were the catalyst for major reform of the American educational system.

Among one of Jerome Bruner's statements that has been widely quoted from his book was one that intrigued me, as a science educator: "Any subject can be taught in some intellectually honest form to any child at any stage of development" (Bruner, 1960, p. 12). That statement was the topic of many personal conversations with colleagues, usually resulting in no consensus of opinion, but it certainly piqued my interest. Further readings led me to another statement: "Content knowledge is the natural consequence of process."

I used that powerful statement for each class that I taught for eight years. During that time, I searched and searched to find the reference for Bruner's wise statement - to absolutely no avail. So, sometime in 2006, I called Dr. Bruner at his office at New York University to ask him where I could find that reference. To be honest, I did not even know if he was still living (if so, he would have been 90 years old). To my great surprise, he answered his phone, and we had a very nice, yet brief, conversation. I asked about the statement, and to my even greater surprise, he responded with, "You are not able to find the reference to that statement because I never said that. But it is a good one, and I wish I had said that." He went on to explain, "What I did say was, 'Knowledge is not found in the content, but in the activity of the person operating within the content domain'" (J. Bruner, personal communication, 2006).

The conversation with Jerome Bruner changed my thinking completely. And it clearly places me on the side of those educators who are more concerned with enabling students to develop their imaginations, creativity, curiosity, and to me, the most important quality of all: to instill a sense of wonder in our students. If they are free to exercise those qualities, they will become so immersed in following their own interests, the content *just happens*. I firmly believe you cannot stop it from happening.

There are countless examples of scientists and inventors who have become famous for their contributions to society as a direct result of their passionate and creative curiosity and imagination. Most of them did not reach their levels of success and notoriety by memorization and recall. According to Bruner's statement, "Knowledge is not found in the content, but in the activity of the person operating within the content domain" (J. Bruner, personal communication, 2006). Activity within a content domain requires curiosity, imagination, and creative thinking. These important qualities are not usually found, encouraged, or valued in the standardized curricula in most schools.

Perhaps one of the most well-known examples of a successful scientist who gained notoriety by just "messing around" was physicist, Richard Feynman. As a Cornell professor eating in the school cafeteria, a friend tossed a plate in the air. As the plate spun around in the air, Feynman noticed that the school logo in the center of the plate was spinning at a different rate than the outer edges of the plate. That piqued his curiosity, so just as he did as a child, when he would simply tinker around in his home-made lab laboratory, creating simple gadgets, motors, and photocells, Feynman began to study the rotation of the plate. He had no apparent reason for doing so, other than the fact that he enjoyed it. He eventually worked out a mathematical formula that explained, through quantum electrodynamics, the wobble and rotation of the plate. The result of his "messing around" with that plate earned him the Nobel Prize for Physics in 1965 (Feynman, 1985; Wasserman, 1992).

In his book, *Surely, You're Joking, Mr. Feynman!* (1985), Feynman said, "I don't know what's the matter with people; they don't learn by understanding; they learn some other way -- by rote, or something. Their knowledge is so fragile!" (p. 44). In regard to some of his university students, Feynman figured out that they "memorized everything, but they didn't know what anything meant . . . Everything was entirely memorized, yet nothing had been translated into meaningful words" (Feynman, 1985, p. 242-243).

In Richard Feynman's case, he acquired meaning by *playing* with objects and ideas, figuring out how things work and finding solutions for problems. He called it "piddling around." Perhaps the standardized STEM/CS curriculum should include a section on piddling around.

Leonardo da Vinci (1452-1519) is known for his imaginative inventions that were hundreds of years ahead of their time. He was a painter, engineer, architect, theorist, and, of course, the inventor of such futuristic creations such as an armored fighting vehicle, an adding machine, a flying machine similar to a helicopter, solar power, and the hydraulic pump, among many other inventions. Leonardo was not necessarily known as a genius, as we would define it today. Yet he was extremely imaginative and highly creative. He was curious about many things such as a goose's foot, what a woodpecker's tongue looks like, how birds fly, astronomy, geology, mechanics, and the human anatomy. As Stone (2017) notes, imagination gives people the freedom to create and invent, which is a foundation for their future roles in society.

Leonardo da Vinci was self-taught. What little schooling he had was focused on mathematics, yet he found few benefits of formal schooling, instead spending his time experimenting. He considered himself a free-thinker, and once said, "I suspect that people will say that 'I have no book learning' . . . but they do not know that my subjects require experience rather than the words of others" (Isaacson, 2017, p. 4). For da Vinci, personal experience and experimenting brought knowledge and understanding.

There is also the example of a scientist who, by "messing around" with things and ideas, came up with an invention that not only earned him an obscene amount of money, but also helped him to be inducted into the Alabama Engineering Hall of Fame in 2011 (Raatma, 2020; Schwartz, 2018). Lonnie Johnson was born in Alabama in 1949. As a young boy, he loved to fix things. "As far back as I can remember," Lonnie recalled, "I was interested in devices and how they worked . . ." (Raatma, 2020, p. 8). Lonnie mounted a lawn mower engine on a go cart and drove

it around his neighborhood. At one point, Lonnie attempted to make rocket fuel on the stove top, but it caught fire. Instead of being angry, his parents "bought him a hot plate and told him to do his experiments outside" (Raatma, 2020, p. 9). The valuable lesson here is that Lonnie had parents who supported him and encouraged his creativity and imagination as he experimented with various inventions.

Lonnie Johnson continued his curiosity through high school and college at Tuskegee University in Alabama, where he earned a bachelor's degree in mechanical engineering, and a master's degree in nuclear engineering. He went on to work as a research engineer at the Oak Ridge National Laboratory before joining the United States Air Force (Raatma, 2020; Schwartz, 2018). In 1979, at the age of 30, Lonnie began working as a nuclear engineer for NASA at the Jet Propulsion Laboratory in Pasadena, California. There, he worked on numerous space missions, including the Galileo mission to Jupiter and the Cassini mission to Saturn.

Johnson had an extremely important job, working for NASA. Yet, he never gave up on his imagination and curiosity, so on his free time, he would "mess around" with other ideas. Hoping to invent a better heat pump that used water instead of Freon, he created and attached a high-powered nozzle to the pump. He attached his creation to the bathroom sink, and to his great surprise, a strong stream of water shot all the way across the bathroom (Raatma, 2020; Schwartz, 2018).

Thinking of how his invention could be utilized, he came up with the idea of modifying this invention to create a children's toy: a high-powered water gun that he named the *Power Drencher*. After several additional modifications, he came up with a new name for his creation: Super Soaker™.

Lonnie Johnson, a curious child who grew up to be a mechanical and nuclear engineer, through his excitement to "mess around" with things, became the creator of the Super Soaker™ water gun, which he sold to Hasbro Corporation. That toy water gun soon became the best-selling toy in history of the United States in 1991, earning over one billion dollars in sales.

Even in his older life, according to Raatma (2020), "Johnson is always trying new things. Some things work, and others don't. He must use his imagination when inventions fail. He tries over and over until the product works" (p. 26).

This article only gives a few examples of how imagination, curiosity, and creativity can lead to amazing creations and inventions. Most of the examples we find are discoveries made while "messing around" outside of school, and on free time. Consider what could be done in a school setting where children are free to explore their own imaginations without being constrained by a national, standardized curriculum with limited and expected outcomes.

Another fascinating story describes the path that led Jennifer Doudna from a curious child amazed by discovering interesting things about the flora (i.e., ferns) of her home in Hawaii, to discovering the details of the nature of DNA. Doudna's curiosity and imagination eventually led her to Harvard University, where she studied the intricacies of DNA. The chair of her doctoral dissertation committee and Nobel Prize winner, Dr. Jack Szostak, encouraged her to study RNA,

of which he thought would unlock the "biggest of all biological mysteries: the origins of life" (Isaacson, 2021, p. 45).

After receiving her doctorate in physical chemistry, Doudna continued her work in one of the top RNA biochemical laboratories at the University of Colorado. From there, she accepted a professorship at Yale University, and finally to the University of California at Berkeley, where she applied her knowledge of RNA as it related to viruses, such as the Coronavirus. Doudna and a colleague, Dr. Emmanuele Charpentier, are credited with inventing and developing a gene-editing tool called, CRISPR, which was a "cut and paste" tool that could, in a sense, peer into the antivirus defense system of bacteria and alter it to allow the bacteria to detect a viral attack and fight back.

So how did a young girl who was so intrigued by ferns in Hawaii that would curl up when you touched them, begin a path that would lead her to winning a Nobel Prize in Chemistry? According to Walter Isaacson (2021) in his book, *Code Breaker*, Doudna was especially curious and looked at "nature's wonders every day, whether it be a plant that moves or a sunset that reaches with pink fingers into a sky of deep blue" (p. 5). She was always asking questions to find why things worked the way that they do.

In her early years as a college student studying chemistry in California, she realized that the experiments she conducted were simply following a recipe, with strict, inflexible protocols and right answers (Isaacson, 2021). There was no room for imagination, curiosity, or creativity. After a disappointing freshman year, she got a summer job in a biology lab working with a professor at the University of Hawaii. As she worked with the professor, she discovered how different her lab experiments could be. "Unlike in class, we didn't know the answer we were supposed to get" (Isaacson, 2021, p. 33). It was in this lab that she tasted the thrill of discovery because she had the freedom to explore her passionate curiosity. As Doudna's colleague Charpentier noted, as a scientist, "I wanted to create knowledge, not just learn it" (Isaacson, 2021, p. 121).

As the teacher may have asked in the movie, *Ferris Bueller's Day Off*, "Who has ever heard of *Richard Drew*? Anyone? Anyone?" The response to that teacher's boring questions in the movie are most likely the same responses that you are providing for that same question . . . silence. But I'll bet you a whole quarter that you have heard of the *product* that Drew came up with by just "messing around."

Richard G. Drew was born in Minnesota in 1899. As a young man, Drew played the banjo in night clubs and dance halls, which provided him enough money to enroll as an engineering student at the University of Minnesota. College just wasn't his thing, so he dropped out after just a little over a year. He enrolled in a correspondence course, studying mechanical design. Using the knowledge gained from that course landed him a job at the Minnesota Mining and Manufacturing Company (3M) which made sandpaper (Matchar, 2019).

As a part of his job with 3M, he would deliver sandpaper to automobile shops, which used the sandpaper to smooth the finish on cars that were scheduled to be painted. At that time, the painters would use glued-on newspaper to mask off areas that were not to be painted, such as

windshields, mirrors, and headlights. But the problem with this method was that the glue didn't stick to the car very well, and it kept falling off. To add to the problem, the sticky glue residue was difficult to remove. Workers became very frustrated with the inefficiency of the gluing method. So, while on the job at 3M, Drew began experimenting with better ways to hold the newspaper to the cars. He tried coating various materials with vegetable oil, tree gum, and many other sticky substances.

One day, Drew was approached by William McKnight, a company executive at 3M, and Drew's boss, who told him to "stop messing around and get back to doing his regular job" (Matchar, 2019, para. 6). Drew obeyed his boss's command while at work, but on his own time, he kept "messing around," trying to find a solution to the painter's problem.

"Eventually, in 1925, he found a winning formula: crepe paper backed with cabinetmaker's glue mixed with glycerin. But this first version of masking tape only had adhesive on the edges. When the painters used it, it fell off. They allegedly told Drew to take his 'Scotch' tape back to the drawing board, using the term to mean 'cheap,' a derogatory dig at stereotypical Scottish thriftiness" (Matchar, 2019, para. 7). After five years of refining his "masking tape," Drew received a patent on his product.

The same year he invented his "Scotch" masking tape, Drew developed a semi-transparent tape using recently invented cellophane. However, the adhesive that he used was amber colored instead of transparent, so he continued to experiment with other materials until he came up a colorless adhesive. He also designed a machine that would apply the adhesive to the cellophane. Remembering his earlier days at 3M, Drew recovered the Scotch name for his product: Scotch Tape™. "The tape was released just as America plunged into the Great Depression, a time when 'mend and make do' became a motto for many. People *used Scotch tape for everything* from mending ripped clothing to capping milk bottles to fixing the shells of broken chicken eggs. At a time when many companies were going under, tape sales helped 3M grow into the multibillion-dollar business it is today" (Matchar, 2019, para. 9). Remarkedly, every year, the 3M company sells enough Scotch Tape™ to cover the Earth's circumference 165 times!

William McKnight, Drew's boss, who told Drew to "stop messing around," eventually was promoted to the Chairman of the Board of Directors at 3M, and finally realized that allowing researchers to spend free time experimenting with various ideas could lead to new and innovative products. McKnight then implemented a 15% rule, which allowed workers to spend 15% of their time on what he called "passion projects." When announcing this new program, he said that it would encourage experimental doodling. He said, "If you put fences around people, you get sheep. Give people the room they need" (Matchar, 2019, para. 11).

Drew went on to invent many other products during his career at 3M. Before he died, he made the statement that there is great joy in "finding something valuable in something not even sought out" (Matchar, 2019, para. 12). After Drew died in 1980, he was initiated into the National Inventors Hall of Fame.

Interestingly, 3M's 15% rule has become the model for many other corporations, such as Google and Hewlett-Packard (Black, 2016; Matchar, 2019). Google says that, perhaps, 20% of their new ideas and products have come from their version of the 15% rule. Art Fry, the inventor of the Post-It™ notes, used the 15% rule to develop that product while experimenting with a removable adhesive that would allow bookmarks to easily be removed from church hymnals (Kretkowski, 1998).

Conclusions

So, the question demands an answer: If million-dollar corporations have unbelievable success with giving their employees free time to use their imaginations, their curiosity, and their creativity to develop new and innovative ideas and products, why is our education system ignoring such opportunities for students?

Oh, I know what you are thinking. Many schools are beginning to implement their own version of the 15% rule, which they now call "Genius Hour" (Genius Hour, 2021). The Genius Hour encourages teachers to provide time for students to "explore their own passions and encourages creativity in the classroom" (Genius Hour, 2021, para. 1). Students are given time during the school day to choose their own *passion projects*. Genius Hour based their approach on Google's 20% rule. Google found that employees who spent 20% of their time using curiosity and passion to create their own projects were "happier, more creative, and more productive" (Heick, 2021, para. 4). Would this same approach do the same for students? I think the concept of supporting students' passion projects is a great idea, and I wish that every school would implement a similar program.

So far, however, many of the schools that are currently using that program are not giving students time to be imaginative, curious, and creative to come up with their own ideas and products. Rather, many schools simply use the so-called Genius Hour to do teacher-directed projects that have expected outcomes. For example, in the program, teachers are encouraged to facilitate "the student projects to ensure that they are on task" (Genius Hour, 2021, para. 5). Being "on task" actually belies the title of the program and suppresses student choice and autonomy. But, I suppose, if students are free to follow their own creative ideas, the Genius Hour concept could be a positive step in the right direction if the priority is students' imagination, curiosity, and creativity – not attendance to the required task.

Instead of implementing a school version of the 15% rule or Genius Hour as a separate "reward" time, why can't we build such a program directly into the STEM CS curriculum? The results just might set students on a path from just "messing around" to the next Nobel Prize! As previously stated, educators should be more concerned with enabling students to develop their imaginations, creativity, curiosity, and to me, the most important quality of all: to instill a sense of wonder in our students – not simply covering the standardized curriculum. If students are free to exercise those qualities, they will become so immersed in following their own interests, the content *just happens*. I firmly believe you cannot stop it from happening. In considering STEM content versus a sense of wonder and the joy of learning: It shouldn't have to be a choice!

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Page Turners: Books for Children

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Bonaparte Plays Ball
Written by **Margery Cuyler**
Illustrated by **Will Terry**
Crown, 2020
ISBN 9781984830470
Batter up! It's time for the Weird Series where Bonaparte, the friendly skeleton and his fellow Little Monsters must face the daunting Mighty Aliens. Are they up to the task? Not just for baseball fans, this picture book serves up images in which kindness and good will prevail over bullying. Young readers will cheer on the amiable and hardworking Little Monsters as they step up to the plate. Ages 3-7.

Facing Fear
Written by **Karen Lynn Williams**
Illustrated by **Sara Palacios**
Eerdmans, 2021
ISBN 9780802854902
Enrique is so excited about the upcoming soccer tournament. He can't wait to travel and play with the team. His dreams crumble when his father declares that it is too dangerous for Enrique to participate. He fears that officials may stop Enrique at an immigration checkpoint, revealing that not everyone in their family entered the country legally. Enrique, angry and deeply disappointed, contemplates going anyway. He is caught between worlds; desiring to protect his family on one hand, while not wanting to let his teammates down, on the other. This powerful picture book illuminates the ways in which immigrants who lack documentation must navigate a host of serious challenges and decisions in everyday life. The story does not offer straightforward answers to complex situations, but rather highlights the roles of courage, caution, love, and solidarity in facing them. Ages 5-10.

Here We Are: Book of Numbers
Written and illustrated by **Oliver Jeffers**
Penguin Books, 2021
ISBN: 9780593466124

The Earth is a vast and wide space, filled with innumerable people, plants, and animals - but this book breaks it down. This charming board book for young children takes them through numbers 1 to 10, using the language of exploring and wondering about our natural world. It ends with a message about the infinite nature of love and how that is the greatest wonder of all. This book brings together simple numeracy and complex ideas through beautiful illustrations. Ages 2-5.

If You Come to Earth
Written and illustrated by **Sophie Blackall**
Chronicle Books, 2020
ISBN 9781452137797
This whimsical book is written as a letter to a visitor from outer space explaining humans, our homes, animals, and what they might expect when they come to visit Earth. Blackall was inspired to write this book after many years traveling the world as she worked for Save the Children. The book is a call to action to care for our planet and for each other. It celebrates the differences that are present in our species and in how we live, work, and play. The pages have simple text and colorful illustrations that highlight the diversity present on Earth. The simple message of celebrating differences and the accompanying illustrations make this an engaging text to read aloud and explore. Ages 4-8.

Me and My Sister
Written and illustrated by **Rose Robbins**
Eerdman Books, 2020
ISBN 9780802855442
Being a sibling isn't always easy. It can be particularly hard when your sibling has autism and might have different strengths, challenges, and family expectations. In this loving book centered on the complexities of a relationship between a child and his sister, it looks at the small moments of joy and difficulty. Without ever using the word autism in the text itself, the book looks at the ways that neurodivergent children have unique needs but also enjoy many of the same activities and humor that all children do. This is a poignant story of an individual sibling pair that has many themes teachers can draw on to discuss more broadly the experiences of families who include children with autism. Ages 4-8.

Moon Camp
Written and illustrated by **Barry Gott**
Viking, 2021
ISBN: 9780593202678
Being away from home can be really hard, and this clever book captures this universal feeling when Lucas is sent to summer camp on the Moon. He would much rather play video games and sleep in, but instead he has to experience zero gravity, go on nature hikes, and avoid tripping on craters (which seem to be everywhere!). And like many kids in summer camp, Lucas misses his family and his planet. The humorous and detailed illustrations will engage readers in Lucas' plight, while the story includes positive themes about friendship and making the best of things, even when they are difficult. Ages 4-8.

No Reading Allowed: The WORST Read-Aloud Book Ever
Written by **Raj Haldar & Chris Carpenter**
Illustrated by **Bryce Gladfelter**
Sourcebooks, 2020
ISBN: 9781728206592
This tricky text is filled with homonyms, homophones, and playful punctuation to highlight the many ways that English may sound the same but have vastly different meanings. As the authors state, "you can't believe everything you hear." Haldar and Carpenter provide two sentences side by side that if read aloud sound the same. The illustrator accompanies each sentence with a simple, colorful illustration that ensures that the reader understands the differences between the two sentences. Teachers and children alike, who are studying homonyms, homophones, and punctuation or who find our language interesting, will find this book both amusing and helpful as they advance their language skills. Ages 4-8.

Ship in a Bottle
Written and illustrated by **Andrew Prahin**
Putnam, 2021
ISBN: 9781984815811
Mouse and Cat have problems living together, and this humorous book captures the adventures of Mouse as she escapes her life with Cat and navigates the world as captain of a ship in a bottle. The descriptive language, sophisticated vocabulary, and detailed illustrations will draw young readers into the story, as Mouse encounters creatures and situations that challenge her survival. Teachers will enjoy reading aloud and discussing this text with children, and all readers will connect with the emotions depicted by the characters through the very last page. Ages 4-8.

Rules of Wolves
Written by **Leigh Bardugo**
Imprint, 2021
ISBN: 9781250142306
In the final installment of the King of Scars Duology, war comes to the Grishaverse. The Demon King, Nikolai Lantsov, and his strongest allies, Zoya Nazyalensky and Nina Zenik fight to save Ravka from its enemies. Those familiar with Bardugo's Grishaverse will be at the edge of their seats to see if their heroes can defeat Fjerda's massive army. Told from multiple points of view that highlight the fight on multiple fronts, fans of the Grishaverse will devour this book. Ages 13+

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Emerging Scholar

The Utilization of Instructional Coaches on the Impact of Student Achievement and Teacher Instructional Practices in Reading and Math in Grades Three Through Eight

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Abstract

Instructional coaches may assist teachers in their continued learning by providing embedded professional development in areas of need. In this study, most sub-groups in the school district realized increases in proficiency levels in math and reading after the implementation of instructional coaches. Some sub-groups evidenced significant rates of improvement; however, English Language Learners demonstrated lower levels of achievement in both math and reading throughout the year. Both math and reading proficiency levels remain still low and even with instructional coaches in all schools, student achievement did not reach 50%. These findings suggest that the implementation of instructional coaches did not significantly impact student achievement scores, nor did the implementation of instructional coaches improve teachers' instructional practices. Problems with the successful implementation of instructional coaches are described in an effort to increase the positive impact of instructional coaches in the future.

Background

School districts face increased pressure each year to increase student achievement. Beginning with the publication of *A Nation at Risk* (1983) to the Every Student Succeeds Act (2015), public schools remain challenged to increase student achievement and close educational gaps in student subgroups. Today's administrators remain tasked with managing a school building as well as

serving as an instructional leader. Past solutions for improving student achievement focused on professional development and teacher evaluation models. Professional development, while intended to be an opportunity for professional growth, often is designed as one day sessions and frequently becomes "disconnected from deep curriculum and learning, fragmented, and non-cumulative" (Ball & Cohen, 1999, pp. 3-4). The delivery format as well as the lack of follow through to ensure teachers implement learned strategies into classroom practices, remain as areas of disparity in the traditional professional development model. Follow through and delivery format are critical in order to increase both students' achievement and teachers' content knowledge (Knight, 2005). Data demonstrate teacher evaluation models do not yield higher student achievement scores as desired after states revamped teacher evaluation formats (Dynarski, 2016). With the increasing high stakes accountability and the desire to deliver quality education, school districts continue to implement instructional coaches as a means to improve students' achievement scores. Instructional coaches**,** tasked with increasing teachers' knowledge of best practices, target the goal to increase students' achievement scores (Knight, 2005).

Instructional Coaching

Instructional coaching**,** developed in the early 1980s, responded to school districts' efforts to meet the on-going demand for support for teachers who "needed to learn how to meet the mandated, more stringent standards for student learning" (Neumerski, 2012, p. 322). With the inception of instructional coaches, the professional development model shifted and transformed. Schools began to hire instructional coaches to support teachers in their classrooms during the school year by creating collaborative cultures wherein teachers requested on-demand professional development opportunities, participated in co-teaching with content experts, engaged in reflective feedback conversations, and committed to strong collaborative relationships (Cohen & Ball, 1999). Knight (2007) describes collaboration as a necessary component for instructional coaching. In order for reflection to occur on teacher practices, it is essential conversations occur. Collaborative teams, engaged in creating norms in which they operate**,** begin meaningful conversations about student achievement and instructional effectiveness. When this culture exists, instructional coaching becomes impactful.

Sparks (2008) describes non-collaborative teams as not prepared, not focused, and not positive. Sparks (2008) further discusses when collaborative teams engage in creating norms, they structure a work environment that is student focused; otherwise, it is difficult to resolve issues. Successful teams focus, define roles and responsibilities, structure and set processes, and evidence positive behaviors and relationships (Sparks, 2008). With the creation and implementation of norms, members of collaborative teams help teachers remain focused and engaged and then take risks. Norms are not created as "rules;" they are designed "to ensure that teams develop shared knowledge of how collaboratively developed team norms are an effective tool for enhanced team effectiveness" (Eaker & Keating, 2012, p. 113). The processes of collaborating involve teams deciding norms; these decisions drive teachers' work and provide a chance to negotiate and define particular practices for the ongoing collaboration (DuFour et al., 2006). These norms enable collaborative teams to create the desired work environment.

Risks for teachers can be intimidating because a weakness could be exposed. This is when instructional coaching can be impactful. Instructional coaches are seen as proactively becoming

partners in school communities and not perceived as evaluators (Knight, 2007). Transparent communication establishes effective partnerships when teachers become aware of vulnerability in their instruction requiring revision. The dialogue in a professional learning community meeting can be the beginning point of a collaboration between a teacher and an instructional coach. Effective communication exists between an instructional coach and a teacher; in this way, the meaning of the message is not distorted because, perceived as a partner, it is more likely the teacher receives the meaning as non-threatening (Knight, 2007). In order for instructional coaches to motivate a positive impact on improving teachers' instructional practices, a trusting relationship is established. As partners, instructional coaches work with teachers and leadership teams to improve instructional practices with the aim to improve student achievement (DuFour et al., 2006).

As instructional coaching increases in practice, it is critical for administrators to identify coaches who exemplify effective teaching as well (Knight, 2005). Effective instructional coaches, as well as effective teachers, understand demonstrated classroom strategies and work side-by-side with teachers and administrators without evaluation. Knight (2005, 2007) describes how it is critically important for instructional coaches to truly believe in teachers while working deeply with them, side by side, in order to improve their instruction and affect student achievement. Research findings indicate coaching increases teachers' willingness to implement new instructional strategies and practices (Showers & Joyce, 1996). As teachers improve their knowledge and instructional practices, the desired effect is to increase student achievement.

Professional Development and Student Achievement

In the past, the traditional approach for professional development is for teachers to enroll in sessions, attend, implement the new practices, and supposedly indicate an increase in student learning. Yet, data demonstrates this traditional professional development model fails to yield higher student achievement scores (Ball & Cohen, 1999). A particular problem with this traditional model is teachers remain restricted to participating only in district sessions and learning remains passive (Ball & Cohen, 1999). Additionally, school districts often fail to equip teachers with the necessary tools and equipment required for effective implementation (Guskey, 2014).

Another difficulty is for teachers to choose areas in which they truly require revised learning. The traditional professional development model indicates a 10% implementation rate (Bush, 1984). With such a low level of implementation of practices learned, the question becomes, **"**why do school systems continue this ineffective method of professional development?" This traditional "sit and receive" model is no longer an effective practice if the goal is to impact student achievement.

With the immense pressure for schools to perform at high levels, school leaders seek to change professional development delivery and support new initiatives in order for teachers to not feel overwhelmed by changes that are poorly planned and not well supported (Knight, 2007). In order to positively affect student achievement, it is critical professional development programs include job-embedded follow up for a sustained period of time, identify a specific focus, and frame active teacher learning (Darling-Hammond et al., 2009). Incorporating instructional coaches in

schools identifies relevant content, provides support for implementation, and ensures immediate feedback.

Another disparity with the traditional professional development model is frequently there is no clear and targeted purpose. Those in charge of developing the professional development content often negate the essential element; the process of the session is completed with no focus on the end results (Guskey, 2014). Planners often prepare the necessary scope of the work and provide materials for the session but never touch on or evaluate the desired session outcomes. It is critical professional development focuses on student outcomes; designing professional development learning based on student success goals which drives professional development decisions (Guskey, 2014).

Another issue related to traditional professional development is the lack of follow up after teachers complete sessions. Follow up is rarely a goal of school districts. The problem with this lack of follow-up is there is no school district accountability to ensure student achievement is increasing as a consequence of the professional development. Instructional coaching generates from teachers' requests; this approach supports teacher effectiveness which, in turn, influences student achievement.

It is important to acknowledge that not only administrators become instructional leaders. It is the administrator's responsibility to create a culture of trust and collaboration in schools. When this culture of trust and respect is created, embedded follow up of professional development practices further extends educators' experiences.

As a component in the traditional administrator's evaluation, the post conference allows administrators to offer instructional advice and suggest professional development to strengthen teachers' practices. These administrative suggestions may, in reality, create a negative perception of professional development, as teachers perceive it as punishment for performing negatively in areas of performance (Tschannen-Moran, B. & Tschannen-Moran, M., 2011). In contrast, using the instructional coach model, evaluation and professional development remain apart (Showers & Joyce, 1996). As administrators work to improve classroom instruction and implement instructional coaches to facilitate teachers' understanding of effective instructional practices, the evaluation and coaching cycles for teachers remain as two different processes.

The desire to increase student achievement prompted states to reevaluate and rewrite teacher evaluation models (Hill & Grossman, 2013). Policy makers encroached upon teacher evaluation models. The results do not become a framework for improvement; rather, the feedback becomes a tool used for termination (Hill & Grossman, 2013). The failures of the evaluation models remain embedded into current state and district practices, thus only adding to an unchanging and ineffective process. Administrators, observing teachers, may not be knowledgeable in all content areas. Additionally, they may only observe a few times each evaluation cycle (Hill & Grossman, 2013). How effective is an evaluation model that requires an administrator to observe three hours of the approximately 1,260 hours an educator teaches each school year? Many current evaluation models do not provide for a complete and comprehensive representation of a teacher's effectiveness.

In 2009, 15,000 teachers in 12 school districts in the U.S. completed a survey regarding feedback given from teacher evaluations. Three-quarters of the teachers reported not receiving any areas of identified improvement on their evaluation results; almost half of the teachers who did report their evaluation identified an area of improvement received no subsequent support for improving in the deficit area (Weisberg et al., 2009).

Another evaluation model that researchers describe as ineffective is value added (VAM). The VAM model is based on the belief that, regardless of anything else, the gains students make on standardized tests relate to a teachers' effectiveness. This measure is based on a given assessment and assumes that no other influences affect the student's performance (Darling-Hammond et al., 2012). VAM models do not consider curriculum, adequate instructional time and materials, home life, individual student needs, prior teachers and schools, and specific tests used to generate the score (Darling-Hammond et al., 2012).

In the past decade, many states revamped the teacher evaluation systems with the purpose to create a more rigorous evaluation model with the intent to increase student achievement (Dynarski, 2016). However, when National Assessment of Educational Progress (NAEP) student scores from 10 years ago compare with current student scores, the test results do not match the effectiveness level scores teachers receive which generate from the revamped evaluation models. For example, in 2009, teacher effectiveness scores, based on state teacher evaluation models, included: Florida 98%, New York 95%, and Michigan 98% of teachers identified effective (Dynarski, 2016). In 2016, the Department of Education websites for Florida, New York, and Michigan, reported the following percentages for teachers identified as effective based on the evaluation models: Florida 97%, New York 97%, and Michigan 98%: however, the proficiency scores for the three states include: Florida, Grades 3-8, 52.6% proficient; New York, Grades 3-8, 38% proficient; and Michigan, Grades 3-8, 45% proficient (Dynarski, 2016). Evaluation models include checklists for what is observed in the classroom; most models fail to examine students' learning (Dynarski, 2016).

In order to meet federal and state reforms, school districts have utilized instructional coaches as a tool to help teachers improve instructional practices to positively impact student achievement. This study examines the effects of the utilization of instructional coaches.

Purpose of Study

The purpose of the current study is to determine if teacher instructional practices and utilization of instructional coaches support districts and schools to increase student achievement scores. While in the past, professional development and teacher evaluation models intended to increase student achievement, the field is currently studying the impact of embedded follow up with the utilization of instructional coaches. The research remains limited on what constitutes, "high quality coaching professional development" (Cobb & Jackson, 2011, p. 9).

In order for teachers to begin utilizing best classroom practices, instructional coaches help classroom teachers engage in high-quality and embedded feedback as well as guide in reflective feedback (Cobb & Jackson, 2011). Research indicates professional learning from sessions is more likely to be sustained across time when instructional coaches and instructional leaders work

with teachers to ensure that investigative pedagogies and enactment pedagogies become active in teachers' practices to ensure content knowledge growth and increased student achievement (Cobb & Jackson, 2011).

School districts and individual schools continue to struggle with accountability and the demand for increasing student achievement for all students. In order to support professional development and provide embedded follow up with teachers to ensure effective implementation of school and district initiatives, the instructional coach model warrants investigation. With professional coaches as support, teachers use effective and research-based instructional practices to improve delivery. The utilization of instructional coaches also allows for the professional development and evaluation processes to remain separate.

Research Questions

This study examines the effects of teachers' instructional practices and utilization of instructional coaches on student achievement scores in order to clarify if teachers' utilization of instructional coaches can assist schools in creating effective instructional coaching programs with the intent to improve student achievement. Research questions include:

1. Does the frequency of interactions with an instructional coach increase the instructional practices in reading in third through eighth grades?
2. Does the frequency of interactions with an instructional coach increase instructional practices in math in third through eighth grades?
3. Does instructional coaching impact student TNReady achievement in math in third through eighth grades?
4. Does instructional coaching impact student TNReady achievement in reading in third through eighth grades?

Theoretical Framework

Situated learning theory connects how learning occurs in school communities with effective implementations of instructional coaches (Smith, 2003/2009). Knight (2007) describes instructional coaches as "a partnership," with teachers, "built around the core principles of equality, choice, voice, dialogue, reflection, praxis, and reciprocity" (p. 24). The foundational beliefs framing instructional coaching become what Lave and Wenger (as cited in Smith, 2003/2009) describe as, "communities of practice" (para. 5).

Lave and Wenger (as cited in Smith, 2003/2009) believe learning is social and occurs in daily life. The use of embedded professional development by instructional coaches illustrates the point of situated learning theory. Relationships with one another that nurture within schools when the community works together as a whole for things that matter have a positive culture (Lave & Wenger as cited in Smith, 2003/2009). Communities of practice begin when the school community engages together with the instructional coach facilitating their learning. This journey of learning together builds trust and binds the community (Smith, 2003/2009; Tschannen-Moran, B. &Tschannen-Moran, M., 2011). Lave and Wenger (as cited in Smith, 2003/2009) believe learning is based on relationships between people and the relationships help create meaningful exchanges. Situated learning theory is rooted in the belief that learning is both personal and

social. For educators, learning is social, taking place in both their classroom and school communities (Borko, 2004).

Guskey (1986) explains the need for a new model for professional development in education. He believes a new pathway reflecting on instructional practices would support teachers' understanding of their students' ongoing learning. In order to promote student achievement, feedback on instruction may also support teachers' understanding. Furthermore, change can be challenging for teachers, and to ensure teachers receive regular feedback on student learning, it is recommended continual support and follow up be provided teachers after initial trainings (Guskey, 1986). Situated learning, making learning a community partnership with the direction of an instructional coach, allows these necessary changes to occur in a safe and supportive environment.

Communities of practice allow teacher learning to continue daily; learning is an ongoing process together with colleagues. When changes occur in teacher practices, teachers grow together as a community. The changes are trustful, community-based, and relevant, and positively impact school's effectiveness (Smith, 2003/2009).

Methods

This study used a non-experimental, quantitative causal-comparative design and used the Tennessee Comprehensive Assessment Program (TCAP) scores of students in Grades 3 through 8 to first examine if the use of instructional coaches indicates an effect on student math and reading achievement scores. Causal-comparative studies are done when no manipulation to a variable occurs and when no experimental designs become implemented. A comparative study approach is appropriate (Van Dalen, 1979). In this non-experimental study design, the researcher is not manipulating any variables that may alter the findings.

The study analyzed student proficiency rates a year prior to the implementation of instructional coaches and three years after the implementation to explain the effects on the proficiency rates across time on TCAP test scores in math and reading and also to determine if gains were maintained after implementation. The researcher sought to discover a rate of change between the percentages of proficient students on TCAP math and reading tests for four years. Examining the rate of change of proficiency allowed the researcher to identify increases or decreases of proficiency levels during the implementation of instructional coaches and years following implementation. The rate of change is the percentage of change at which a variable change across time. Proficiency is defined at which a student is meeting the target projection of grade level or above mastery.

Secondly, a correlational study was conducted with the survey administered to teachers in third through eighth grades. The correlation was to examine the instructional practices implemented in classrooms by teachers to the number of times a teacher utilized an instructional coach in their school. The purpose was to determine any correlations to the increase of instructional practices used by teachers and the frequency of utilization of instructional coaches in Grades 3 through 8.

Participants

Six schools in the school system serving 3,579 students in grades pre-school through eighth in a small-size urban school district in the Southeastern U.S. participated. The participants include all of the 91 teachers, Grades 3 through 8, in the six schools. Two middle schools serve 1,143 students and four elementary schools include pre-k through fifth grades with 2,436 students. Most of the students in the school system are represented by sub-groups identified by the state Department of Education. Based on the subgroups identified by the state, 91.8% of the students are in an identified subgroup.

Student ethnic groups were comprised on Asian (1.6%), Black or African American (18.8%), Hispanic or Latino (14.4%), Native American or Alaskan (0.3%), Native Hawaiian or Pacific Islander (0.3%), and White (64.6%).

Specific student groups included: Black, Hispanic, Native American (33.5%), Economically Disadvantaged (37.2%), Students with Disabilities (5.3%), English Language Learners (13%), Students in Foster Care (0.1%), Homeless (1.3%), and Migrant (0.2%). Student gender was 50.7% male and 49.3% female.

Teacher demographics showed 80% female, 8.8% male, and 2% no data recorded. Teacher ethnicity included American Indian or Alaskan Native (1.1%), Black or African American (1.1%), White (95.6 %) and Other - No Data Given (2.2%). Teacher years of experience had the following range: 0-3 years (11%), 4-6 years (16.5%), 7-10 years (12.1%), 11-15 years (17.6%), and 16+ years (40.7%). Teacher pathway to licensure accounted for 22% with a Master's in Education – Undergraduate Degree in Non-education Field, 66% with Traditional Undergraduate Degree in Education, and 4.4% with Alternative Licensure.

A survey adapted from the Wisconsin Center for Educational Research's Survey of Instructional Practices Teacher Survey Grades K-12 Mathematics and English (Blank, 2009) was used. The survey, in its entirety, included 412 questions and targeted Grades K-12. The survey was divided into different sections such as demographics of the classroom to instructional practices.

Data Collection

Student data in this study were gathered from the Tennessee Comprehensive Program (TCAP). Student data consisted of TCAP results for math and reading from the state achievement test administrations from the following years: 2009-2010, year of implementation of instructional coaches, 2010-2011, year after implementation of instructional coaches, and the 2011-2012 and 2016-2017 school years. Test administrations were based on the state allowable accommodations for students. The survey on teachers' instructional practices was sent to every third through eighth grade teacher in the school district. The survey consisted of selected questions from the Wisconsin Center for Educational Research survey. For the current study, the teacher instructional practices survey was used to collect teacher perception data on utilizing instructional coaches and instructional practices.

A correlational test on the teacher survey and a percent of change test was performed to determine if there was an increase or a decrease in state assessment scores. Tests checked for statistically significant results at the p =.05 level for the research questions. In the percent of change tests, utilizing proficiency data from Grades 3 through 8 in reading and math, data demonstrate the percentages in terms of student proficiency. The percentages reported represent the percent of students scoring in the proficient bands of advanced and proficient, and mastered and on-track. Data for this study was analyzed using a PC computer version of IBM's SPSS statistical software and Excel.

Data Analysis

Data was analyzed for the following research questions (RQ):
RQ 1. Instructional Coaching and Reading Practices. Does the frequency of interactions with an instructional coach increase instructional practices in reading in Grades 3 through 8?

When analyzing the data from correlations from the survey for questions regarding reading, approximately half of the questions showed a positive correlation and half indicated a negative correlation. No questions regarding reading and the number of times using an instructional coach resulted in a significant correlation. The following reading instructional practices show negative correlations: supporting arguments with evidence r = (-.005), n = 88, p = (.966), exploring language arts content with technology r = (-.040), n = 90, p = (.709), responding creatively to texts r = (-.042), n = 91, p = (.689), and making predictions and hypothesis
r = (-.008), n = 88, p = (.942).

These instructional strategies indicate direct links to the state standards on which students' assessment occur. The survey questions link to reading multiple texts, analyzing multiple texts, and generating a written text based on the texts read and analyzed. These are all higher order levels of thinking and analyzing for students to perform. These negative correlations could be the result of the instructional coach only providing surface levels coaching; it is desirable to implement a more rigorous form of a teaching model or of a co-teaching approach with teachers. There could also be a resistance to coaching from the teachers, or the particular instructional coach is not as effective to facilitate teachers on how to instruct on a more rigorous level to move students to higher levels of learning.

The instructional practices that revealed negative correlations indicate practices that remain essential to teach many of the state content standards set forth by the Department of Education that create the proficiency standards for students r = (-.138), n= 88, p = (.195) as shown in Table 1. In order for students to be proficient (on grade level) students demonstrate mastery of the content standards on the state assessment. There is no statistical significance in the frequency of interactions with an instructional coach and the increase of instructional practices in reading in third through eighth grade.

RQ 2. Instructional Practices and Math Practices. Does the frequency of interactions with an instructional coach increase instructional practices in math in third through eighth grade?

When analyzing the data from the correlations from the survey, data demonstrate seven negative correlations between math practices and number of times an instructional coach utilized by a teacher, but findings evidenced no statistical significance. Integration of math r = (-.070), n = 89, p = (.508), teaching with manipulatives r = (-.012), n = 87, p = (.914), reasoning mathematically r = (-.126), n = 84, p = (.246), applying mathematical concepts to the real world r = (-.034), n = 86, p = (.755), making predictions or hypothesis r = (-.022), n = 89, p = (.834), and assessing credibility and relevance of mathematical precision r = (-.053), n = 85, p = (.624). These math practices represent high level instructional strategies recognized by the National Council of Teachers of Mathematics. It is essential students master these practices in order to demonstrate proficiency on the state assessment.

The positive correlations, shown in Table 1, include instructional strategies, but not higher order levels of math practices. Again, it is important to analyze instructional coaches' effectiveness and interactions with teachers in order to determine coaching effectiveness in classrooms. There is no statistical significance in the frequency of interactions with an instructional coach and the increase of instructional practices in math in third through eighth grade.

Table 1

Correlations for Number of Times Teachers Used an Instructional Coach

Question	r_s	*Df*	*p*
I integrate math with other subjects	-.070	89	.508
I integrate reading with other subjects	.205	89	.051
I teach my students problem solving strategies	.004	89	.943
I teach math with manipulatives	-.012	87	.914
I develop students; communication skills in expressing mathematical concepts and procedures	-.096	84	.378
I teach students to reason mathematically and to evaluate mathematical claims	-.126	84	.246
My students solve word problems from a textbook or worksheet	.003	86	.977
My students explain their reasoning or thinking in solving a problem by using several sentences orally or in writing	.063	88	.556
My students apply mathematical concepts to real-world problems	-.034	86	.755
My students make predictions and/or generate hypotheses	-.022	89	.834
My students analyze data to make inferences or draw conclusions	.073	88	.491

My students assess the accuracy, credibility, and/or relevance of mathematical precision	-.053	85	.624
My students work with manipulatives to understand mathematical concepts	.009	84	.937
My students collect, summarize, and/or analyze information or data from multiple sources	-.026	89	.803
My students listen to the teacher explain or observe the demonstration of modeling of English, language arts, the reading and writing process	.011	87	.922
My students present or demonstrate to others	.109	88	.305
My students work individually on language arts and reading assignments	.033	87	.755
My students participate in whole group discussion about language arts and literature	.033	86	.701
My students engage in a writing process to support arguments with evidence	-.005	86	.966
My students use computers or other technology to learn, practice, or explore language arts content	-.040	88	.709
My students work on a project in which group members engage in peer revision and editing	.093	88	.382
My students explain their reasoning or thinking in solving a problem by using several sentences orally or in writing	.009	89	.933
My students respond creatively to texts	-.042	89	.689
My students make predictions and can generate hypotheses	-.008	88	.942
My students can analyze text information to make inferences or draw conclusion	.043	87	.687
My state content standards influence my instruction	-.138	88	.195
My district's pacing guide influences my instruction	.022	88	.839
The district textbook and instructional materials influence my instruction	.162	88	.128
State test results influence my instruction	-.201	88	.057
District test results influence my instruction	-.121	88	.258

I have many opportunities to learn new instructional practices with mathematics	.049	83	.654
I have many opportunities to learn new instructional practices for reading	.246	86	.021
How many years have you taught	-.117	87	.275

RQ 3. Does instructional coaching have an impact on student TNReady achievement in math in third through eighth grades? Examining the proficiency scores of math in Grades 3 through 8 shows increases and declines in scores in particular subgroups. See Table 2. The largest increase in proficiency gains show for the English Language Learner subgroup and the students with disabilities versus non-disabilities. Both sub-groups evidenced gains in proficiency levels in math. In the 2011-2012 school year, the second year of implementation of instructional coaches, data reveal an increase in proficiency in ethnic subgroups versus all, economically disadvantaged versus non-economically disadvantaged students, and students with disabilities versus non-disabilities. Data indicated a decline that year in the English Language Learner subgroup.

In 2016, data showed an increase in ethnic groups versus all and English Language Learners versus non-English Language Learners, and students with disabilities versus non-disabilities. These scores represent the test years (2010-2011, 2011-2012, and 2016-2017) versus the year before implementation (2009-2010).

When analyzing the proficiency percentages from year to year, decreases in proficiency rates become evident. In the 2010-2011 versus 2011-2012 school years, English Language Learners versus non-English Language Learners indicated the only subgroup to decline in proficiency. In the 2011-2012 versus 2016-2017 school years, English Language Learners versus Non-English Language Learners subgroup demonstrated the only subgroup to increase. All other subgroups evidenced drastic declines in proficiency levels. When analyzing the proficiency percentages from year to year, decreases in proficiency rates become evident. In the 2010-2011 versus 2011-2012 school years, English Language Learners versus non-English Language Learners indicated the only subgroup to decline in proficiency. In the 2011-2012 vs 2016-2017 school years, English Language Learners versus Non-English Language Learners subgroup demonstrated the only subgroup to increase. All other subgroups evidenced drastic declines in proficiency levels. It appears that the independent variable, instructional coaches, did not impact student math achievement in Grades 3 through 8 as measured by the TCAP.

Table 2

Math Proficiency Rates on TCAP

Student Sub Groups	2009/2010 school year implementation	2010/ 2011	% of Change	2011/ 2012	% of Change	2016/ 2017	% of Change
Ethnic subgroup vs all	21.7	28	29.03%	43.7	101.38%	30.6	40.78%

Economically Disadvantaged vs non	24	31.3	30.42%	45.6	90.00%	28.7	19.58%
ELL vs non ELL	15.4	23.5	52.60%	21.4	38.96%	26.1	69.16%
Students with disabilities vs non	16.1	33.2	106.21%	36.7	127.95%	23.1	43.17%

RQ 4. Does instructional coaching have an impact on student TNReady achievement in reading in third through eighth grades? The reading proficiency percentages fluctuate in sub-groups from 2009-2010 to 2016-2017. See Table 3. Every subgroup realized increases from the 2009-2010 school year except English Language Learners versus Non-English Language Learners until the 2016-2017 school year; and all sub-groups declined in proficiency percentages. From the 2010-2011 to 2011-2012 school years, English Language Learners versus Non-English Language Learners declined in proficiency. All other subgroups increased in proficiency levels. From the 2011-2012 to 2016-2017 school years, all subgroups saw significant declines in proficiency except the English Language Learners versus Non-English Language Learners sub-group. It appears that the independent variable, instructional coaches, did not have an impact on student reading achievement in Grades 3 through 8 as measured by the TCAP.

Table 3
Reading Proficiency Rates on TCAP

Student Sub-Groups	2009/ 2010	2010/ 2011	% of change	2011/ 2012	% of change	2016/ 2017	% of change
Ethnic subgroup vs all	39.5	42	6.33%	50.5	27.85%	24.9	-37.09%
Economically Disadvantaged vs non	38.5	46	19.48%	49.6	28.83%	24.1	-37.53%
ELL vs non-ELL	10.3	29.4	185.44%	8	-22.33%	7.45	-27.67%
Students with disabilities vs non	23.3	41.9	79.83%	37.8	62.23%	19.1	-18.03%

Summary of Findings

These findings illustrate the student state data prior to implementing instructional coaches as low. No sub-group approximated close to 50% proficient in math. The year after implementation, scores did increase in all sub-groups. This growth, however, did not maintain by all sub-groups.

In the 2011-2012 school year, scores for both English Language Learners and students with disabilities decreased. ELL diminished significantly to a level that was lower than the year before implementation of instructional coaches. This trend continued for the next few years. In the 2016-2017 school year, every sub-group decreased significantly to percentages lower than the year before implementation of instructional coaches.

Most sub-groups in the school district realized increases in proficiency levels in math and reading after the implementation of instructional coaches. Some sub-groups evidenced significant rates of improvement; however, English Language Learners demonstrated lower levels of achievement in both math and reading throughout the year. Both math and reading proficiency levels remain still low and even with instructional coaches in all schools, student achievement did not reach 50%. These findings suggest that the implementation of instructional coaches did not significantly impact student achievement scores, nor did the implementation of instructional coaches improve teachers' instructional practices.

Discussion

National reform movements have failed to significantly improve proficiency levels for students in math and reading in US schools. Many schools and school districts continue struggling to achieve increases in student achievement on state level assessments. Proficiency levels in math and reading remain low throughout the United States. This study is congruent with NAEP results.

Instructional coaching, when implemented and utilized effectively, may impact best practices teachers use in instruction; thus, their practices impacting student achievement. In this study, negative correlations could be the result of the instructional coach only providing surface levels coaching. There could also be a resistance to coaching from the teachers, or the particular instructional coach is not as effective to facilitate teachers to instruct on a more rigorous level to move students to higher levels of learning.

Instructional coaches can provide teachers with clear, concise, and effective feedback associated with instructional practices (Ball & Cohen, 1999; Cohen & Ball, 1999; DeFour et al., 2006; Knight, 2005, 2007). This immediate feedback has the potential to facilitate students to gain higher levels of achievement.

In the future, one important goal for instructional coaches is to create trusting relationships with teachers. Teachers cannot view instructional coaches as evaluative or as leaders who represent the capacity to enact punitive measures when teachers indicate vulnerability as they attempt to learn new practices. Rather, instructional coaches can become a tool for teachers to use in order to better their practices and build their capacity as instructional leaders in their school building.

Another goal is to provide coaches who represent specific content knowledge in order to coach teachers in specific content areas and, thus, impact student achievement (L'Allier & Elish-Piper, 2006).

In addition to coaches building trusting relationships with teachers and providing instructional content knowledge for teachers, it is important for school districts to examine how instructional coaches are utilized. The dialogue in a professional learning community meeting may serve as the beginning point of a collaboration between a teacher and an instructional coach.

Current findings indicate higher-level teaching strategies that require integration and higher order thinking and problem-solving skills did not occur as strategies on which teachers and instructional coaches collaborated. These higher order skills remain essential for students to acquire proficiency on the state assessment.

Although utilizing instructional coaches may indicate improvements in professional development and thereby increase student achievement scores, it is incumbent school districts consider the following questions generated from this study: What did the school system do to prepare for these instructional shifts, how did instructional coaches support teachers during these changes, what professional development did schools offer, did district assessments align with the new standards to provide teachers with data to inform their instruction, and did instructional coaches receive any specialized training in specific content areas to help teachers increase student achievement?

Results also question what did the school system do to prepare for these instructional shifts, did teachers know how to choose appropriate texts with Lexiles appropriately matched, how did instructional coaches support teachers during these changes, what writing instruction professional development did the district offer to teachers, what reading professional development did the district offer teachers, and did the district assessments align with the new standards to provide teachers with data to inform their instruction?

How teachers utilize instructional coaches to improve instructional practices may help school districts support effective student learning. Improved implementation of coaching strategies may assist teachers in their continued learning by providing embedded professional development and collaboration in areas of need.

Limitations

This study evidenced several limitations. First, the study was limited to six schools in a small district with only 91 teachers participating in the survey. Second, none of the current instructional coaches received their formal evaluation which described teacher effect scores and were not made available to the researcher. Third, administrators' post observation feedback was not reviewed; the researcher did not know if administrators recommended particular teachers seek help from instructional coaches for specific instructional practices. Also, there was no set procedure for administrators to follow through on any collaboration between the teacher and the instructional coach based on the post observation feedback conversation.

Fourth, the professional training of instructional coaches in this district was unknown. Fifth, some teachers did not utilize the instructional coach as often as they may have needed. Teachers who are struggling are not required to meet with the instructional coach a specific number of times. This allows for some teachers to not ask the instructional coach for help. Because of this, some ineffective teachers may remain vulnerable until the school creates a plan of improvement for the teacher. If school leaders do not act quickly with intervening with an ineffective teacher, students may develop academic learning gaps difficult to remedy in future years of instruction.

Sixth, some students in the different grade cohorts left the school system. Seventh, different instructional coaches serviced different schools which may have impacted teachers building a trusting relationship with the new instructional coach. The last limitation is the faculty who may have been new to the school and not yet trusting of the instructional coach.

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Emerging Scholar
"Productive Struggle" as an Effective Strategy in Elementary Math Classrooms

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Abstract

Productive Struggle refers to a strategy that gives students an opportunity to increase their background mathematical knowledge. Productive Struggle helps students connect key concepts, determine how and where an error occurs, and supports students in figuring out how to use their own thinking and reasoning skills to correct an error. Teaching without utilizing Productive Struggle instruction can lead to students being reluctant to work towards developing a deeper understanding of math concepts. Without a deeper understanding of mathematical concepts, students, who often do not perceive themselves as competent in math, may continue to find math difficult for them in the future.

Introduction

Productive Struggle (Murdoch et al., 2020) is an instructional strategy designed for teachers to help students use their own thinking and reasoning skills to solve math problems. The process helps students develop an improved understanding of conceptual math as well as to gain confidence in their abilities to solve problems.

Productive Struggle instruction is not a concept that is easily implemented. It requires teachers to know the material well enough to determine where a student may go wrong in the process and then, know how to guide them to the correct solution without directly providing the answer. Productive Struggle, as a part of instruction, enables students to develop confidence in their abilities, become more willing to take risks, and grow in their understanding of the content.

When students are building a new skill, it is not always comfortable for them. In addition, allowing students to struggle is typically not in most teachers' comfort zone, which begs the question: What is to be gained from this uncomfortable and time-consuming method?

Productive Struggle Instruction

Productive Struggle, as explained by Murdoch et al. (2020), is recognized both in policies and research as a signal of quality education. They believe Productive Struggle is an important and necessary strategy for teaching mathematics for conceptual understanding. Instruction in Productive Struggle can help students by teaching them how to problem-solve effectively. These skills will help students, not only in their current classroom, but throughout their educational time as well.

Traditionally, a common method of instruction in mathematics involves teaching students a formula or pattern to follow. These instructional methods provide students with the correct answer in a timely manner, but unfortunately, do not teach students how to independently solve problems. This leads to other issues in both their future math classes and in real-life situations.

Mathematics teaches students the important skills of how to problem solve and adapt in a variety of situations, not just get right answers. By only teaching formulas and not problem solving, teachers deny their students the opportunity to perceive themselves as competent at math; this perception undermines students' potential to become a problem solver.

Math problems are often tasks without clear solution paths. Effective teachers can provide their students with more than just a formula; rather, they can highlight the possibility of how students can solve problems by themselves in a variety of ways. The instructional method used to teach problem solving and help aid students in becoming more confident in their mathematic abilities is called Productive Struggle. Productive Struggle is an effective method for enhancing the process of mathematics teaching for the benefit of students.

Productive Struggle Goals

Productive Struggle instruction goals include students learning to think deeply, gaining understanding, and developing independent problem-solving skills (Amidon et al., 2020; Baker et al., 2020; Granberg, 2016). While students who develop their own methods may encounter more errors and take longer to solve the problems, they often score more positively on tests than students who use memorized procedures. Even if the students who created their own methods are incorrect, they are more likely to adapt their methods than their classmates who used memorized information (Granberg, 2016). By creating their own methods, students can create new pathways and develop connections to concepts previously taught in mathematics. Without assistance from teachers, this is much more difficult for students to accomplish if all they have previously learned to do is memorize how to solve a problem.

As teachers, one of the most limited resources is time. Spending time doing something deemed unproductive is not a common practice. It is more likely that teachers will evaluate struggling students as doing something unproductive and provide those students with steps in how to solve the problem rather than allowing the students to develop the techniques themselves. There is a possibility when teaching problem-solving, that teachers will reduce it to following an algorithm rather than allowing the students to reason it out for themselves (Brousseau & Gibel, 2005).

Another problem may arise when teachers become unwilling to allow their students to fail, so they make the problem easier to solve, taking away the chance for the students to develop problem-solving skills (Brousseau & Gibel, 2005). Struggle takes time and is often not seen as worth the risk to a teacher not familiar with the benefits of Productive Struggle.

However, teachers who use Productive Struggle are taking a risk. First, implementation of Productive Struggle requires teachers to truly know their content. Thorough knowledge of the subject matter increases teachers' effectiveness in challenging and encouraging their students to engage in Productive Struggle (Murdoch et. al., 2020).

Second, learners possess diverse background knowledge and require different strategies to challenge them. Because of this, unpredictable behaviors often occur as they struggle during learning events. Teaching Productive Struggle not only takes preparation and an in-depth knowledge of the content but also understanding of the individual students' needs in order to be implemented effectively.

Most research describing Productive Struggle regards secondary students struggling in mathematics (Baker et al., 2020; Granberg, 2016; Warshauer, 2015; Zeybek, 2016). Research describing implementation of Productive Struggle in elementary schools is limited. However, this approach is complementary to Constance Kamii's (1982, 2000) constructivist understanding of how young children (ages birth to eight) develop logico-mathematical knowledge. Kamii (1982) asserts, "Relationships are created by the child from within, and not taught by someone else from the outside" (p. 29). She advises teachers to create an environment that encourages children to think and make their own decisions. Kamii (1982) explains that the teacher's role is not simply correcting children's answers, but rather figuring out how the child made the error, and then guiding the child's "process of reasoning which is far better than correcting the answer" (p. 41). Similar to Productive Struggle, Kamii's (2000) approach supports children developing their thinking skills, rather than memorizing rules, as this will enhance their understanding of math concepts as well as build their confidence.

Lev Vygotsky's theory, zone of proximal development, can be found in several Productive Struggle studies. Struggle involves students doing scaffolded tasks that are within the student's understanding (Betts & Rosenberg, 2016; Vazquez et. al., 2020). Scaffolding allows the students to take steps towards the desired goal at a reasonable pace. These scaffolded tasks can lead to better memory of the material, a deeper understanding, and a chance to create more solutions to the same problem (Vazquez et. al., 2020). The key to Vygotsky's theory is for teachers to maintain high expectations of their students. In a study by Ewing et al. (2019), English language learners were thought to not have mastered English and were provided with problems outside their zone of proximal development. These expectations only hurt the students and the teachers. By providing problems within the zone of proximal development, students can develop their mathematic skills without becoming overwhelmed.

Brousseau's theory of didactical situations in mathematics has been implemented in Productive Struggle research as well. Granberg (2016) states that mathematics without struggle involves fast ways that will always lead to the correct answers. While this is an ideal output and useful in saving time, it does not prepare students for the future. Teachers wish for their students to

succeed. Some teachers find that when leading their students, they break down the problems until they no longer require critical thinking (Brousseau & Gibel, 2005). Effective teachers do not simply provide their students with procedures but allow the students to solve problems on their own and develop the skills necessary for all subjects.

The earlier students are supported in working through difficult problems, the better prepared these students will be throughout their education. Problem-solving skills are not limited to mathematics. Students who are supported in developing their own methods will likely be more successful in many other school subjects. Teachers may not initially acknowledge the time spent teaching Productive Struggle as worthwhile, but their students' test scores will reflect the benefits. More importantly, the students will become confident problem-solvers, an important life skill.

Benefits for Students

Researchers consider Productive Struggle as a crucial and natural part of the learning process in mathematics (Murdoch et al., 2020; Russo et al., 2021). Math problems are not meant to be similar. They are intended to be implemented in a variety of situations and designed to prepare students for life after the classroom. Through intellectual struggle, students learn from their own mistakes. Instruction in Productive Struggle encourages students to implement this knowledge in other tasks and improves their ability to be self-directed (Lemley et al., 2019).

Productive Struggle provides students with opportunities to thoroughly study difficult problems in order to determine similarities between them. This helps students to develop a deeper understanding of mathematics (Ewing et al., 2019; Lemley et al., 2019; Russo et al., 2021). Allowing students to correct their mistakes is another means to build mathematical understanding. This knowledge cannot be achieved unless students can determine how their mistakes were made, or if their teachers specifically guide them to where they erred in their understanding.

The idea of struggle can be defined as students attempting to understand something in mathematics that is not clearly discernible at first glance (O'Dell, 2018; Warshauer, 2015; Warshauer et al., 2021). The problems meant for Productive Struggle are difficult, but not impossible. Problems requiring students to think about the process of finding solutions provide challenge as they use their thinking and reasoning skills. Importantly, if they can immediately use memorized information, the problem does not promote Productive Struggle. Struggle is only productive when teachers implement it correctly, and students are able to gain understanding and problem-solving skills from the effort. Herein, lies the benefit for students engaging in Productive Struggle.

Productive struggle builds students' understanding of mathematical concepts (Warshauer et al., 2021). The more students do on their own will promote future mathematics learning. By productively struggling, a more thorough knowledge of the topic is developed. Students remember concepts longer and better than if they had only been taught the steps to solve by their teachers (Vazquez et al., 2020; Warshauer et al., 2021).

Productive Struggle indicates where students are lacking in their knowledge (Amidon et al., 2020; Granberg, 2016; Murdoch et al., 2020; Vazquez et al., 2020). If a teacher walks the student through a problem, there is no critical thinking involved. The students cannot determine if they know how to do all the steps on their own. By allowing the students to figure out the problems for themselves, they can discern the differences between their current knowledge and what they are trying to understand (Granberg, 2016). These students will be able to make their own connections to other topics, which will help them with encountering future concepts and reviewing learned material.

Students feel positive emotions when they productively struggle. When students are successful in their struggles, they feel pride (O'Dell, 2018). There is something special about being able to solve something without any aid from others. The more often students are afforded opportunities to feel prideful in their work, the more likely they are to see mathematics in a positive light. Students were also noted to feel joy when they finished a problem (O'Dell, 2018). When a teacher can link happiness together with mathematics, students will benefit. When students can fail and still want to continue dealing with difficult problems, Productive Struggle instruction is successful (Livy et al., 2018).

How to Teach Productive Struggle

Effective teachers instruct students in how to think like problem solvers. Through guiding and questioning, students become encouraged to determine exactly what is necessary for solving math problems. In general, a student's response to Productive Struggle is to practice, ask for assistance, or persist in struggle (Warshauer et al., 2021). When a student seeks assistance, it will usually come from a lack of understanding. The goal for teachers in this situation is not to tell the students specifically how to solve the problem, giving them steps and protocols, but instead, to scaffold and support them with guidance by providing students with strategies to help them to create their own methods and be able to solve the problems themselves in the future (Ewing et al., 2019; Warshauer, 2015).

There are several different strategies that can be used to teach Productive Struggle. For example, during instruction, the teacher talks the students through what they already know and provides them with questions requiring deep thinking. Providing questions for students encourages them to take the time to make sense of the problem they are trying to solve (Ewing et al., 2019). Unfortunately, there is not a set list of questions to ask. Productive Struggle requires teachers to adapt to each individual student and instruction varies with each type of problem (Lemley et al., 2019; Murdoch et al., 2020).

Another strategy used to teach Productive Struggle involves teachers inspiring their students to reflect upon their own work and become capable of explaining how they arrived at a particular answer. The ability to explain their own thinking enables students to develop their problem-solving skills. When students explain or show their reasoning behind how they arrived at their answer, the teacher helps guide the students with the knowledge of where they erred. In this way, students improve understanding and develop those skills for the next problem (Baker et.al., 2020; Betts & Rosenberg, 2016; Murdoch et al., 2020).

Another strategy to implement Productive Struggle instruction entails teachers initially providing students with problems in a new concept, and then providing instruction *after* the students have had time to explore (Vazquez et al., 2020). This strategy builds on student understanding of the material because the students can develop their own reasoning on how to solve the problem. They determine the elements of the problem and create connections with problems they solved in the past with similar elements.

A common problem when teaching Productive Struggle is to reduce the cognitive load. Teachers are accustomed to achievement that seems to be effortless (Livy et al., 2018). Most teachers wish to help a student who seems to be struggling. Not doing so appears neglectful, but this is not always the case. Students require adequate time to develop persistence to be able to complete the tasks themselves. When teachers help students solve problems, they diminish students' chances to build critical thinking skills, support their dependence on others when confronted with challenges, and extend students' struggles in the future.

The key to teaching Productive Struggle is to provide students with the tools to independently solve the problems (Warshauer et al., 2021). Similar to reading instruction where students learn to decode words themselves, teachers can help their students develop the ability to create a list of approaches to solving a problem. The more the students can do by themselves, the more effective their learning.

Effective teachers purposefully plan the time to create an environment where students are able to develop a deeper understanding of the topics. They encourage learning through process and building knowledge rather than attaining correct answers. While these teachers maintain high expectations of their students and their abilities, they prepare for and support Productive Struggle; when they do not, they deny students opportunities for growth and understanding (Ewing et al., 2019).

Productive Struggle in the Classroom

In Productive Struggle instruction, the goal is not for students to consistently and correctly solve the problems. Effective teachers shift their understanding of success to create opportunities for their students to build knowledge, not just show correct answers (Vazquez et al., 2020). Students who always get the correct answers do not necessarily understand how or why their answers are accurate. Students who fail can develop useful strategies for solving problems and determining where they went wrong (Amidon et al., 2020; Livy et al., 2018; Russo et al., 2021).

Hearing or seeing students' failures will help teachers. When Productive Struggle is happening, it is important the process is documented. The teacher's responses, the ways in which a student attempts to solve a problem, and records of how and why a student becomes "stuck" become important components that will be necessary to consider the next time the lesson is taught (Zeybek, 2016). The goal is to provide students with the necessary tools to independently solve the problems.

It is common for teachers to want to reward their students with free time to do as they wish, but in mathematics, that time can be used to benefit the more efficient students. Ewing et al. (2019)

discuss their study about a teacher who allowed the students to read when they were finished with their math instead of offering more challenging problems. Those students lost an opportunity to build upon their knowledge and gain a deeper mathematical understanding. In contrast, Betts and Rosenberg (2016), describe how students who finished quickly were challenged to find multiple solutions to the same problem. A problem with multiple routes to the solution not only engages higher-achieving students, but also encourages students to use other avenues that support their mathematical strengths.

Time is the key to Productive Struggle. In several studies, it was determined that given adequate time, ability to work in small groups, and an environment where students feel safe, students were able to solve the difficult problems (Ewing et al., 2019; Warshauer, 2015; Zeybek, 2016). Time is imperative for students to develop their own strategies and figure out whether the strategies will work or not. It also provides teachers with an opportunity to identify struggling students and guide them towards the correct path without hindering students' critical thinking.

Potential Productive Struggle Problems

Productive Struggle instruction is not without challenges. If the wrong tasks are chosen, students are likely to grow frustrated and will be unwilling to try again. A teacher that provides too many steps, reduces the cognitive load, or does not provide enough time will undermine Productive Struggle. A teacher who does not allow students to learn from their mistakes is preventing them from building a deeper understanding of mathematics (Ewing et.al., 2019).

Productive Struggle can lead to uncomfortable feelings in students. When a student is tasked with facing the unknown, it will often lead to anxiety (Murdoch et al., 2020). The first few times a student struggles productively, it will be difficult. Prior to this new problem-solving instruction, students were previously taught the specific steps to follow. In the former model, they did not understand what they did, only that they had to follow the identified steps. In Productive Struggle, many students push back, asking for help or saying they do not know what to do. They are unwilling to try because of the anxiety of getting the problem wrong.

Before students learn to productively struggle, many of them perceive their struggle as a weakness. When students observe themselves falling behind their classmates, it is seen as shameful. Shame will cause students to withdraw, lash out at others or themselves, or cause them to avoid the issue (Amidon et al., 2020). If this shame remains unchecked, the students could forever see themselves as "bad" at math. One effective strategy teachers use to deal with shameful feelings is to place less emphasis on correct answers and more focus on the learning process (Amidon et.al., 2020).

The benefits of Productive Struggle outweigh the challenges that may occur. Students develop a deeper understanding of mathematics, including the disparities between what they do and do not know. Even though Productive Struggle may lead to feelings of shame and anxiety in students practicing this method, the benefits include pride and joy in their accomplishments after succeeding in solving the problem. Regarding the time and effort, Productive Struggle evidences value for both teachers and students.

Parents and Productive Struggle

The effectiveness of Productive Struggle instruction is influenced by parents as well. Many parents were taught mathematics differently than current instruction. This causes parents to grow frustrated with new instruction methods and, sometimes, insist on the ways they are familiar with using. This will only cause problems for the student in the classroom. Once parents understand the benefits of Productive Struggle instruction and why teachers are choosing to implement this method, they will appreciate the advantages for their children.

Unlike teachers, parents are less likely to understand the necessity for struggle. They may not see the struggle as beneficial, only as a waste of time. Parents want their children to succeed, so the parents are likely to talk their child through the process, or just provide the correct answer and move on (Russo et al., 2021). Mothers who helped their children with their homework reported a negative attitude toward the experience. This was caused not by having to help, but because they thought of their child as helpless (Vazquez et al., 2020). This idea is not beneficial to the student or the parent.

Parents react differently to Productive Struggle in their children's homework. Parents who view their children as "good" at mathematics are more likely to allow their students to struggle because they believe their child has the background knowledge to solve difficult problems (Vazquez et al., 2020). Some parents were not content leaving their students alone. Parents with strong stereotypes linked to math are more likely to interfere with their child's homework (Vazquez et. al., 2020). In order for Productive Struggle instruction to be effective, a united front in implementation between the parents and the teachers becomes necessary.

It is helpful to inform parents about Productive Struggle instruction and how it includes teachers making time for students to solve the problems themselves. It is important for parents to understand that if a teacher tells the students how to solve the problem, the students lose the opportunity to develop a deeper understanding of the process. Additionally, parents may require assurance that teachers understand how a student's struggle will more effectively prepare them for the next lesson. However, the more a teacher knows about the topic and the moments in the problem-solving process with the highest potential to derail the student, the more effective the instruction will be along with increased opportunity for greater positive outcomes. Instruction in Productive Struggle cannot succeed in the classroom without parental support on the home front. Productive Struggle in the classroom requires many elements working together, including teacher and parent cooperation and understanding, to enable the students to be successful.

Conclusion

Productive Struggle is an essential method of instruction for mathematics (Amidon et al., 2020; Baker et al., 2020; Ewing et al., 2019; Granberg, 2016; Lemley et al., 2019; Zeybek, 2016). The key to this method of instruction is to allow students to struggle and come to appreciate the benefits of the process. If they do not understand the reasoning behind their struggle, they are more likely to give up on the difficult problems. Students engaged in Productive Struggle realize an additional advantage. Productively, struggling students outperform students with similar

capabilities who did not participate in this problem-solving instruction of Productive Struggle (O'Dell, 2018; Vazquez et al., 2020; Warshauer et al., 2021).

Productive Struggle encourages students to take risks (Livy et al., 2018; Murdoch et al., 2020; Russo et al., 2021). In order to build their own knowledge and understanding, students try out ways to find solutions. These methods may be successful or not, but by engaging in this process, students become more effective at problem solving in the future.

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Emerging Scholar
Multiple Intelligence in a Center Based Environment

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Abstract

The Theory of Multiple Intelligences (MI), originally defined by Howard Gardner (1993, 1999), continues to contribute to epistemological and pedagogical understandings and practices in the elementary classroom. The multiple intelligences manifest naturally through students' work; center-based learning is an effective approach to authentically activating children's innate intelligences. Centers provide an opportunity for students to explore a subject through varied experiences. The MI Theory reveals each child possesses particular intelligences and ways of understanding which supports their learning in unique ways. Consequently, traditional lessons taught in whole group settings do not satisfy individual needs. Furthermore, affording children with opportunities to determine choices in their own education, they become more motivated to engage with the material. Self-Determination Theory explains why an individual's interest in their schoolwork increases once they are empowered to make decisions about what they learn based on their interests. Building on Gardner's work, this current discussion suggests the most effective way to foster all intelligences is through choice-based centers. This overview of existing research supports implementing the theories of Multiple Intelligences and Self-Determination in the classroom. Recommendations for centers and authentic assessments are also included as a guide for reforming instruction to best benefit students.

Keywords*:* Multiple Intelligences, Intrinsic Motivation, Centers, Assessment, Student-Centered, Self-Determination Theory, Learning Styles, Small Groups, Units, Choice-Based, Constructivism

Introduction

Howard Gardner's (1993, 1999) Theory of Multiple Intelligences, as well as other literature, supports a student-centered approach in education. The Theory of Multiple Intelligences increased in popularity with educators because many were finding that not all students responded to traditional teaching approaches; thus, teachers sought to find an effective way to improve instruction in order to reach all their children (Strauss, 2013). With the defining of these intelligences in the classroom and the implementation of a student-centered approach, students have the opportunity to gain more control over their own education and also the chance to pursue their personal inquiries. Teaching is an evolving profession requiring both educators and students to adapt as they grow and develop. In order to provide students with dynamic learning opportunities that foster genuine interest in and understanding of class material, it is important for teachers to provide creative, inquiry-based, and explorative center options allowing students to operate in multiple domains.

For many educators, multiple intelligences become evident in all student populations as they work with children on a daily basis. Thus, it is important for teachers to develop an idea of how to activate MI's through different methods of instruction (Peterlin et al., 2021). Developing the strengths of learners is essential for student success in the classroom. Even though students manifest a particular intelligence, it does not mean they lack the skills of the other intelligences, or that they cannot operate in multiple domains. This is a key point to remember when deciding how a teacher wants to guide their students through the learning process. Many teachers believe that identifying the multiple intelligences in their students is the best way to guide their instruction, but when intelligence is identified by the teacher, it can lead to overly structured assignments (Jiajun, 2020; Kaya et al., 2007). It is critical students be trusted with the power to regularly decide for themselves how they can best engage with the content. Developing a one-size-fits-all lesson for students to follow does not leave flexibility for them to explore different approaches to the presented material (Sharon, 2001). Furthermore, if a teacher labels a child into a particular MI box, that may have the potential to narrow the child's educational experience. One solution to this potential limitation is to introduce centers and choice into the classroom. By introducing choice-based centers, students are granted more power over their own education and are allowed to manifest their intelligence(s) in multiple and dynamic ways. Ensuring multiple options for interest-based learning provides a way for children's inherent intelligences to manifest in a natural way. This can lead to a greater degree of intrinsically motivated effort as well as help students gain confidence in their abilities (Ballinger, 2011).

Providing students more freedom and choice can be an intimidating idea for some teachers. Teachers may worry that by giving students more control, the students will abuse their freedom and that the choice-based centers will lead to classroom management issues. Often situated in a curriculum-centered, standards-based paradigm, some teachers operate in a coverage mindset and worry about test scores. However, multiple studies describe how providing students with choice in their education increases their motivation to spend more time and energy on the learning task (Chang et al., 2016; Erwin, 2004). Not only does choice in the classroom benefit students academically, but it also develops lifelong skills such as self-regulation and problem solving. Additionally, the Self-Determination Theory supports these findings and concludes that

allowing students to make their own decisions promotes feelings of autonomy, motivation, and healthful functioning (Patall et al., 2010).

A difficult aspect of implementing choice into the classroom is understanding how the role of the instructor changes. In a student-centered and choice-based learning environment, the teacher's role is to guide students through their own explorations and discoveries. Traditionally, educators' training is to teach students based on the school curriculum, which can lead to narrowed pathways for learning and allow limited flexibility for students to explore content from multiple intelligences. The traditional methods of instruction may be more efficient in terms of content delivery and standardization, but it might also lead to burnout for both students and teachers (Oberle et al., 2020). One of the benefits of ensuring students the power to make their own decisions in the classroom is it leads to diverse, creative, and imaginative projects that inspire teachers and students alike while also maintaining a fresh, varied classroom atmosphere. Afforded control over their own learning, students demonstrate hidden talents and innovative ideas not possible through worksheets or scripted teaching and learning processes. By supporting students in their own search for knowledge, teachers channel their instructional energy into focusing on the individual needs of their students rather than creating standardized lesson plans targeting all learners.

In order to begin implementing these practices into the classroom, a base knowledge of the Theory of Multiple Intelligences, an understanding of the rationale for implementing choice-based centers, and a description of how choice and interest-based learning foster intrinsic motivation become important. This discussion provides educators with ideas and recommendations on how to apply these strategies into practice and additionally, illustrate specific examples of centers and project ideas. Finally, integral to the discussion, descriptions underscore the importance of authentic ways to assess students' work without the use of rubrics or tests. Research-based recommendations for instruction that fit within a child-centered paradigm will also be included. As the most effective and applicable methods of instruction become evident, teachers situate their teaching philosophy and decide how they will apply this knowledge to benefit their future students.

Literature Review

Finding a way to engage students in the school curriculum can be difficult because of the differences between each student and the nature of homogenized curriculum programs. Classroom instruction becomes impacted by a variety of factors. These include developmental stages, cultural identities, socio-economic status levels (SES), individual backgrounds, and multiple intelligences (Goetz et al., 2013). In order to instruct all students in an authentic way, teachers recognize the individual needs of each student (Kolman et al., 2017). Teachers view children as unique individuals, rather than perceiving them as a whole group. Understanding children's learning in this way, teachers use culturally responsive pedagogy, meet individual developmental needs, provide diverse and dynamic scaffolding, and allow for the natural manifestation of multiple intelligences (Sanders et al., 2016). When teachers evidence an awareness of the many differences in their children and participate in the freedom to create varied instructional experiences, they become better able to engage all of their students.

Multiple Intelligences

Howard Gardner indicates nine main multiple intelligences exist in humans (McClellan & Conti, 2008). He argues that people are not born with all of the intelligence they will develop in their lifetime, but that intelligence emerges as they grow and encounter new experiences. The original theory of intelligence states that each person has a general "g" intelligence that focuses on their cognitive abilities (Marenus, 2020). Gardner describes the nine intelligences as verbal-linguistic, logical-mathematical, spatial-visual, bodily-kinesthetic, musical, interpersonal, intrapersonal, naturalist, and existential (Northern Illinois University Center for Innovative Teaching and Learning, 2020). Gardner's research contributes to the development of instructional methods considered appropriate in support of children's unique and emerging minds. Many studies evidence these methods can be effective and valued by the children, which can positively impact intrinsic motivation (Gardner, 1993; Dueñas Macías, 2013; Kaya et al., 2007; Norris et al., 2004). The following provides a description of Gardner's nine multiple intelligences as they relate to the classroom environment.

1. *Verbal-linguistic intelligence* is referred to as "well-developed verbal skills and sensitivity to the sounds, meanings and rhythms of words . . ." (Northern Illinois University Center for Innovative Teaching and Learning, 2020, para 2.). Strengths for this intelligence include reading, writing, and speaking. Proper use of language is understood as is the meaning of written and spoken words. Students who have a strong verbal-linguistic intelligence might gravitate towards creative writing, debating a topic, or expressing their learning through a literature project. A person with a strong verbal-linguistic intelligence evidences the skills to speak, write, communicate, and learn new languages more easily (Gardner, 2017). These students benefit from meeting in groups to tell stories, reading books, taking part in a debate, playing word games, and writing for a class newspaper (Pal, 2011).
2. *Logical-mathematical intelligence* is the ability to think in an abstract and conceptual way. Students with this type of intelligence can find and interpret patterns in life and in schoolwork. If given center choices, a logical-mathematical intelligence would most likely engage with scientific or mathematical projects to investigate inquiries or explore the options of solving a challenging problem (Marenus, 2020). The purpose of teaching mathematics to students goes beyond providing them with numerical facts. Math requires students to use problem-solving skills that can be applied to other aspects of their life as well (Arum et al., 2018). When teachers provide the opportunities for students to explore their logical-mathematical intelligence capacity, they build their problem-solving skills and grow as learners.
3. *Spatial-visual intelligence* is defined as the capacity to think in pictures, images, and visualize in an abstract approach. Students who think in this way use both their visual input from the external world and internal imagery to think about and understand content on a deeper level. To aid students who identify most with this intelligence, an instructor might provide various artistic options of expression (Marenus, 2020). One barrier regarding this intelligence might be students with aphantasia which refers to a condition for which a person has reduced or absent voluntary imagery (Zeman et al., 2015). This means some students cannot visualize class material in the way that people with a strong spatial-visual intelligence can. This is one of many reasons why it is important for

students to be presented with various opportunities to learn rather than compelled to complete an assignment that requires them to do something they physically remain incapable of.

4. *Bodily-kinesthetic intelligence* is defined as the potential for a person to use their body to solve problems. Howard Gardner described how mental and physical activity become related and that a coordinated child could learn through this approach (Macnamara, 2016). Students with a strong bodily-kinesthetic intelligence communicate well through body language and learn best when something is first modeled by the instructor so they can mimic their actions. To most accurately assess what students with this intelligence understand, teachers provide students with opportunities to make or invent something with their hands, perform a dance, or participate in role-play. Centers in the classroom greatly benefit these students because they may evidence difficulty in sitting still for a lesson (Blumenfeld-Jones, 2009).
5. *Musical intelligence* refers to a skillset in performing, composing, and appreciating musical patterns (Marenus, 2020). Introducing music and sound into the classroom is critical for children evidencing a strong musical intelligence. These children become most aware of sounds in the classroom as well as in the real world. They benefit from engaging in band practices or listening to the different sounds of animals to better understand connections between species. These thinkers can communicate and find meaning through different sounds that may not activate the same type of learning for other students (Helding, 2010). Additional research describes how musical centers in the classroom benefits students because they can creatively interact with material through a method that best fits their learning needs (Ballinger, 2011).
6. *Interpersonal intelligence* is the ability to understand the motivations, intentions, and desires of other people. Additionally, people with this intelligence, possessing good social skills, work effectively with others (Macnamara, 2016). This way of approaching learning explains how they are able to easily relate to others. This intelligence can be activated in the classroom through partner or group work because these students learn best through personal interactions. Students with an interpersonal intelligence find it easy to understand the feelings of others and are able to see situations from their perspective. This understanding of others draws students with a strong interpersonal intelligence to other people which can lead to seeking out a career with a highly social aspect (Marenus, 2020).
7. *Intrapersonal intelligence refers to* "the capacity to understand oneself and appreciate one's own feelings, fears, motivations, and limitations as well as strengths," (Macnamara, 2016, p. 251). This definition is similar to that of interpersonal intelligence, but the main difference is whether the person better understands themselves or others. A child with a strong intrapersonal intelligence can easily reflect on their own thoughts and actions in a constructive way from which they can learn. These children are most aware of their own emotions, values, and beliefs. Students who think in this way might prefer to complete activities alone rather than with a partner or group. These students may express themselves as more self-confident and inwardly motivated. This type of intelligence helps students to guide their life decisions and supports their ability to self-regulate emotions (Mowat, 2011).
8. *Naturalist intelligence* is described as one's ability to connect with nature through environmental awareness. Students who have a strong naturalist intelligence can

recognize, understand, and appreciate the environment, making them more able to solve environmental and sustainability problems (Wirdianti et al., 2019). One way students express and develop a naturalist intelligence in the classroom is through outdoor activities. Students may garden or research living things surrounding the school (Hasanah et al., 2019).

9. *Existentialist intelligence* is defined as a sensitivity and capacity to develop and look for answers to deep questions about human existence (Northern Illinois University Center for Innovative Teaching and Learning, 2020). Students seek answers to questions such as "What is the meaning of life? Why do we die? How did we get here?" (Northern Illinois University Center for Innovative Teaching and Learning, 2020). A center-based environment allows students to pursue deeper questions and, in doing so, develop problem-solving skills in the process of learning about the world. Students with a strong existentialist intelligence are reflective in their approach to school and life (Northern Illinois University Center for Innovative Teaching and Learning, 2020). Most recently added to Howard Gardner's Theory of Multiple Intelligences, this intelligence is less developed than the previous eight intelligences.

Intelligences are not limited within children as some children evidence access to many or all of the intelligences, but they may demonstrate greater strength in some areas than others. Teachers include different classroom activities to help develop some of these intelligences in students; centers represent one of the most effective strategies to provide students with opportunities to develop multiple intelligences (Bautista et al., 2019). Providing students with multiple opportunities to explore through various methods of learning reveals the more prominent intelligences in the classroom. The Theory of Multiple Intelligences was not initially developed for educators to improve their practice, but once educators applied Gardner's findings, they found it to hold true in the classroom (Armstrong, 2018).

How to Use the Theory of Multiple Intelligences in the Classroom

The theory of multiple intelligences is not the same as an understanding of learning styles. The definition of intelligence according to Gardner is a "biopsychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture" (Gardner, 1999, p. 28). The term learning styles refer to "how learners gather, sift through, interpret, organize, come to conclusions about, and 'store' information for further use," (Chick, n.d., para. 1). The difference between intelligence and style in the context of teaching and learning in school is that intelligence refers to the strong computational power a person possesses, while their learning style is how the individual approaches a situation (Strauss, 2013). When it comes to determining a child's most dominant intelligence, it is important to remember that they will have characteristics of many of the other multiple intelligences as well. To effectively instruct, a teacher is aware of how the student interacts with the material, rather than focusing solely on their prominent intelligence (Dolati & Tahriri, 2017). When instructors focus too much on this idea of emphasizing a particular intelligence or activating a specific learning style, they begin to assign students a prescribed course of action, which moves the direction away from the learner-centered approach of teaching and into teacher-centered instruction.

A more efficient way to reach students is to offer multiple approaches to learning by setting up choice centers in the classroom (Dueñas Macías, 2013). During center time, students become empowered with the opportunity to make their own decisions about their learning. This student-centered environment introduces choice into the classroom, encouraging students to pursue their own interests and become more intrinsically motivated to learn (Norris et al., 2004). Today, in many classrooms, students remain compelled to follow someone else's rules and curriculum, and then take a standardized assessment that relies heavily on memorization of facts rather than fostering conceptual understandings. In order to ensure students, succeed in the classroom, it is important they are able to make decisions about their own learning, so that the environment becomes developmental, constructivist, holistic, and learner-centered (Kohn, 2020). Requiring students to follow a strict lesson plan that has only one option will not allow them to fully investigate their own interests. School is meant to be a place for students to explore and inquire about the world; if they are given a topic or assignment in which they have no interest, their curious minds may diminish, being shut down or ignored.

Self-Determination Theory

Multiple studies conclude providing students with some freedom and choice in the classroom leads to the development of an intrinsic motivation. This means students engage in an activity because they find it interesting and receive satisfaction in the process. Through intrinsic motivation, students exert greater effort and put more time in their work and projects which result in more authentic learning (Gagné & Deci, 2005). This motivation is further explained by Edward Deci and Richard Ryan's Self-Determination Theory (SDT). This framework examines the human tendency to move towards growth and outlines the differences between intrinsic and extrinsic motivation. The main difference between the SDT and other motivation theories is that its focus is on the strength of autonomous versus controlled motivation, rather than a total amount of motivation. Autonomous motivation helps with effective performance and well-being whereas controlled motivation takes away from these results, especially if creativity, cognitive flexibility, or deep processing of information is involved (Gagné & Deci, 2005).

The Self-Determination Theory also investigates the difference between intrinsic and extrinsic motivations particularly observed in the classroom. One core tenet of SDT, extensively supported by the research, is that "more autonomous forms of motivation will lead to an enhancement of students' engagement, learning, and wellness" (Ryan & Deci, 2020, p. 4). This is true for children at every level of development and across multiple content areas. Higher academic achievement is seen with autonomous forms of motivation, which is likely due to the internalized motivation that leads to a greater effort put forth by the students. As they increase their investment in the work, they identify more with the subject and come to realize a relationship with schoolwork in a positive way (Ryan & Deci, 2020).

Importance of Play and Inquiry to Activate Multiple Intelligences

The Multiple Intelligences Theory highlights the importance of moving away from whole group lesson plans and strategizing towards a less structured approach. Allowing students to play in the classroom is important in that they can discover their own interests. The Declaration on the Importance of Play states that "play is self-chosen, for without active choice and engagement the

activity is empty and reduced in meaning and significance" (IPA, 2014, p. 1). By definition, play is not rule bound. This means play is not attached to learning outcomes. Authentic play allows students to determine and use their diverse forms of intelligence; it evidences no objectives because this might undermine children's self-discovery.

Play is important for learning because it develops essential skills in the students that they will use for the rest of their lives. If a student chooses to play alone, they can improve on their individual problem-solving skills. This will help them when encountering challenging problems during a lesson. Students can also choose to play in groups which assist in building meaningful relationships and as well attain experience collaborating with others (IPA, 2014). Even if play is not directly related to students' academic learning, the experiences they receive through these hands-on explorations increase their engagement in the classroom (Kinkead-Clark, 2019). Data describe how students evidencing opportunities to play in the classroom become "physically healthier, more socio-emotionally grounded, more creative in their thoughts, have more developed oral vocabularies, and are able to engage in more complex critical thinking and problem-solving strategies" (Kinkead-Clark, 2019, p. 178). A center-based environment provides students with multiple opportunities to play because of the freedom to decide how they want to approach their topics of choice.

Incorporating Multiple Intelligence Theory in Classroom Practice

Creating a Student-Centered Environment

Building a student-centered environment in the classroom is essential when strategizing for student success (Ballinger, 2011). It is important students participate in learning opportunities involving social interaction while engaging in classroom activities and centers. Introducing students to this type of environment may take some planning; a highly scripted, teacher-centered approach undermines social interaction. A student-centered environment requires teachers to step back and allow children to inquire and discover on their own. Letting students choose how they want to investigate a topic and spend their time will ultimately lead to a positive shift in their motivation and academic performance (Patall et al., 2010). One art teacher found that allowing her students to be creative and push the boundaries of what they were asked to do resulted in work that was unique, imaginative, and inspired (McElhany, 2017). This is one example of ways in which students demonstrate their extensive capabilities when they have the freedom to explore. Teachers can only provide the conditions for students to authentically learn because ultimately, learning resides within each student. Standardization narrows learning opportunities and creates superficial understandings through memorization.

Using Centers in the Classroom

Educators acknowledge the idea of implementing traditional centers into their classrooms. Traditional centers operate with a specific task for students to complete in a certain amount of time. Then, the students rotate through the stations, so that the teacher can ensure they have a chance to engage with each of the activities. Having various stations for students to explore makes it easier to distinguish between activities and provides a way for teachers to monitor the classroom. However, this type of structured center approach does not foster a genuine

understanding of material or allow students to make authentic connections in their learning (Dueñas Macías, 2013). The predetermined activity at each station limits the options for students and narrows the range of opportunities for engagement.

Apart from the traditional center, Pattillo and Vaughn (1992) describes learning centers as "a defined space where materials are organized in such a way that children learn without the teacher's constant presence and direction" (p. 13). Howard Gardner's Theory of Multiple Intelligences suggests students need to have the opportunity to explore different approaches to learning (Dolati & Tahriri, 2017). This authentic learning is achieved when teachers afford their students the freedom to engage with material in whatever format most appeals to them. Providing this time for students leads to the development of an intrinsic motivation and genuine interest in school (Gagné & Deci, 2005).

Learning centers allow students to work both independently and in small groups. Taking away rules about timing and rotations through center spaces allows students to work at a pace and level that is appropriate for each child's individual needs (Ballinger, 2007). Importantly, centers reflect the interests of a student or group of students. Learning objectives and standards which limit the possibilities for center time and do not support children's choices do not belong in centers. Standards and objectives may be targeted in a small group setting where lesson plans are more structured and guided by the teacher. This customization of centers creates experiences that allow for meaningful learning on an individualized basis and provides students with greater potential for success in and out of the classroom (Pattillo & Vaughn, 1992).

It is important to remember that the idea of centers is not to attach a specific learning objective. Their purpose is to give students a chance to explore their interests in whatever way they see fit. This supports the idea of activating each of the multiple intelligences simultaneously in the classroom. Students can choose from an abundance of options provided by the teacher or generate an activity or project completely on their own. The options provided range in difficulty from simple to complex so that children can decide to challenge themselves or remain in a learning comfort zone. When students choose to repeat the same center or engage with material at a lower level than others, there is no punishment or shame. This choice might be their way of building a strong foundation with the topic before they can grow and challenge themselves. Centers provide an opportunity for children to use their imagination and learn in a way that is comfortable and fun for them. The freedom to choose what center they go to and how they express their understanding supports the Self-Determination Theory as students become more intrinsically motivated. They can choose to work by themselves, with a friend, or even with a group. In this way, centers can also provide opportunities for students to build social skills and learn how to collaborate with others.

Guided by two primary strategies, teachers plan for students' successes. First, as much as possible, teachers individualize learning. As a part of constructivist theory, students learn best when they can connect new learning with personal experiences or their prior knowledge (McLeod, 2019). One way to do this is by integrating technology that will adapt to each student's unique intelligence. Ensuring that each student feels comfortable in their learning environment will improve their confidence and therefore their success in the classroom. The second strategy is to pluralize teaching. This means that rather than following the one-size-fits-all curriculum that is

provided through textbooks and worksheets, teachers introduce a variety of options that their students can choose (Sharon, 2001). The freedom of a choice-based center environment will allow students to explore through their diverse intelligences, interests, and will fit within developmentally appropriate ranges that activate learning in a way that is rarely seen in a one-size-fits-all lesson plan. Providing center options in a classroom allows the teacher to present the same material to students in many ways. Students can then choose to remain at a single station and learn in that way, or they can rotate through the options, giving them a better understanding of a topic through differing methods of delivery (Strauss, 2013).

Setting up effective centers in the classroom can be challenging for teachers who are more familiar with traditional classroom teaching methods. Generally, educators are seen as having facilitative roles and believe that when the teacher is not leading instruction, he or she has lost control of the class. In contrast to a controlled classroom, effective classroom management involves creating an inviting and appealing environment for learning (Korpershoek et al., 2016). Choice-based center environments provide students with opportunities to gain confidence in their learning abilities and can help them recognize their own intelligence and potential to succeed. Various studies on classroom management in relation to center time reveal classroom management does not require students to follow strict rules (König & Kramer, 2016). When children are not allowed freedom of choice while engaging in centers, they disconnect from the material and may lose their interest in school all together (Bautista et al., 2019).

When reviewing learning center types present in elementary school classrooms, data illustrate the options for some subjects more common than others; additionally, time spent by teachers in the different centers varied widely (Bautista et al., 2019). Also, teacher-directed centers with time limitations defeat the purpose of giving students the time they need to inquire and explore their personal interests at their own pace. It is important students be provided with more freedoms and less restrictions for their multiple intelligences to manifest naturally and for them to have the opportunity to think in multiple domains (Barbot et al., 2012). For centers, students can be prompted with various choices or the option to create an original center idea of their own. The provided prompts might include different terminology based on the multiple intelligence they activate. The verbs that would be present at various centers demonstrate examples of how students might engage with the material. It is important to remember that these prompts ensure options for the students; prompts/verbs do not translate into measurable objectives for the class. According to McKenzie (2015), the verbiage used in choice-based centers might include: read, write, speak, or explain for centers that foster a verbal-linguistic intelligence. A logical-mathematical intelligence might be fostered by the following verbs: solve, question, hypothesize, or calculate (McKenzie, 2015). These verbs can be included in center prompts or suggestions that promote opportunities for the student's intelligence to manifest in dynamic ways. Likewise, a visual-spatial intelligence may be fostered by the following: observe, draw, create, or imagine (McKenzie, 2015). It is important to note that these verbs are not key terms in objectives and will provide a broader range of authentic learning and opportunities for applications that may not be quantifiable. In fact, choice-based centers should have no standardized objectives. Bodily-kinesthetic prompts could include build, play, dance, or move (McKenzie, 2015). A musical intelligence might be characterized by the following: listen, hear, echo, or mimic (McKenzie, 2015). As evidenced by these verbs, the teacher must plan an environment that is rich with diverse pathways for exploration and interest-based learning. Interpersonal could include

sharing, collaborating, interviewing, or influence (McKenzie, 2015). Similarly, intrapersonal could include express, evaluate, rationalize, or defend (McKenzie, 2015). Naturalist opportunities might include sort, classify, arrange, or map (McKenzie, 2015). Finally, existentialist opportunities could include reflect, synthesize, explore, or even dream (McKenzie, 2015). These verbs can be used as a guide for writing potential center ideas, but during class time, students should also be provided with the option to do something that is not listed by the teacher but is interesting to them (Norris, 2004).

Each of the verbs that can be used in instructional prompts at centers activates various parts of a student's mind, creating a more effective activity for them than a universal worksheet given to the entire class (McKenzie, 2005). The verbs become a starting point for students to use as a resource, helping them to brainstorm and guide their own thinking; these terms should not be used as a tool to grade students' work. Students may authentically demonstrate their learning from centers, but any assessment should be qualifiable and situated in the unique context of the individual's activities.

The wording of the center options is important because a narrow set of instructions could limit the possibilities for a student. For example, at a writing center, if an option is to learn the correct spelling of selected words from the dictionary, students will not be encouraged to understand the meaning of the word. However, if students were asked to create a story using words from a dictionary, they could generate unlimited ideas for a story. An effective center structure is to provide open-ended suggestions with unlimited possibilities that can involve a student's own motivations, interests, and passions (Armstrong, 2018).

Using McKenzie's (2015) center verbiage, many of the verbs align with Bloom's Taxonomy, which is defined as an educational framework that can be used to determine a student's depth of knowledge (Lin Hunter et al., 2020). It is a hierarchy of cognitive skills ranging from simple to complex comprehension (Bloom, 1956). The six levels of cognitive skills become more challenging as they progress, thus giving students the opportunity to challenge themselves (Bloom, 1956). When writing potential center options, teachers should consider using the higher cognitive skill terminology to promote more imaginative activities. These include the lower levels of cognitive process including remembering and understanding with indicators such as: memorize, list, summarize, and paraphrase. Center suggestions should also include opportunities for students to use middle level and higher-order processes like application, analysis, evaluation, and creativity. The indicators for these cognitive levels could include diagram, apply, compare/contrast, judge, defend, construct, plan, and produce. Using Bloom's Taxonomy can be a helpful reference throughout any aspect of teaching to ensure that students are meeting goals that activate higher order cognitive skills and do not simply ask students to memorize information.

Choice centers provide a time for students to develop skills on their own in whatever way they choose. Centers do not contain any objectives or standards regulating students. Regulation restricts the possibilities and defeats the purpose of a student-centered environment. However, it still remains important for teachers to maintain the standards and objectives for their grade level but through different means. In addition, they need a concrete way to assess student progress throughout a unit.

For example, during center time, teachers can create small groups and teach more-individualized content. This allows teachers to more accurately gauge where each student is in their understanding (Weiss, 2013). Students will then have the opportunity to develop a deeper understanding of a concept through the guidance of the teacher (Armstrong, 2018).

Effective Methods of Assessment

Teachers can assess their students in many ways without the use of tests or assigning letter grades to their work. Some of these ideas include projects, presentations, or products of students' center explorations. Student-driven projects can be open-ended and allow students to explore a topic in whatever way they choose. This is similar to the reasoning behind centers because a strict rubric limits the possibilities inspired by the multiple intelligences. Projects can be guided by an overarching topic, but then students experience the freedom to go in whatever direction they choose. Presentations afford a similar element of freedom as the projects. The assessment aspect originates in the teacher's examining knowledge and understanding holistically which can be recorded through anecdotal records. The teacher can pose prompting questions to the students about their project and determine if there are still gaps in their understanding. While tests and rubrics may be easier to produce and grade, they do not represent the same depth of understanding as projects and presentations provide (Armstrong, 2018).

To help children embrace their creativity and individualism in the classroom, teachers provide options of open-ended assignments and projects that can be assessed authentically by the teacher. The goal of an authentic assessment is to determine the students' conceptual understanding. The focus of the assessment is not to grade the work or rank it against others, but rather, for the instructor to see where the student is missing some information and determine how they can reintroduce it later in the unit. One strategy to accomplish this is for students to present their projects, sharing with the entire class or with a small group what they discovered about their topic of interest. The teacher can then write an anecdotal record, a detailed descriptive narrative written after a specific behavior or interaction and use this note to guide their instruction (McFarland, 2008). It is important teachers provide documentation for their students to show growth; authentic assessments can align with standards. However, rather than benchmarking, authentic assessments can be used to guide students through their own continuum of learning on their own timetable. In this way, teachers individualize the assessment for each child and nurture each child's independent growth at their own pace. If teachers emphasize students meeting each of the grade level standards, they run the risk of pushing a child through material they do not yet fully understand, leaving them unprepared for future units that may require them to build on previous knowledge.

The rationale for ensuring students create personalized projects to demonstrate their understanding is tied to the idea that each student learns in different ways. Children develop at different rates and expecting each of them to be able to produce the same prescribed product representing their understanding would not provide true insight into what they actually understand. According to Marenus (2020), one of the most important educational implications from the Theory of Multiple Intelligences can be summed up through individuation and pluralization. Individuation reveals that because each person differs from one another, there is no reason to teach and assess students identically. The identical assessments that are seen in

classrooms today consist of multiple-choice tests that encourage memorization rather than investigation of the topic.

Conclusion

Instructional practice that is informed by the Theory of Multiple Intelligences continues to indicate a positive effect on student achievement (Hanafin, 2014; Kaya et al., 2007). The Theory of Multiple Intelligences enhances learning, teaching, and assessment in schools (Hanafin, 2014). Incorporation of choice-based centers in the classroom promotes the ideas behind Gardner's theory and provides more opportunities for authentic learning across multiple domains than traditional instructional methods. The one-size-fits-all lesson that relies on textbooks and worksheets prioritizes verbal-linguistic and logical-mathematical intelligences at the expense of the other seven intelligences, which remain equally important (Lynch, 1992).

Choice-based centers provide the most flexible opportunities for developing multiple intelligences in students, but that does not mean it is not possible to develop these skills during a whole group lesson. All of the multiple intelligences identified by Howard Gardner exist in every classroom so that teachers can provide experiences to promote the less predominant intelligences in their instruction (Dueñas Macías, 2013). Allowing students to choose where to develop their new knowledge of a subject leads to more flexible lessons. Knowing about the benefits of activating multiple intelligences affords teachers an increased probability of ensuring their students succeed in and out of the classroom. Encouraging students to pursue their own interests will enhance their intrinsic motivation and support their determination to achieve academically. Providing students with choices in their education can positively impact their overall academic achievement. When the learning environment is too controlling, autonomy and intrinsic motivation become reduced and burnout for students and teachers alike is more common (Patall et al., 2010). It is important students be provided with the power to decide how they want to learn so that their multiple intelligences are activated. Choice-centers remain one of the most effective ways to provide these engaging and creative opportunities for individual achievement in the classroom.

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Updates

Thank you for your continued support of the International Journal of the Whole Child and our commitment to holistic learning and to the development of the whole child. To improve the efficiency of the journal, we have updated our submission and publication dates. Beginning Fall 2021, submission deadlines for the Fall will be September 30th. The submission deadline for the Spring will be February 28th. The Fall issues will be published in December and the Spring issue will be published in May. Lastly, our journal has officially moved to the APA 7th edition. We ask that all authors adhere to this edition when submitting your manuscript for review. Thank you again for your continued support. We look forward to seeing you in Spring 2022.