Tennessee Association for Childhood Education International

International Journal of the Whole Child

Volume 5, Number 2

December 2020-May 2021

ISSN 2474-297X

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International Journal of the Whole Child

Editorial Team

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Introduction

Tiffany Wilson, Editor

This Fall issue is fully committed to providing readers with information that promotes the holistic learning and development of children. The content provides teachers, parents, and pre-services candidates with several strategies to support a variety learning experiences for students inside and outside of the classroom.

Articles:

The Importance of Learning Through Play in Early Childhood Education: Reflections on *The Bold Beginnings* Report
Manal ObedAullah Alharbi, Mona M. Alzahrani

In the article "The Importance of Learning Through Play in Early Childhood Education: Reflections on *The Bold Beginnings* Report," Manal ObedAullah Alharbi and Mona Mohsen Alzahrani compares two perspectives on using play while learning. The authors of "*The Bold Beginnings*" support the idea of providing a structured learning environment as the best approach to helping children in early childhood reach academic success earlier upon entering elementary school. Moreover, Alharbi and Alzahrani explain the added benefits students receive when play is incorporated into the learning process, as it encompasses a more holistic approach to learning.

Pictures for Reflections

Bubbles and Balls in Belize: A New Perspective on Play
Rebecca Giles
Photographs by Jim Hoot

"Bubbles and Balls in Belize: A New Perspective on Play," by Rebecca Giles, sheds light on the importance of allowing children to engage in what is already available instead of creating an environment of play that could be too restrictive. After more exposure to the different dynamics of play during her visit abroad, the experience provided a new definition of creating the best possible learning environment for young children.

Tech Talk

Finding Flexibility with HyFlex: Teaching in the Digital Age
Leslie Trail, Stacy Fields, Nancy Caukin

With the impact that the year of 2020 has had on different areas of life, Leslie Trail, Stacy Fields, and Nancy Caukin draw attention and discuss changes on the delivery of education, in the article "Finding Flexibility with HyFlex: Teaching in the Digital Age." The authors recognize that the challenges in delivering instructional material during the spring 2020 semester pushed teachers of all levels to seek alternative ways to teach that would continue to be engaging. In this article, Trail, Fields, and Caukin describe the various ways that the new school year began, in terms of delivery systems. The authors further discuss the implications of one specific educational delivery service: the online and in-person blend of teaching. This modality gave name to the HyFlex model because of its need for flexibility for both educators and students. The authors further describe the values of this model as well as personal experiences from the authors.

ETC.

Using Children's Books to Foster a Growth Mindset
Angela Danley

In "Using Children's Books to Foster a Growth Mindset," Angela Danley writes about the important role parents and educators play in promoting a growth mindset in children. Danley explains that the process of fostering a growth mindset is important to begin during childhood to be best equipped with the skills to maintain a growth mindset as the child ages. Danley describes the use of books as a way that parents and educators can help children foster a growth mindset. In this article, Danley specifically provides "Beautiful Oops" by Barney Saltzberg and "Stickley Makes a Mistake: A Frog's Guide to Trying Again" by Brenda S. Miles as two examples of books that promote a growth mindset through resiliency.

Children and Families: Health and Wellness

Sleep Hygiene: Evidence for a Healthy Family Habit
Barbara Whitman Lancaster

Barbara Whitman Lancaster dives into the discussion surrounding sleep hygiene in the article "Sleep Hygiene: Evidence for a Healthy Family Habit." In the article, Lancaster describes sleep as a mystery, yet its power can revitalize and rejuvenate everyone, regardless of age. Nevertheless, not practicing sleep hygiene can affect various areas of health (e.g., obesity), performance (e.g., decreased school performance), and attitude (e.g., poor behavior). Even though sleep hygiene is crucial to overall health, healthcare providers often times do not discuss sleep hygiene. Therefore, in this article, Lancaster aims to inform the importance of sleep hygiene to parents by defining sleep hygiene, explaining overall benefits, and providing the overall process of sleep hygiene.

Education by the Numbers

How Does Level of Education Affect Income?

Donald Snead

In "Education by the Numbers," Donald Snead brings awareness to the affect that level of education has on annual income. In his summary, Snead reviews earnings based on various levels of educational attainment and compares the earning among gender as well as race.

STEAM

Innovative and Engaging Approaches in a Middle School Science Classroom: Ideas to Capitalize on Student Interest

Shelley Wermuth

In "Innovative and Engaging Approaches in a Middle School Science Classroom: Ideas to Capitalize on Student Interest," author Shelley Wermuth shares a middle school teacher's experience in shifting the current educational paradigm to a paradigm that is more inclusive of innovative approaches in STEM education. In this article, Wermuth discusses the literature supporting the move of a curriculum-centered paradigm to a student-centered paradigm. The review of the literature explores the changes in the instructional delivery, such as with the use of technology, of STEM courses has provided a learning environment where students are not actively engaged in the learning process. However, a student-centered approach to STEM courses highly encourages active experiences and meaningful integrations among other benefits.

Page Turns: Books for Children

Page Turn: Books for Children

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

Katrina Bartow Katrina, Carla K. Meyer, Michelle Sobolak, Patricia Crawford, and Maria T. Genest review a collection of children's literature. They provide literature for children of all ages aimed at various developmental areas.

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The Importance of Learning Through Play in Early Childhood Education: Reflection on *The Bold Beginnings* Report

Manal ObedAullah Alharbi [a], Mona Mohsen Alzahrani[b]

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Manal O. Alharbi is a Lecturer in the Early Childhood Education program at Prince Sattam Bin Abdulaziz University in Saudi Arabia. Manal Alharbi has worked as a kindergarten teacher in Saudi Arabia, and experienced training in American schools. Alharbi's research interests focus on early childhood policy, curriculum development, and play-based pedagogy. Alharbi is a strong advocate of play-based instruction which, in addition to supporting academic growth, remains holistic and most appropriate for young children's learning. Alharbi currently is pursuing her doctorate in Early Childhood Education at the University of South Florida.

Mona M. Alzahrani is a Lecturer in the Early Childhood Education program at King Khalid University in Saudi Arabia. Alzahrani has worked as a kindergarten teacher in Saudi Arabia, and experienced training in American schools. Alzahrani's research interests focus on children's development, play, and parent involvement. Alzahrani currently is pursuing her doctorate in Early Childhood Education at the University of South Florida.

Abstract

In this paper, authors reflect on the implications of the report titled "*Bold Beginnings: The Reception Curriculum in a Sample of Good and Outstanding Primary Schools*" (Ofsted, 2017). This report is a review of curriculum for four-and five-year-old children in the United Kingdom. The *Bold Beginnings* report argues for teaching young children more academic subjects, instead of introducing learning through play. The report claims when children learn more academic curriculum early without spending too much time on play, they become ready and qualified in their academic lives which in turn, makes instruction easier for their future elementary school teachers.

In contrast, this paper focuses on the importance of allowing young children to learn naturally through a variety of play experiences. The authors argue play is holistic and provides children with a range of support including mental and emotional well-being, social interactions, and physical challenges. The premise for this paper underscores the critical importance that children play and learn about the world with relevance, authenticity, and developmentally appropriate opportunities. Early childhood settings become an extraordinary space for this natural and

holistic learning to occur. After describing how play most effectively accommodates children's unique needs and individual development, authors explain how learning through play provides children the opportunities to grow in a risk-free environment, communicate with peers, express feelings and thoughts, discover and investigate various subjects, improve social-emotional skills, develop language and vocabulary, enhance cognitive capacity, build self-esteem, prepare for life, and establish a foundation for the next stage of school. Early childhood teachers can help students to do all this and more by providing learning through play.

Keywords: Play-based learning, learning through play, academic curriculum, early childhood settings, early learning, children's holistic development.

Critique of *Bold Beginnings* Report

Bold Beginnings: *The Reception Curriculum in a Sample of Good and Outstanding Primary School*s (Ofsted, 2017) report highlights the importance of early learning in preparing four- to five-year-old children for an effective and supportive transition to kindergarten in the United Kingdom. Ofsted is the acronym for *The Office for Standards in Education, Children's Services and Skills* whose main purpose is to regulate and inspect childcare. The Majesty's Chief Inspector of Ofsted (2017) collected data for the period of 2016-17. The report generated data using a thematic survey, school visits, an online questionnaire, and analyzed more than 150 inspection reports of primary schools in the UK. The aim of this report was to gain a deep understanding of the curriculum and how it is implemented. Ofsted used the information sources and observations of 41 school visits to compare these schools and distinguish differences in practices. This data is intended to improve the different aspects of education such as informing policy makers, advising counselors, and influencing curriculum designers, as well as impacting the global thinking about the importance of academic curriculum.

The Ofsted report describes the potential of using academic curricula to teach the basics of reading, writing, and mathematics to young children as well as to prepare them for life and their first year of school. According to the report, it is important for children to learn these academic skills and apply them in the early years. In addition, this report discusses how children who daily practice the academic skills demonstrate academic success in later years. Furthermore, the report claims successful learning programs set their targets with appropriate academic curricula to meet children's needs for the first year of school instruction. For example, the report suggests that teachers instruct reading through systematic phonics direct instruction and teach mathematics with a focus on children's ability to count and compare numbers. The report states that "the ability to read, write and use numbers is fundamental. They are the building blocks for all other learning. Without firm foundations in these areas, a child's life chances can be severely restricted. The basics need to be taught – and learned – well, from the start" (Ofsted, 2017, p. 10). *Bold Beginnings* emphasizes transforming learning in the early-childhood setting from free-play, exploration, and child-guided experiences to traditional, direct instruction based on literacy, mathematical understanding, teachers' guidance, and less play. However, an open letter signed by more than 1,850 educators believe this report should be rejected as it would have a negative effect on children and undervalues play-based approaches for children (TACTYC, 2017; Ward, 2018).

What is Early Childhood?

Are the early years an important designation of time for children to learn through play? The Ministry of Education in the Kingdom of Saudi Arabia [MOE] (n.d.) recognizes early childhood as a stage in which children require nursery education and learning through exploration and play; this means, teachers should prepare children, ages three to six, for entry into general education with the important foundation of play. In the United States of America, the National Association for the Education of Young Children [NAEYC] (n.d.) defines early childhood as a period of time in which children go through a rapid period of development and growth. NAEYC indicates that children's brains develop quickly, so these years are essential for the foundation of children's social skills, self-esteem, and cognitive development. Moreover, Heikkilä, Ihalainen, and Välimäki (2004) emphasize that early childhood settings are places where children spontaneously play and interact educationally. Such settings promote the balanced growth, venues of learning and development, and are designed to advance children's knowledge and realization.

The online Free Dictionary (n.d.) defines early childhood as "the early stages of growth or development." According to the online Etymology Dictionary (n.d.), the Old-English word *cildhad* divides the word into "child and hood" and means the "state of being a child; period of life birth to puberty." The online Oxford English Dictionary (n.d.) also references the Old-English word *cildhad* and defines early childhood as the "state or period of being a child." These three online dictionaries agree that early childhood is the time of being a child.

Theories in Play

The "time of being a child" is the focus of many early childhood theorists. According to Mooney (2013), Dewey's, Montessori's, Erikson's, Piaget's, and Vygotsky's theories stress the importance of learning through play in early childhood settings. These theorists agree that "education should be child centered; education must be both active and interactive; and education must involve the social world of the child and the community" (Mooney, 2013, p. 4). Play provides all these necessary components (Dewey, 1938; Montessori, 2008; Piaget, 1962; 1976; Vygotsky, 1976).

Children will easily explore and learn through play in an effective way, including content skills. The most important role of children's educational setting is to build their experiences based on their past learning and knowledge and help the students to understand the content effectively. Preparing the environment for children's learning is a vital task that every teacher in the early-childhood setting seeks to accomplish. In a prepared and planned environment, children will learn by exploring, discovering, investigating, thinking, and using the materials in their classrooms.

Montessori (2008) believes that children learn effectively through sensory experiences and can develop life skills through interactive classroom opportunities. Piaget (1962, 1976) emphasizes the idea that the interactions between the children and their environments create learning. Piaget and Montessori describe the importance of an open environment which provides a range of possibilities for children to discover and construct. Piaget (1976) also stresses the importance of

play as an important avenue for learning (Mooney, 2013). Through play, children experience opportunities to become well prepared for life and fully develop in mental, physical, emotional, and social ways.

Furthermore, Vygotsky (2004) confirms that children learn when play takes place in their journey of learning and development. Vygotsky transformed the ways in which educators think and view play. Play is an essential part of children's learning in all different domains. In addition, he believes development and language remain connected and build on one another, and play assumes an integral role in children's development and learning. He highlights in his explanation of the Zone of Proximal Development (ZPD) that teacher's scaffold children's learning and development through play-based learning. In this ZPD, through play, teachers can support children at the first stage and then withdraw slowly so children can independently complete the task. Children can go beyond their limits of their ZPD with the support of the teacher through play.

The Importance of Learning through Play in Early Childhood Education

Similar to the Ofsted report in the UK, the early childhood curricula in the United States is making rapid changes from learning through play to following more standard curricula (Miller & Almon, 2009). Compared to the previous curricula, the new standard curricula require children to spend more time on mathematical and literacy instruction instead of allowing children to learn these concepts through play.

Even with a movement toward direct academic instruction in the early years as indicated by the Ofsted report, there is still a shift toward the use of play-based learning in early education in various countries (i. e., China, Canada, New Zealand, Sweden, United Arab Emirates) (Danniels & Pyle, 2018). Play-based learning understands that children learn while they play, both developmentally and academically (Danniels & Pyle, 2018).

Playing does not mean children are wasting time; at this young age, children predominately learn through play (Danniels & Pyle, 2018; Thomas, Warren, & deVries, 2011). Learning through play develops children's health, imagination, social-emotional competencies, language skills, and physical capacities. Moreover, children at this age are growing in all domains of development, especially their mental health. Through play, teachers are able to recognize and address any developmental or health problems that children may exhibit. When children engage in complex socio-dramatic play, they have the opportunity to develop their language and social skills, empathy, imagination, self-esteem, self-control, and higher levels of thinking.

Aljarrah (2017) describes Froebel's and Vygotsky's claim that play is a developmental tool in children's pre-school years, and creativity can be fostered effectively as an essential skill for life. According to Aljarrah, play is the children's business and their way of discovering the world.

Vygotsky (2004) states that play-based learning is necessary in early childhood in order to learn the new ideas and experiences about the world. Rich experiences are necessary for adequately informing imagination. Some researchers argue that this increased focus on direct instruction is developmentally inappropriate, because children are expected to learn academic content that may

be beyond their developmental level in a manner that does not actively engage students. Pyle and Danniels (2017) state that a teacher-directed focus is depriving children of stress-relieving play opportunities.

Through play, children also learn to read, write, and use math and science knowledge; young children learn with sensory activities and build the experiences that will help them in their lives. Research supports play as effective in establishing the curriculum such as reading, writing, science, and mathematics. Many existing studies demonstrate the role of play in each of these curricular areas. For example, James Christie for literacy (Christie, 1987, 1991; Roskos & Christie, 2000), Constance Kamii (1988, 2000) for mathematics, and Brian Stone (2016) for science. Christie (1987) found when children play out stories in dramatic play, it increases their story comprehension. In addition, when children use symbols in play (symbolic play), it provides them with the foundational ability they will need for future reading and writing (Stone & Burriss, 2016). Kamii (1988, 2000) understands how play helps children put things into relationships which is important for developing number sense. Stone (2016) says "playing around in science presents children with opportunities to think creatively and divergently, to solve problems in innovative ways, and to develop a unique scientific identity" (p. 6).

Crehan (2016) explains that starting formal schooling when the children are a little older makes no lasting difference to children's later reading ability. Children need the opportunities to develop their basic knowledge gradually through rich activities, and therefore, depend on learning through playing. Encouraging children to learn pre-reading and pre-math skills through play helps them develop their cognitive skills, preparing them for a new type of learning, which is an effective and reliable practice. Children need to develop their individual confidence levels and understand their abilities, which they cannot achieve without playing with peers and manipulating a variety of materials.

Besides providing important foundations for academic learning, play elicits imagination which draws on elements of reality (Diachenko, 2011; Vygotsky, 2004). Personality development is also important in children, ages four to five, because children develop the essential foundations in their early years for their future beliefs and knowledge. Furthermore, preschool years remain foundational for children to positively shape their personality, habits, skills, and basic knowledge (Kazu & İş, 2018; Tarman & Tarman, 2011). Children who develop positive self-images will become well prepared for school and life. Toward supporting well-being and self-confidence, play is important in helping children to develop later life skills such as social interaction and emotional competency.

Crehan (2016) describes the purpose of learning through play is to provide children with the opportunities to enjoy their learning. Preschool children, learning through play, assume ownership in the process, and demonstrate more confidence in their abilities and express joy while learning. Thus, play is an effective, developmentally appropriate, and holistic approach for educators to implement for young children's learning.

Crehan (2016) understands the important nature of learning for young children, "because children don't do formal learning at desks in preschool or kindergarten, they learn through

playing" (p. 15). Four- to five-year-old children are active and while learning, they are likely to move more instead of sitting and listening. Children understand the content more effectively with opportunities to participate in active learning through playing and interacting with peers. Children learn in everyday activities while engaging with peers and adults, sharing learning, negotiating, and building strong relationships (Fasoli, Wunungmurra, Ecenarro, & Fleet, 2010). Furthermore, teachers, during playtime, indirectly encourage children in reading, writing, and mathematics. Children are more likely to learn by listening, speaking, observing, and exploring during playtime than through direct instruction. Teachers focus on supporting the children's learning by asking insightful questions and discussing their answers.

Choice play time is a rich time for children to learn reading, writing, and mathematics. Learning through play provides children at this age the opportunity to practice essential activities such as thinking, exploring, and investigating in a risk-free environment. These skills established through play will provide valuable life-long learning for children.

However, it remains critical for teachers to understand how to most appropriately prepare the environment for children's quality play experiences. Kemple, Oh, and Porter (2015) emphasize the idea that using appropriate teaching strategies through play are fundamental in meeting children's learning and development needs in their early years. Children can play at school, home and in other community settings. However, many children may face limitations in entering some of these play settings effectively; for example, over-structured curricula activities, lack of complex materials, and sparse peer interactions. Nothing can compare with the holistic, authentic, and risk-free experience of learning through play.

Playing at school is important because at school, children have access to materials and to their peers as playmates. Furthermore, Miller and Almon (2009) describe how Finland's children go to a playful early childhood setting before entering first grade at age seven. They found that the experience of learning through play did not negatively affect Finish children's learning outcomes in the long-term. In fact, children in Finland receive the highest scores on the Program International Student Assessment [PISA], which is an international exam for 15-year-olds.

The epistemology in children's play, learning, and development is that young children grow quickly, and as they adapt, play experiences provide a natural and developmentally appropriate pathway for authentic learning. The more children interact with one another, the more learning experiences will occur. Learning through play and hands-on activities will remain important teaching methods in early childhood.

Recommendations

The following recommendations support children learning through play:

1. Use block centers to provide opportunities for children to explore mathematics and science. For example, counting, colors, sorting, patterns, size, balance, and comparisons.
2. Through dramatic play, children rehearse and explore language skills in a risk-free experience. For example, ask children to role play and act out characters from a familiar

story, invite children to write a script and identify characters they wish to represent, or provide children with relevant props in the family living and block centers.

3. Include a variety of different writing and drawing materials in the family living, block and art centers.
4. Pay attention to children's representations. Request and invite they display their products. It is important children gain their own internal sense of competence and not rely on an external evaluation. Children practice/rehearse for themselves and not for the teacher's approval.
5. Provide opportunities for individual, small and large group play events.
6. Ensure outdoor and nature play for exploring science and mathematics.

Conclusion

Children naturally play during most of their time in or out of the school. Play is the center of children's lives and also one of the most common ways of enjoying and exploring life. Children benefit from playing in many ways; they develop their language, self-regulation, social-emotional skills, problem-solving skills, interact with others, and discover the world (Dinnerstein, 2016). Teachers can support children's learning and stimulate their attention to learn from play by asking children to observe, record, ask, explore, confer, and participate. Additionally, children who experience play-based learning/inquiry in the early childhood years, become more likely to sustain a higher level of engagement and motivation in later more formal learning experiences.

When we challenge children to solve complex problems through play, they will benefit from these experiences, thus, these learning experiences by play will assist children to be prepared for future academic learning. Using play to facilitate children's needs is a more effective way for teachers to meet children's naturally occurring stages of development than direct academic instruction. In order to support children successfully, it is essential to provide teachers with various ways to use play for optimal learning as well as train pre-service teachers on mastering these approaches to achieve effective learning through play.

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International Journal of the Whole Child
2020, VOL. 5, NO. 2

Pictures for Reflection

Bubbles and Balls in Belize: A New Perspective on Play

Rebecca Giles[a], James Hoot (Photographs)[b]

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Rebecca M. Giles, Ph.D., is a Professor at the University of South Alabama in Mobile, AL, where she teaches both undergraduate and graduate courses in Early Childhood and Elementary Education. She has spoken and published widely in the areas of early education, literacy, and teacher preparation and is the author of *A Young Writer's World: Creating Classrooms Where Authors Abound* (2020, Exchange Press).

Dr. James Hoot, professor emeritus, University of Buffalo, provided photos of an adventure playground. He was responsible for building an adventure playground in Tanzania, shown in the photographs. This adventure playground was developed to support the first comprehensive school for girls in rural Kitanga, Tanzania. Wooden structures were formed from eucalyptus trees harvested by the local community and brought to the site via water buffalos.

Margaret Mead, a pioneering American cultural anthropologist of the 20th century and recipient of the Presidential Medal of Freedom, once said, “If a fish were an anthropologist, the last thing it would discover would be water.” Her tongue-in-cheek reference to the study of human behavior is a reminder that the familiar aspects of life are often overlooked because they seem unremarkable. In contrast, when placed in a new and unfamiliar environment, we become keenly aware of the behavior, habits, and customs different from our own.

Children explore in both natural and manmade spaces in this Tanzania playground. (Photo by James Hoot)

This was the case when I traveled to Belize City, Belize where I had the opportunity to interact with young children during a local church’s summer program. With twenty-five years of experience as an early childhood educator, I felt well-equipped to assist with all facets of planning and implementing the program including organizing groups, preparing the environment, and providing developmentally appropriate materials. Not knowing exactly what to expect, I included various craft supplies and some simple gross motor toys along with the personal belongings I packed in my luggage.

Within the first few minutes of arriving at the facility, I realized that I was in unfamiliar territory. The small, rectangular area designated for outdoor play was situated between the main building and another building so that there were walls on three sides and a chain link fence across the far, narrow end. You stepped out the door of the main building onto a narrow patch of uneven, broken cement that ran the length of the area opposite the fence and this place was also covered with an assortment of construction materials and tools currently being used to replace a well-worn tin roof during hours when the children were not present. Nearby was a fruit-bearing tree, which offered very little shade in the scorching July heat. Fallen fruit resembling greenish-white grenades littered the ground in various stages of decay. Many had been trampled creating a squishy mess that filled the still air with a pungent odor. The hard ground had a thin, patchy layer of grass over packed dirt strewn with broken cinder blocks, trash, and other debris. Broken wooden pallets and plastic garbage bags lined the periphery. A discarded metal desk and chair set in one corner.

I immediately focused on the hazards and began to imagine the many possible scenarios of children playing in this space that could result in injury. I was nervous and anxious as 20+ children ages two to six years entered the space later that day, but no one tripped or fell. The rotten fruit was not used to bomb others, and the building materials did not become climbing apparatus. The children simply enjoyed being together with the blue sky overhead. In the absence of any toys or the desire to offer organized games, several adults began blowing bubbles within the children's reach. There were excited squeals and much laughter as the children ran around chasing the floating bubbles and jumped wildly in attempts to pop them between clapping hands. Soon, the children were taking turns blowing the bubbles and the fun continued with no one fighting for a turn, crying over spills, or complaining of soap in their eyes.

Play Experiences become open-ended dramatic play. (Photo by James Hoot)

The next day, about 50 colorful, crushproof plastic balls (the kind found in some fast food restaurant ball pits) were distributed among the children for their use in the play space. While there was a lot of carrying, some were tossed about, and others were rolled around. I noticed a boy about four years old placing his ball at the end of a discarded piece of gutter about three feet long and using his hand to push it to the other end. I joined him in this activity and demonstrated how lifting one end of the gutter off the ground would result in the ball rolling down the gutter without being propelled. He quickly located part of a brick nearby and used it to support one end of the gutter. As I walked away, he was joined by others who each placed their ball in the top of the now slanted gutter and thrilled at its journey to the other end. Before long, the children were

racing the rolling balls alongside their improvised track and, then, releasing multiple balls at one time to create a parade of moving color.

As the days progressed and my fearful imagining of worse case scenarios failed to occur, I began to consider the space and children playing there from a new perspective. Upon closer examination, I started to see that this space I previously deemed so lacking actually possessed the core qualities of an adventure playground. It was fenced and filled with loose parts. It challenged children's imagination and physical skills in support of constructive and manipulative play with adult oversight that never reached the point of controlling the children's play. The children asserted independence and were keenly aware of other's needs. Limited access to elaborate materials resulted in an appreciation for the simplistic and fostered creativity in an environment where nothing was wasted. I was repeatedly reminded of children's ability to produce enjoyable and inspired ways to play with everyday items by repurposing something often viewed as worthless into a thing of awe that could occupy their attention for an extended period of time.

Children move in and out, swing, and climb in the adventure playground. (Photo by James Hoot)

As the author of many articles suggesting how teachers can appropriate space and materials to create the best possible learning environments for young children, I had to stop and wonder if the typical housekeeping centers and outdoor playgrounds found in American child care and preschool facilities were not too prepared resulting in an over sanitized and, possibly, restrictive place to play. Stories of children's preference for the cardboard box over the elaborate toy it contained are legendary. Similarly, children may abandon the commercial playscapes found in many parks and school playgrounds to make their own fun by playing with rocks, sticks, and sand, when permitted to do so. The many benefits of outdoor play are well-documented, as is our understanding that many of today's children are spending much less time outside than previous generations. While the reasons for children being inside vary and include such factors as increased exposure to electronics and involvement in numerous scheduled activities, access to adult designed playgrounds with traditional gross motor equipment should not be one of them. As I recently discovered, all children really need to play outdoors is access to it.

[Note: Pictures of Belize were not available.]

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International Journal of the Whole Child
2020, VOL. 5, NO. 2

Finding Flexibility with HyFlex: Teaching in the Digital Age

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Teachers knew in the summer of 2020 that the next school year would be a new venture in education. After experiencing a rapid shift in delivery of their classes in the spring, teachers across the country sought the best ways to engage students meaningfully in a variety of modalities, knowing that shift might continue to happen in the coming year. As summer gave way to fall, teachers returned to their schools with great anticipation and a bit of uncertainty. Some teachers returned to their classrooms in a virtual environment with all of their students online. Others returned with all of their students in person. Still others returned with a blend:

some students online and some students in person. For those classes that have a blend of online and in-person students at any given time, a flexible approach is needed, a hybrid-flexible or HyFlex model of teaching is the answer, particularly if the students have choice in how they attend and engage in class and they have access to the necessary technology (Beatty, 2019; Ferrero, 2020; Nave, 2020).

The HyFlex learning model is a combination of the hybrid learning model and a flexible learning classroom (Beatty, 2014). The typical hybrid classroom combines both online (whether synchronous or asynchronous) and face-to-face learning. This model pushes students to be independent and self-directed for their own learning (Cybinski & Selvanathan, 2005). As students make decisions about where, when, and even how they will access instruction (a HyFlex approach), they also need to develop this independent and self-directed model of learning. The HyFlex model is student-centered, student-directed, multimodal, involves students in active learning in person and online, and requires full student engagement (Beatty, 2019; Ferrero, 2020).

There are four "fundamental values" in the HyFlex model: learner choice (in the modality), equivalency (in learner outcomes regardless of modality), reusability (of content and activities for the different modalities), and accessibility (to the technology and skills needed to engage; Beatty, 2019; Nave, 2020). This model is similar to the choice board model of instruction that teachers have been using for years. The primary difference is that the choice comes from how the instruction is delivered: in person, online synchronous, or online asynchronous delivery.

Through personal experience, a high school English teacher and one of the authors of this article, started teaching this fall using this model and immediately found the benefits of offering instruction in all three ways: in-person, online synchronously, and online asynchronously (see article and video of her teaching using the HyFlex model at https://www.rcschools.net/apps/news/article/1298279) . She noticed that students in the classroom get the immediate benefit of in-person instruction. They are able to work in groups and are able to engage with one another. Students in distance learning are able to choose how they receive instruction. She found that there is an even split in how students are approaching the instruction with some choosing to attend lessons synchronously and others choosing to attend lessons asynchronously. When students are asked why they have made these choices, some reply that they need the "in person" synchronous instruction to understand what to do and how to engage with the work. Students who attend via online synchronous lessons are also able to participate in "break out" rooms with in-classroom students and "on-line" discussions in "real time" so that they still get the group work experience that happens in a classroom. Students who participate in synchronous instruction generally report feeling more engaged in what is happening even in the online setting because they are present when the instruction occurs. However, students who participate in the work asynchronously are able to work at their own pace. Furthermore, some high school students using asynchronous instruction have found the model allows them to work during the day and participate in school at night. Some students who work in the asynchronous online environment struggle if they are not highly self-motivated to

ensure that videos and instruction are watched and that they are fully participating in all work. She has had to find ways to ensure engagement in videos and instruction that help these students be successful. For example, giving students access to class discussions through video recordings and through using technology tools such as Playposit, an ed-tech tool which requires student engagement with the video rather than passive viewing of the video, or Edpuzzle, a web-based interactive video tool that allows teachers to target specific learning objectives by cropping video. One middle school student who is learning using the HyFlex model via asynchronous and synchronous participation, and who is the daughter of the English teacher/author, shared that access to teacher videos helps her better understand content because she can "rewind" and "rewatch" until she knows she has "gotten" it. By recording and sharing lessons with all students, they have access to what is being taught when they go back to review or do practice homework assignments after the class ends.

When contemplating using the HyFlex model, there are several things that the creator of the HyFlex model, Brian Beatty (Nave, 2020), suggests to consider. For example,

- Can the objectives and learning outcomes of the course be met online?
- Can the students be engaged in all three modalities (in-person, online synchronous, and online asynchronous)?
- If using the Hyflex model in a University setting, does the course have to be designed like a certified online course? (Not necessarily conducive to the Hyflex model)

If the HyFlex model is chosen, it is of utmost importance to record in-person lessons for asynchronous learners. This allows them to have access to in-class discussions. All learning activities and materials need to be digitized or an equivalent made available, which benefits both online and in-person students. When in-person and online synchronous students engage in small group work, summaries can be provided and digitized for asynchronous students to enrich their experience. Additionally, students working at home will need accountability to ensure that they are accessing instructions. Teachers may find tools like Playposit and EdPuzzle, mentioned earlier, beneficial wherein they can assign videos and embed questions into the instruction so that students know that they must still watch the information being given. Furthermore, in-person students need to be encouraged to engage with online content too. They, along with the online students, can post weekly in a learning journal whereby they respond to their own thread in a discussion board (Nave, 2020). By encouraging in-person students to engage with online content, the teacher is able to further establish a strong classroom community so that in-person and online students still participate in sharing ideas and learning together.

Teaching in the HyFlex environment requires advanced planning, constant preparation, a commitment to flexibility, and comparable engagement with students (Beatty, 2019; Ferrero, 2020; Nave, 2020). Students attending class in person must know that the teacher is present and working with them while also attending to the students online at the same time. All lessons and class instruction must be recorded and posted in a timely manner for the asynchronous learners. Assessments must be appropriate for online and in-person learners. It may be important to rethink traditional assessments in favor of projects, student video recordings, blog posts, Socratic

seminars, and Backchannel discussions, which may already be part of the learning activities (Ferrero, 2020). These assessments are performance based thus allowing demonstration of group and individual student knowledge and understanding.

Currently, at the university level there is little research on the effectiveness of using the HyFlex model. One study suggests that when comparing students who attended mostly in person and others mostly online (all in the HyFlex group), students who were in person had higher grades on homework, midterms, and final course grades, though the result was not significant (Miller, Risser, and Griffith, 2013). However, other research found that the mode of delivery does not impact student performance (Rhodes, 2020). For most primary and secondary teachers, this fall (2020) is the first encounter with options in mode of delivery, including teaching in a Hyflex model, so outcomes are yet unknown, however, the evidence from post-secondary education models shows that student performance overall should not be greatly impacted either positively or negatively. Still, this begs the question that if students are given choice in their mode of instruction, could they then have a greater desire and motivation to work towards success?

Teachers of all grade bands have entered a new world of education during the fall of 2020. Technology now extends student choice not only in how they demonstrate mastery of content, but also in how they receive their content. Teachers are now called upon to engage students in this new form of education to help ensure that all students have opportunities regardless of their situations and regardless of their chosen mode of instruction. While it is a challenge, it is also a great opportunity to be part of a movement that could change the face of education for the future.

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International Journal of the Whole Child
2020, VOL. 5, NO. 2

Foster A Growth Mindset in Children Using Two Books: "Beautiful Oops" by Barney Saltzberg and "Stickley Makes a Mistake: A Frog's Guide to Trying Again" by Brenda S. Miles

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Abstract

This article provides early childhood educators and parents information on the importance of teaching students about growth mindset. Assisting children at a young age about how their mistakes can help them grow is necessary so they can view setbacks as opportunities to accomplish goals. Through using read alouds, early educators to help young children make personal connections to the characters and the theme of the story. Through the read alouds connected to growth mindset, the educator can promote discussion, provide writing opportunities, and help students develop personal goals.

Introduction

Growth mindset is important to develop at a young age so children can begin looking at challenges as opportunities instead of obstacles. Children with a growth mindset "interpret setbacks, challenges, and effort as effective approaches to improving their ability, intelligence, and experience" (Zeng, Hou, Peng, 2016, p. 2). Assisting children at a young age that they can take their mistakes to become resilient people is necessary, so they do not develop a fixed mindset or feel defeated or a sense of failure at something they wanted to accomplish. Children who perceive effort as important are said to have a growth mindset (Hochanadel & Finamore, 2015). When children develop a growth mindset along with passion to persevere, it promotes goal setting and achieving those goals.

There are many children's books connected to developing a growth mindset. Using read alouds connected to growth mindset provides students the opportunity to connect to the story or character. Using read alouds allows the students to gain an understanding that stories can relate

to their own lives (Reading Recovery, 2019). Providing children the opportunity to make these personal connections allows them to reflect and in return it is more meaningful.

Summary of "Beautiful Oops"

In the book, "Beautiful Oops," the author, Barney Saltzberg tells a story that it is okay to make mistakes. This simple picture book is filled with colorful artwork sharing a story of that when a person makes a mistake, the picture is still beautiful. His message is to help children understand that sometimes the mistakes may end up being beautiful creations. Children can learn from their mistakes and become resilient learners.

Summary of "Stickley Makes a Mistake: A Frog's Guide to Trying Again"

This story is about a frog named Stickley who wanted to be perfect. When Stickley would make a mistake, he would proclaim, "Oh No!" Stickley would not try again because he feared making mistakes. With the help from his grandpa, Stickley learns that making mistakes is actually a good thing. Stickley learns to hop up and try again.

Using Discussions to Promote Conversations on Resiliency

"Beautiful Oops" and "Stickley Makes a Mistake: A Frog's Guide to Trying Again**"** are both simple read alouds, but the meaning of the stories is powerful for children. "Resilience—or whether students respond positively to challenges—is crucial for success in school and in life' (Yeager & Dweck, 2012, p. 1). Saltzberg's message of sharing that mistakes are okay to make connects to helping young children understand the importance of resiliency. Additionally, Miles' message about trying again makes children mentally stronger because they are more willing to take risks in their learning and personal goals. These two read aloud books allow for personal one-on-one discussions or a classroom discussion of sharing personal mistakes in school and outside of school.

Questions for Discussion

When promoting discussions centered around growth mindset using these two books, it is important to consider questions that children can connect with to help them reflect on their personal experiences. The Center for Research on Learning and Teaching (2016) stated it is important to connect questions which connect to their personal lives. Using these two books to promote discussion opens the door for children to use their schema. Questions focused on assisting children to understand the importance of making mistakes helps them become resilient and develop a growth mindset. Example of questions include, but are not limited to the following:

1. Have your ever made a mistake? If so, did you become frustrated, upset, or sad?
2. How do the authors of the books help you understand that mistakes are okay?
3. How can you use your mistakes to work towards a goal?
4. Did the frog remind you of yourself when it comes to making mistakes?
5. In "Beautiful Oops," what did you learn about yourself?
6. How can you use your mistakes to learn about yourself?

These open-ended questions can be asked one-on-one or in small groups to provide the children opportunities to share their thoughts in a safe environment. Promoting discussion in small groups allows those children who are hesitant in speaking in a large group an opportunity to take risks and share their voices.

Goal Setting Connection

Children at a young age can create goals connected to their academic learning or personal lives. Communicating with children that mistakes and failures coincide with growth is important. Children can use these mistakes and create a goal for self-improvement. As explained by Schunk (1990),

> As learners work on tasks, they observe their own performances and evaluate their own progress. Self-efficacy and goal setting are affected by self-observation, self-judgment, and self-reaction. When students perceive satisfactory goal progress, they feel capable of improving their skills; goal attainment, coupled with high self-efficacy, leads students to set new challenging goals. (p. 71)

Further, in a study completed by Ames and Archer (1988), they found that students who set goals and work towards those goals possess a growth mindset, especially true when teachers focused on mastering goals in the classroom. In a sense, the adult is coaching and supporting children with their goals, but ultimately setting the goal and the plan to achieve the goal is the responsibility of each child. A goal planning template is provided (Appendix A). This planning sheet allows for students to write and illustrate their thoughts connected to their goal.

Writing Connection

Using these two children's books opens an opportunity for children to write their own books about making mistakes and how they overcome their mistakes in school and everyday life. They can write their own "Beautiful Oops" or their personal guide to overcoming obstacles, barriers, or mistakes. Writing is an important part of the academic curriculum. Writing can take on the form of telling a story through pictures and words. Polisena (n.d) stated, "Introducing and practicing writing with engaging activities in elementary school, can foster confidence and a lifelong love of writing" (para 1). Providing children a purpose for writing with a meaningful connection allows them to share their story with other children and adults in the home and at school.

Summary

Developing a growth mindset at an early age can help students use their setbacks and challenges as opportunities to achieve academic and personal goals. Burns (2006) stated that children enjoy sharing what they read. When the educator reads books focused on growth mindset along with asking questions to promote discussion, the children are learning to make connections to develop a growth mindset. Children should be given the opportunity to share their thoughts, write about what they are thinking, and develop goals to work towards an area they want to improve and overcome. Dweck (2008) affirmed that educators can successfully teach children to develop a

growth mindset. Providing opportunities in the classroom to do this can increase engagement and performance.

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Appendix A

Goal Setting Template for Children

I am great at:	**A challenge I have is:**
_____	_____
_____	_____
_____	_____
_____	_____
I want to improve on:	
_____	
_____	
_____	
_____	

I will achieve my goal by:	**Dates to check in on my goal:**
_____	_____
_____	_____
_____	_____
_____	_____

International Journal of the Whole Child
2020, VOL. 5, NO. 2

Children and Families: Health and Wellness

Sleep Hygiene: Evidence for a Healthy Family Habit

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"Now I lay me down to sleep" … this is a closing thought said by many children as they get into their beds and begin their journey to sleep. Sleep…it is a daily ritual or routine that humans practice throughout time. Sleep is important for all ages—it is what revitalizes and rejuvenates individuals; yet, sleep is a mystery. Why do we sleep? Why is it important? The scientific community continues to research these questions. This article focuses on the topic of sleep hygiene including describing sleep hygiene, providing the evidence-based literature, and highlighting how sleep remains important in family life and wellness.

Sleep Hygiene

For 30 years, The National Sleep Foundation continues to serve as the leading expert voice in the world of sleep science and health (National Sleep Foundation, n.d.). Sleep remains vital for our mental, emotional, and physical well-being. Problems such as obesity, diabetes, poor decision making, accidents, and mood instability have been associated with not having good restorative sleep (National Sleep Foundation, n.d.). Sleep hygiene is a term used to describe the habit of sleep and what constitutes good sleep. The authorities at the National Sleep Foundation describe sleep hygiene as divided into four categories:

1.) **Creating a sleep-inducing bedroom of comfort and relaxation**. This includes a good mattress and pillow(s), clean sheets, and a cool room temperature that is suggested to be 70 degrees or less. Tantamount to this sleep-inducing environment is to diminish lighting, create a quiet zone (meaning no television, radio or people noise), and to introduce a relaxing scent such as lavender.

2.) **Optimizing your sleep schedule.** Identify wake and sleep times that do not vary. It is imperative to have close wake and sleep times throughout the week. In other words, do not get up at 6 O'clock one morning and 10 O'clock another morning. Try to maintain similar wake and sleep times. Build in a healthy sleep time to your schedule. You can do this, just provide thoughtful regard to the schedule. Lastly, be cautious regarding naps. The best time to take a nap, if you need one, is after lunch and for about 20 minutes.
3.) **Crafting a pre-bedtime ritual**. Poor pre-bedtime habits contribute to insomnia. Winding down for approximately 30 minutes prior to bedtime is part of a healthy ritual. Suggestions include enjoying quiet reading, listening to soothing music, and decreasing stimulation. Prior to bedtime, lowering lighting helps to increase the hormone melatonin which aides in restful sleeping. Finally, about 30 minutes prior to bedtime, disconnecting from devices is recommended.
4.) **Fostering pro-sleep habits during the day**. Our internal clocks depend on the light of day. During the day open your blinds and drapes and "let the sun shine in". Move about as much as possible. Increase your physical activity. Monitor your caffeine and alcohol intake. Mediate how much you eat later in the day as it will be more difficult to fall asleep if your body is trying to digest a larger meal. If you are a smoker, do your best to not smoke at least one hour prior to bedtime.

If you cannot fall asleep:

- Try some relaxing stretches.
- Do not try and force sleep, get out of bed if 20 minutes has passed and sit in a comfortable chair/couch and read a non-stimulating type of book/magazine.

Experts suggest if you are having trouble with sleeping that you keep a sleep diary and connect with a sleep specialist.

To clarify healthy sleeping possibilities, the Sleep Foundation.org, recommends the bedroom climate consist of three main activities (three S's):

- Sleep
- Sex (adults)
- Sickness

When the bedroom is used for other activities, the brain becomes confused. Sleep is supposed to rest the brain, so it is important the bedroom emanate tranquility. For some people, healthy sleeping practices come easier as they were raised in a family environment that cultivated this attitude. For others, it is a ritual to newly construct.

Bathory and Tomopoulous (2017) describe how sleep problems are common in those less than five years of age. These problems are associated with decreased school performance, obesity, and poor behavior. If the child is experiencing sleep problems, then the parent(s) may as well experience negative sleep issues. Thus, the entire family dynamic may suffer. Sleep habits are often not discussed at routine well visits to a healthcare provider (Bathory & Tomopoulous, 2017). Most healthcare providers including pediatricians do not receive much training regarding sleep medicine (Bathory & Tomopoulous, 2017). Sleep patterns change throughout the course of one's life and appear especially evident in the first five years of life (Bathory & Tomopoulous, 2017). It is important effective counseling regarding childhood sleep also take into account other

issues. For example, child/parent factors such as temperament/interaction and environmental factors such as culture, geography, and home context become powerful influencers on sleep and quality of sleep (Bathory & Tomopoulous, 2017). The American Academy of Pediatrics (n.d.) recommends parents initiate promoting sleep hygiene early on in a child's life. This includes a sleep promoting environment and a positive bedtime routine in infancy. A peaceful setting and calming behavior go far in creating a conducive environment for sleep.

Lin, Strong, Scott, Brostrom, Pakpour and Webb (2018), in their study regarding adolescents and a theory-based sleep hygiene intervention, found that sleep influenced the quality of life. Their findings purported that sleep hygiene is associated with psychologic health because good sleep hygiene practices increased sleep quality and allowed the body and mind the ability to recover from daily physical and psychological exertion. Making the bedroom more restful is part of the sleep hygiene criteria. Decreasing media and noise remain vital to a restful environment. Keeping bed time and wake time fairly close in time and not sleeping later on the weekends demonstrated important factors in the adolescent group. The adolescents in the study were asked to help plan improved sleep hygiene practices; thus, affording them a sense of autonomy in their structuring particular life choices. Lin et al. (2018) provided adolescents with information regarding sleep and health consequences, pros and cons associated with sleep hygiene practices, strategies toward restructuring the physical environment in their bedrooms, consideration for social support, tips for action planning and problem solving, and ways to self-monitor their behaviors. The findings concluded adolescents did well in being part of the solution to ensuring positive sleep hygiene practices (Lin et al., 2018).

Current research data suggest society indicates a fear of missing out (FoMO). This includes the nocturnal use of social media which may result in sleep disturbances and may adversely affect the quality of sleep one may experience (Tandon, Kaur, Dhir, & Mantymakir, 2020). FoMO is coupled with compulsive social media use (CSMU). FoMO is more strongly associated with CSMU among the working professional. Findings indicated this interaction to adversely affect the quality of sleep and undermine the brain's ability to rest. These findings indicate the need to create interventions to reduce the deleterious impact of the social media interaction on sleep. Tandon et al. (2020) describe a systematic review of literature by Alonzo et al. in 2019 which concluded that poor sleep quality contributed to depression and anxiety occurring in individuals who have excessive activity with social media. It is important to maintain boundaries which include realizing the need for positive sleep hygiene practices across all seasons of life.
We can learn from a traditional farmer's schedule: a farmer went to bed when it became dark and arose when the first light of day caused the rooster to crow. These are the normal circadian rhythms that guided mankind for years. You may not live on a farm, yet, it is the time to create a healthy sleep habit within your family. Healthy sleep is important for both physical and mental health; healthy sleep improves productivity and overall quality of life. Everyone, from children to older adults, can benefit from better sleep, and sleep hygiene can play a key part in achieving that goal. Visit the National Sleep Foundation as well as the Sleep Foundation website. Turn off the television, tablet and phone. Play a game as a family, take a walk after supper, and read a

book together. Begin a positive, relaxing and tranquil bedtime ritual for the health and well-being of all family members.

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International Journal of the Whole Child
2020, VOL. 5, NO. 2

Education by the Numbers

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Education is sometimes referred to as an investment in human capital (Wolla & Sullivan, 2017). How Does Level of Education Affect Income?

Median Annual Earnings of full-time workers ages 24-34 by Educational Attainment

Degree	Annual Income						
	Overall	Gender		By Race			
		Male	Female	Combined Genders by Race			
				White	Black	Hispanic	Asian
All Education Levels	44,880	48,000	40,000	48,930	35,350	35,650	59,470
Less than High School Completion	27,880	30,000	21,980	34,920	24,790	27,550	
High School Completions	34,880	38,890	28,980	37,410	29,730	32,080	35,570
Some College, No Degree	36,300	39940	31,100	37,960	34,390	35,000	38,130
Associate's Degree	39,960	47900	34,020	42,730	34,780	36,190	39,620
Bachelor's Degree	54,700	60,000	50,000	57,740	40,850	45,100	61,580
Master's or Higher Degree	64,980	79,280	59,220	63,560	53,850	59,900	80,150

This table is a summary of the annual earnings of 25-34-year-olds who work an average of 35 or more hours per week for 50 or more weeks per year. Eighty percent of those with a bachelor's or higher degree worked full time compared to 72 percent of high school completers or equivalency (GED).

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International Journal of the Whole Child
2020, VOL. 5, NO. 2

Innovative and Engaging Approaches in a Middle School Science Classroom: Ideas to Capitalize on Student Interest

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Abstract

The purpose of this article is meant to provide evidence and examples from an exemplary middle school science teacher's classroom with regard for using innovative approaches in STEM education. The author of the article suggests moving from a curriculum-centered paradigm to a student-centered paradigm. Strategies for integration in STEM education are discussed, and include choice-based centers, project-based learning, and small group instruction. The role of standards and curriculum are addressed with an emphasis on whole child, developmental practices, and meaningful/relevant activities in science education.

Key Words: science education, STEM, integration, student-centered strategies

Introduction

The days of worksheets and silent classrooms are over. Students are no longer content with sitting passively, taking notes, and listening to a teacher lecture. A changing world and the evolving nature of STEM education demand more of teachers than the traditional means of instruction. Furthermore, a whole child approach is necessary as it promotes an organic, holistic education that recognizes the various needs of children beyond just the academic realm. Through integration, centers, and project-based learning, students are able to experience a more meaningful, and relevant STEM education that fosters engagement and caters to the different developmental levels of students. Furthermore, these processes are driven by an inquiry mindset that approaches content from a constructivist paradigm and calls for learning to be situated in realistic, meaningful, and relevant settings. There are many ways that integration and project-based learning can be used in the classroom. This paper explores the experiences and activities

offered in a dynamic, integrated, middle school science classroom, and how these activities foster authentic engagement and student interest in science.

A Brief Review of Literature

It is necessary to be innovate in education, and as part of the process of creating more dynamic learning environments, it is necessary to review and critique traditional practices. Some of the most common ways of teaching science and math (along with most other subjects) have revolved around lectures, worksheets, and textbook readings. Even the gradual introduction of new technological tools and programs has not shifted the instructional methods away from these traditional practices. Essentially, technology has served to create a digital arena for completing worksheets or worksheet-like tasks, which do not engage students in their learning, or take advantage of new pathways for learning through powerful technologies (Wylie, 2014). Additionally, according to Rolheiser et al. (2019), "students crave a more active classroom environment," and this necessitates a shift away from "traditional lecture-heavy" formats (para 1). Furthermore, worksheets impede "oral language development, creativity, movement, problem-solving opportunities and the sensory experiences necessary for brain development, human interactions and friendships" (Affiliated Services for Children & Youth [ASCY], n.d., p. 2). Worksheets also preclude opportunities for play, inquiry, deeper conceptual development, and active scientific investigations (Stone & Stone, 2013). Also, simple textbook readings fail to provide experiential, inquiry-based activities and they are not sufficient for conveying information in an interesting, engaging manner (Foley & McPhee, 2008; McKinney, 2013; Stambaugh & Trank, 2010). If traditional methods are not particularly effective in the teaching of science, technology, engineering and math, then teachers must adopt different, more dynamic approaches to capture students' interest. Traditional, teacher-led, direct instruction approaches may not lead to deeper conceptual knowledge, and therefore, a more engaging, inquiry-based environment is needed for STEM explorations (Jong, 2019). The American Association for the Advancement of Science recommends a more student-centered approach, rather than these traditional methods that have adversely affected students from underrepresented backgrounds especially (Romero, 2016).

A student-centered, whole child approach would involve active experiences, meaningful integrations, and authentic assessment (Morse & Allensworth, 2015). Furthermore, the teacher needs to engage students through divergent pathways that foster interest, intrinsic motivation, and active experimentation and investigation (Darling-Hammond et al., 2019). The strategies and activities described in the following sections provide examples of how one teacher used a more student-centered, active approach in the science classroom.

Centers

Centers are utilized in the environment to capitalize on student interests, inquiries, and explorations (McCarthy, 2014). These were used in the classroom every other week, and they also provided deep integration with other subject areas. The centers included writing, reading, social studies, math/coding, art/drama/technology, and science and engineering. Frequently, there would also be a play center, which offered students a place to tinker and learn science

through the art of play. At each center there were many (ten or more) options for the students to work and explore. Each option or possibility was geared towards the larger unit of study. For example, eighth grade students explored through physics-based centers at the beginning of the year, then moved into chemistry centers, and finally biology centers. Seventh graders, using the new set of science standards for Arizona, worked through physics, the atmospheric cycle, the rock cycle, plate tectonics, the human body, and general biology/ecology.

How the Centers Worked

Students were called individually, one-by-one, to start working on centers. The centers were choice-based, and the order for who received their first choice of centers was tracked by the teacher. Each day, different students were called first to allow every student an opportunity to explore based on their interests. Because of the element of choice, some students consistently chose to go to the art center and perhaps never visited the science/engineering center. This was allowed by the teacher, as the students were still exploring science through art. However, in an effort to create a healthy environment that fostered diverse explorations, the teacher also implemented a maximum number of students for each center. Once the center was full, students would be asked to make another choice. The maximum number of students at a center was set at five, although that number was increased to six because of large class sizes. Every student had an opportunity to explore their first choice over the course of the unit, and all students had multiple opportunities to explore through diverse pathways of learning. Centers were completed collaboratively or alone. Again, the students had the opportunity to choose what and how they explored while also choosing to work in groups or not. The students moved freely through the centers with no overarching due dates or number of required center visits. They also learned that if they were off task during centers, they would not be as successful as they could be within the course.

While Centers were Happening

The center environment itself was not necessarily used to teach the required curriculum. Furthermore, the centers were not used in such a way that they were expected to teach the curriculum. Centers were used purposefully as an exploratory, investigative environment to foster engagement with the material in a variety of ways. In order to guide the students through a more focused curriculum, the students would be called to small group instruction with the teacher while centers were taking place. The maximum number of students for small groups was set at five so the teacher could sufficiently attend to each individual's needs during the course of the small group instructional time. The length of time for each small group was set at about five to eight minutes. This allowed the teacher to go through focused, guided instruction with the students. Furthermore, the students were not grouped by ability but rather by the students' interest in the subject. Students would always rise to the occasion when they were learning about something that was meaningful to them. This was purposefully done in order to avoid the negative effects of strict ability grouping, and helped to destigmatize students' feelings towards science. Having what seemed like random small groups that changed every day helped the students to avoid comparisons with other students on the basis of their academic ability. Everyone was on an equal level in this way. During small group instruction, students would have

one of three guided lessons: a discussion, a mini lab or activity, or a mini formative. Note taking was never employed by the students, and never expected by the teacher. The days of students taking notes while listening to a teacher lecture are over. Students learn best through meaningful activity, and especially when they are interested in the material.

Integrating the Different Subject Areas

Integrating different subject areas with science is crucial for overall student learning (Brand, 2020). In fact, science naturally connects with other subject areas very well. Examples include reading/writing a lab report, calculating the speed/velocity/acceleration of Newton's 2nd Law, or drawing observations. Science is dependent upon other subject areas to function, and this expands beyond the subjects in STEM or even STEAM. Furthermore, every child learns differently. They have unique needs and background understandings. Teachers can no longer expect every child to learn in the same way and at the same rate (Semrud-Clikeman, 2010). By using an integrated, center-based environment, students are able to explore science in ways that cater to their strengths. Science may not be their best subject, but ELA may be. The students can learn science through writing stories/plays, writing research papers, and writing poems. Students who need more activity can explore through the science and engineering center. Here, they can move around and build models without the fear of a teacher telling them to sit still in their seat and to be silent. The following sections describe specific classroom activities that promoted a high level of student engagement in science and fostered students' interest and intrinsic motivation.

The Cave

Students were required by the Arizona state standards to learn about the rock cycle and minerals. Instead of having students complete a worksheet or having them read about rocks and minerals in their textbook, the teacher created a giant cave in the classroom out of one-hundred, sixty-four-gallon, brown trash bags. Black butcher paper was used to cover the windows in the room as well. When the lights were turned off, the room was nearly pitch black. Routes were created within the cave, and each route was assigned a number and rocks/minerals. The students were placed in groups, and took turns exploring the different routes of the cave (they used their cell phone as a flashlight). Each student had the opportunity to crawl through the cave, and when they found a rock or mineral, they would pick it up and return to their group. The students then wrote down observations about the rock or mineral that they found. After the group noted their observations, the rocks and minerals were placed back in the cave, and another member would crawl through the cave. Once each group found all of the rocks/minerals in the cave, the students returned to the "camp" (another classroom) to examine their findings. At camp, they discussed similarities and differences between the different rocks and minerals.

After all of the groups had finished, the teacher led a whole-group discussion to further explore and refine their findings. The students were asked to hypothesize how the rocks/minerals were formed, and they used prior knowledge and inferencing during the discussion. Student responses were recorded on the board, and students had further opportunities to compare and contrast, classify, and group the rocks/minerals. Once the discussion was over, the students were given the

names of the rock cycles and any corrections that needed to be made to the list of inferences were made.

Integrated Physics Activities: Rockets and Cars

Eighth grade students started the year by watching a video of the NASA Redstone Rocket tests. These were not all successful tests. Students would watch as rockets blew up, perhaps ascending for a short time. Some launches were successful. The students were shown these videos to demonstrate the nature of scientific and engineering endeavors, which are driven by "human curiosity and aspirations," and sometimes result in devastating failure (Next Generation Science Standards [NGSS], 2013). These videos provided a launch point for students to explore aspects of problem-solving and engineering practices, and would help them set up their own rocket experiments. First, students were asked and given time to explore and research their own student-directed inquiries related to the videos. Once the students had discussed their initial research with the whole class, the teacher facilitated a discussion about the difference between open-ended and closed-ended questions. Specific attention was given to the validity of scientific questioning. In this way, students were engaged in initial authentic scientific processes as they related to physics and engineering.

The students then explored Newton's 1st Law of Motion, which states, "an object at rest will stay at rest, and an object in motion will remain in motion, unless acted upon by an outside force." Utilizing the center approach, students were able to play with Newton's 1st Law. Through their play, students were able to explore the concepts in concrete ways. Next, the students began their 1st Law Lab. This lab contained a rocket made of graph paper and a straw. The students were actively engaged in measuring distances and applying their knowledge by identifying where Newton's 1st Law was taking place in the activities. The students learned about inertia, gravity, mass, and balanced/unbalanced forces. All the while, the teacher was incorporating and reviewing scientific processes like the scientific method and the Nature of Science. The students then took this knowledge outside and played the game, tug of war. They applied what they knew of Newton's 1st Law of Motion, observing the balanced/unbalanced forces. Then the students calculated for net force.

For Newton's 2nd Law, "Force equals mass times acceleration," the students used fizzing tablets and water to calculate for mass, acceleration, and force. The students measured a film canister and filled it so that the collected mass was 10.5 grams. Then the students measured how much the different sizes of tablets were in grams. The sizes for the fizzing tablets were as follows: a quarter of a tablet, half of a tablet, three-quarters of a tablet, and a full tablet. Starting with the quarter of a tablet, the students opened the canister, put the tablet in, put the lid back on, flipped the canister upside down, and waited for the canister to pop off of the lid. Meter sticks were taped to the wall (this was done outside) and students watched to determine the height reached by the canister, as well as the amount of time it took to reach that height. Once the students tested for all of the tablet sizes, the students calculated the acceleration of the film canister. After determining acceleration, the students used the measured mass to calculate for the force of the "rocket."

For Newton's 3rd Law, "every action has an equal but opposite reaction," the students created rockets made of pipe insulator, foam trays, a straw, a zip tie, and a rubber band. The pipe insulator was cut into equal pieces (12 inches long). The foam trays were also cut into three equally sized fins. The fins were hot glued onto the foam. Then the straw was tied in a knot around the rubber band and placed into the foam low enough so the zip tie could be placed around the circumference of the rocket near the top. The zip tie was pulled tight enough that the rubber band could be pulled, and the straw would not come out of the foam. Students did two different tests with these rockets. These were called the "thumb vs. index finger" tests, which were accomplished by firing the rocket off of their thumb and off of their index finger. The students were asked to find the average distances for these tests and note them in their data table. Once the lab was over, the students wrote about how Newton's 3rd Law was used during the lab.

Finally, the students did two more activities to measure speed and velocity. These involved "distance divided by time/distance divided by time with a given direction." The speed lab involved miniature toy cars and poker chips. Each group was given a toy car, five fake poker chips, textbooks, and rulers. The textbooks and rulers were used to make the ramp for the car. Then, the students measured the mass of the car. They measured the distance and time for how long the car took to get from the top of the ramp to the farthest distance. The students then calculated the speed and determined if the mass of the car affected its speed. For velocity, the students participated in the "Velocity Olympics," where they were given certain lengths that they must travel and do a certain movement for the entirety of that length (e.g. speed walking, skipping, running, hopping). The students had been placed into groups, and their teammates used a stopwatch to determine how long it took for the students to travel in a certain direction. The direction changed for each test.

Cars. During the second quarter of physics instruction, the students were given the goal of creating a self-powered car with common household materials. The car needed to be able to navigate a track (electrical tape on the ground in the lab section of the classroom), and if it deviated, the students, who were placed in groups, would need to start over again. The track consisted of five straights, four turns, and one hill. When it came to the turns, the students' goal was for their car to make the turns on its own. However, if the students could not figure out a way for the car to turn on its own, they could mark the placement of the car, turn it, and put the car down so the car was facing the correct direction. Furthermore, the cars needed to move on their own without the use of batteries or motors. Finally, the cars could be not be bigger than a shoebox and needed to be planned and constructed in class. Students used shoeboxes, chip canisters, 2-liter bottles, or flat pieces of cardboard for their designs. Commonly used materials for propulsion were balloons, magnets, rubber bands, and mouse traps.

Once the car was built, the students tested their designs on the track, but they were not allowed to handle the car outside of the previously described rules. The students then calculated the speed of the car for each time it moved (at the end they calculated the average speed), measured using the metric system, and used their knowledge of Newton's 3 Laws of Motion to navigate the track. The students tested their car once, made modification, tested again, made final modifications, and completed a final test.

In addition to the strategies of centers and small group instruction, these activities presented multiple, integrated, active pathways for exploring the concepts of physics. The science activities were heavily integrated with math and engineering concepts, but also involved creativity, divergent thinking, problem-solving, and critical thinking. Students were highly engaged and were able to make meaningful connections between the activities and the often-complex nature of the concepts.

LA Smog

The Arizona science standards call for seventh graders to learn about the atmosphere and technologies that predict weather. The teacher decided to use problem-based learning to explore these topics and capitalized on student choice and interest in their planned solutions to Los Angeles' air quality issues.

The students were asked what they already knew about smog in Los Angeles. They were given time to list what they knew, and the teacher facilitated a discussion using the students' ideas. The issues were framed as complex problems that required creative, innovative solutions. Then, students were given time for authentic inquiries, which involved questioning, researching, and even hypothesizing.

After the problems with LA's air quality were identified, and students had a chance to investigate through their own research and inquiry, the students discussed possible solutions as a class. Their preliminary ideas were presented, and the students were then shown information about the "Forest City" that China is currently constructing to combat pollution. This planned city has over 40,000 plants and is estimated to produce 900 tons of oxygen. It would lower the average air temperature by a couple degrees as well. Students were given the task of utilizing some of the concepts from the "Forest City" in addition to their own ideas to come up with ways to implement solutions to the LA smog problem.

Since the students had done some initial research, it was time to put a plan in place. They were tasked with creating a solution that would reduce pollutants in LA's air, improve air quality, reduce smog, increase water vapor in the air, and reduce carbon dioxide levels. Using the project approach in addition to problem-based learning, students could present this plan in many different ways including slideshows, models (on presentation boards or building a scaled model), a research paper, etc... It was up to the students to present this plan to the "Governor" of California (the teacher). The teacher facilitated the planning process and asked students to begin their work.

Once the students had a plan, they had to determine the best way to support its implementation. Guiding questions included:

- How many plants will they have?
- How much fertilizer/dirt is required (Nitrogen Cycle)?
- How much water does each plant need (Water Cycle)?
- How many plants are needed to reduce carbon dioxide levels in LA (Carbon Cycle)?

- What type of soil is best for the plants chosen by the students (Nitrogen Cycle/Rock placement due to plate tectonics)?

A unique and innovative aspect of this project was that the students needed to present their completed plan to the "Governor" of California (the teacher) to gain support and funding for their project. The idea was that science is also interconnected with other issues including economics. The students needed to answer questions regarding their project that discussed the Carbon, Nitrogen, and Water Cycles, as well as address how they were reading carbon dioxide levels, water levels, humidity, air temperature, and pollutants in the air.

After approval and "funding" for their projects, students went through a series of "days" where they had to read outputs from technology predicting the weather. They would determine if their specific plans would have any effects on the ecosystem/air quality in LA. Finally, the students created a project of their choice detailing their plans and solutions. This project incorporated multiple strategies including problem-based learning, the project approach, and integrated not only multiple science topics, but social studies as well.

Conclusions

The nature of science, a changing world, and calls for innovative new approaches in STEM education have led to teachers adopting new instructional strategies that foster inquiry, engagement, and meaningful, relevant activity. Centers, integration and project-based learning are crucial strategies that will pique students' interests and foster authentic engagement in a modern classroom. Students engaged in these strategies were able to work through "real world" scenarios at their developmental level and at their own pace. Now more than ever, it is crucial for students to expand their interests, find meaning in what they are learning about, and take control of their learning. This is especially true of STEM education as teachers need to promote various pathways to explore science, integrate with other topics, develop scientific identity in their students, and promote a life-long love for science.

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Page Turners: Books for Children

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Fish Everywhere

Written and Illustrated by **Britta Teckentrup**

Big Picture Press, 2019. ISBN 9781536206258

This stunning nonfiction text brings the underwater world of fish to life! With detailed, brightly colored illustrations that frequently spread across both pages, readers are quickly engaged in the many facets of fish life, from freshwater to the salty deep sea. This book is packed with information, including labeled drawings of fish anatomy, the evolution of fish over time, the ocean food chain, and the relationship between fish and people. This is a beautifully crafted, worthwhile addition to your sea life book collection. Ages 6-9. (MTG)

Molly Mischief Saves the World!

Written and illustrated by **Adam Hargreaves**

Penguin Random House, 2018. ISBN 9781524788049

Molly Mischief Saves the World! is the second book in the series starring Molly who loves to be mischievous. While Molly loves mischief, and is quite good at it, she certainly does not like chores. When she completes her chores her family is never happy, and Molly thinks there is no way to please them. She comes up with an idea to become a superhero to complete her chores in record time. Not only does she complete her chores but she goes on to help the community and even saves the world. However, there is one problem...being a superhero is really just doing more chores! The bright, engaging illustrations compliment a character to whom many children can surely relate. Ages 4-8. (MJS)

Perfect

Written and Illustrated by **Max Amato**

Scholastic, 2019. ISBN 9780545829311

What does it mean for something to be perfect? That's a question that this delightful book takes up by exploring the perspectives of a neat-loving eraser and a scribble-happy pencil. At first, these two seem like the most improbable of friends, disrupting each other's efforts at every turn. But soon they find that playing together makes things even more perfect than they could have imagined. This nearly wordless picture book is not only a lovely story of compromise when playing together, but also highly engaging for young children, with illustrations that seem to jump off the page. Ages 4-8. (KBJ)

Sadie and the Silver Shoes

Written by **Jane Godwin.** Illustrated by **Anna Walker**

Candlewick, 2019. ISBN 9781536204803

Sadie is the youngest of four children and hand-me-down clothes are the order of the day in her family. So, when she gets to choose brand new shoes for her very own, Sadie opts for a special pair of extra special, sparkly, silver ones. She loves them so much that she wears them everywhere. All goes well until one of her shoes slips off during an outing. What will she do? A serendipitous turn of events helps Sadie reunite with her shoe, and meet a new friend at the same time. This is a gentle story that honors the roles of family and friends, and speaks to the power of resilience when life seems challenging. Ages 4-8. (PAC)

Sweet Dreamers

Written and Illustrated by **Isabelle Simler**

First published in English by Eerdmans Books for Young Readers, 2019.

ISBN 9780802855176

From the author/illustrator of *Plume* comes another lovely book that weaves together non-fiction, poetry, and gorgeous illustrations. Each page shares detailed but graphic drawings of a sleeping animal, crafted with fine lines and bright colors. These are accompanied by short poems that share details of how each animal finds its rest, including details of habitat and anatomy. The illustrations are striking on mostly dark or black backgrounds, inviting the reader to look closer at the wondrous details. In the end, the author brings it together by sharing the ways that a young girl visits these slumbering animals through her dreams. This text would be a peaceful read-aloud text to help children settle down into restful or quiet activities. Ages 4-8. (KBJ)

Try a Little Kindness

Written and illustrated by **Henry Cole**

Scholastic, 2018. ISBN 9781338256413

A little kindness can go a long way! In this straightforward text, a group of animal friends encourage readers to make kindness a way of life by finding many different ways to make the world better for others. Inviting others to play, sharing toys, reading to friends, feeding pets, and writing notes are just some of the ways that one can show care. The snippets in this book offer conversation starters for helping children to identify concrete ways to establish a culture of care in the classroom and home. The reassuring book could also serve as a mentor text for helping children to write and illustrate their own guidelines for spreading kindness in both pandemic times and less pressing ones. Ages 3-8. (PAC)

We've Got the Whole World in Our Hands

Written and illustrated by **Rafael López**

Orchard Books, 2018. ISBN 9781338177367

In this adaptation of the song, *He's Got the Whole World in His Hands*, author and illustrator Rafael López creates a vibrant, colorful tale that shows how the world and all its diverse inhabitants are interconnected. Woven into each page is a multi-colored ball of yarn that travels the world, flowing through the hands of many children representing the beautiful multicultural human race. Readers will be delighted by the larger than life illustrations that highlight not only the children of the world, but also the many magnificent landscapes and animals within this world, as they engage with commonly known lyrics. Ages 3-5. (MJS)

What Kind of Car Does a T.Rex Drive?

Written by **Mark Lee.** Illustrated by **Brian Biggs**

G.P Putnam's Sons, 2019. ISBN 9781524741235

There's kid-friendly humor on every page in this picturebook, with hilarious details in the illustrations and dialogue that bring life to the question of how to choose the best car for each dinosaur that visits the used car dealership. With brightly colored images of larger-than-life dinosaurs, young readers will enjoy discussing why a Pterodactyl might choose a convertible, or how a delivery van meets the unique needs of a Triceratops. This is a perfect read-aloud for all children who love dinosaurs and transportation, as this fun book combines those interests in surprising and engaging ways. Ages 3-7. (MTG)

Dig

Written by **A.S. King**

Penguin Books, 2019. ISBN 9781101994931

Winner of the 2020 Michael L. Printz Medal, “Dig”, written by A.S. King, commands the reader’s attention from page one. The story, told from the varying perspectives of five quirky teenagers, unapologetically explores the intersection of racism, White Privilege, toxic masculinity and death in modern America. On first glance, the level of the text seems straightforward, but those familiar with A.S. King’s earlier work, know the story will challenge even the most advanced reader. *Dig* will tax the reader’s conceptualization of family relationships and leave them applauding the young adult characters’ ability to learn and grow from those who came before them. In today’s world, this is an important read. Ages 14+. (CKM)

International Journal of the Whole Child
2020, VOL. 5, NO. 2

IJWC Updates

For the new column, "Emerging Professional," the IJWC editorial team invites students (undergraduate, masters, and doctoral levels) to submit papers including problem resolutions, literature reviews, and research designs (qualitative or quantitative). The topic choices remain broad with the primary focus on how this content supports all children's holistic learning and development. IJWC editors remain committed to providing student-authors with relevant, productive and concrete feedback. Importantly, a student may identify additional authors; the key factor is for the student to be "first author."

The IJWC mission remains committed to promoting an understanding of holistic learning and development for all children. In particular, IJWC editors believe by supporting student authors with modeling, feedback, and mentoring, IJWC strengthens and extends understanding, recognition, and implementation of "best practices" into the next generation of educational professionals and child advocates.

How to Submit a Student Paper

In order to target the "Emerging Professional" column and to distinguish your paper as a "student submission," merely identify "Emerging Professional" at the top of your document. In this way, the manuscript will be forwarded to the appropriate editors committed to supporting emerging scholars.

If you have any questions regarding this particular process, contact tiffany.wilson@mtsu.edu

See you in the 2021 IJWC Spring issue!