12-2019

Second-Grade Students' Perceptions of Their Classrooms' Physical Learning Environment

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A dissertation

presented to

the faculty of the Department of Early Childhood Education

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Doctor of Philosophy in Early Childhood Education

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by

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December 2019

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Keywords: Physical Learning Environment, Elementary Students, Children's Perspectives

ABSTRACT

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Guided by the constructivist framework, the focus of the investigation was on second-grade students and their perceptions of their classrooms' physical learning environment.

A qualitative multiple case study approach was employed, and data were collected through interviews, participant-generated photographs, and observations. Participants in the study were 16 second-grade students in four classrooms in three school districts in Northeast Tennessee. A physical learning environment tool, Assessing the Pillars of the Physical Environment for Academic Learning (APPEAL), developed by Evanshen and Faulk (2019) was used to select classrooms to take part in the study. The tool focuses on dimensions that help observers evaluate the quality of the primary classroom physical learning environment on a continuum of traditional to constructivist elements.

Findings revealed that second-grade students are aware of, and are affected by, their classrooms' physical learning environment. Generally, participants believed that classroom physical learning environments that were best for them were meaningful, offered easy access to resources and materials, and provided opportunities for active learning and social engagement. Both physical and emotional comfort were important to participants.

There were more similarities than differences between the perceptions shared by participants in the classrooms that scored highest on the APPEAL (more constructivist or student-centered) and the classrooms that scored lowest (more traditional or teacher-centered) on the scale. Some of the differences that emerged were that all the students who were in the teacher-centered classrooms identified features connected to computers as something they liked whereas most of the students in the learner-centered classrooms did not. Students in the learner-centered classrooms were more articulate in talking about how displays helped them to learn, and students in the teacher-centered classroom communicated the need to change displays.

Additionally, the findings suggested that young children's perceptions about the environment can be influenced by their experiences or contexts and their individual differences. The findings encourage teachers of young children to think about their students as actively affected by their environment and challenge them to design classroom physical learning environments that support the diverse needs of students within these spaces.

DEDICATION

This dissertation is dedicated to my parents who have been there for me from day one. They were my first educators; they model dedication in all they do and showed me the joys and value of being an educator. I also dedicate this work to my siblings. Their unwavering love, inspiration, support, and encouragement throughout this journey have been a huge blessing to me.

ACKNOWLEDGMENTS

I am sincerely grateful to my committee chair and mentor, Dr. Pamela Evanshen. Her consistent support, invaluable guidance, and inspiration from the very beginnings of this journey kept me moving forward. I would like to thank my committee members, Dr. Rosemary Geiken, Dr. Carol Trivette, and Dr. Ruth Facun-Granadozo. I greatly appreciate their insights and support during this project.

I am also grateful to the National Association of Early Childhood Teacher Educators (NAECTE) for their support through the NAECTE Foundation Doctoral Scholarship.

I owe a lot to my participants for allowing me to learn from them. In addition, I want to thank their parents, their teachers, school principals, and school district administrators.

I also thank my ETSU Early Childhood Education Department friends, especially my cohort and Randa Dunlap, for their help, encouragement, and friendship. I am thankful for my friends and extended family in the United States and in different parts of the world who provided much needed encouragement during this process.

To the many teachers who taught me over the years, I say, “Thank you.”

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CHAPTER 1

INTRODUCTION

This chapter gives a brief overview of the context and background to the study. It also explains the significance of the investigation and presents study questions and definitions of key terms.

Overview

Students in the state of Tennessee spend 180 days each year and about 7 hours each day in school (Tennessee Department of Education Division of Data and Research, 2015). Additionally, in 2011–2012 public-school teachers of first through fourth grades are reported to have spent 95.1% of the school week delivering instruction in the classroom (National Center for Education Statistics, n.d.). The center of instruction in the public-school setting is the classroom. The large amount of time students and teachers spend in school is not unique to Tennessee or the United States but is common to many countries in different parts of the world (National Center for Education Statistics: Education indicators, n.d.)

Considering this information, we can conclude that students in the early primary grades are likely to spend more than half of their day in the classroom during the school year. That makes school the second place children spend most of their time after their home (Bluyssen, 2017). The classrooms children inhabit determine the extent and quality of learning experiences in which they engage in the hours they spend at school (Merewhether, 2015; Strong-Wilson & Ellis, 2007). It is therefore important to learn about how spaces where young students spend their time learning impact their learning, especially from the perspectives of the students.

Indeed, this should be an area of focus for all educators and stakeholders, especially those who work with young learners in elementary settings, as it is the early grades where children are

taught how to learn and in what ways they learn best. Furthermore, according to the Association for Supervision and Curriculum Development (2017) the requirements of the century call for a joint effort to make sure students are "college, career, and citizenship" ready. The drive to get students ready has led to the development of programs such as the Program for International Student Assessment (PISA) by the Organisation for Economic Co-operation and Development (OECD) and National Assessment of Educational Progress (NAEP) to measure where students are in relation to specific standards. In addition, each year countries and schools aim to get better scores, and policies are put in place at the state or federal level aimed at driving teaching and learning to higher standards.

Apart from PISA, OECD also created the Teaching and Learning Survey (TALIS), which collects data and does comparative analysis among countries to provide more understanding on what is happening in regard to teaching and learning in schools (Organisation for Economic Co-operation and Development [OECD], 2009). The aim of TALIS is to find policy that influences or drives successful teaching practices, so member countries can learn from each other and adapt such policies to fit their contexts. All these efforts are aimed at bringing improvements to schools or increasing efficiency of schools.

Because the center for all improvement at the school level is the classroom, effective reform that will bring positive change in achievement and efficiency that is desired in education should start with an understanding of how children learn (National Association for the Education of Young Children [NAEYC], 2009). This understanding can inform educators in the creation of structures at the classroom level that promote learning. The physical learning environment of the classroom is a significant part of student learning, and it is at the core of the education system (United Nations Educational, Scientific, and Cultural Organization: Institute for Educational

Statistics and Cultural Organisation [UNESCO], 2012) for the early primary grades and for older students. According to NAEYC (2009), developmentally appropriate practice should be the foundation for creating environments where students in the primary grades (PreK-3) learn and succeed.

Guided by theory and findings from research, the environments where students spend a great deal of their learning time can be designed to make teaching and learning more effective and create quality learning environments for young learners. As the National Association for the Education of Young Children (2019) states on their homepage, the key to promoting high quality early learning is "connecting practice, policy, and research."

Statement of the Problem

The physical learning environment is one of the three main components of the classroom learning environment: the social, physical, and temporal environments (Creemers & Reezigt, 1996; Iris Center, 2015). All three components are essential for quality education. These elements of the learning environment are interconnected and form a holistic enabling condition for student learning (UNESCO, 2012). The physical learning environment includes the spaces, furnishings, and materials in the classroom (Iris Center, 2015). Olds (2001) suggested "movement, comfort, competence, and control" as the four core considerations when designing spaces for young children (p. 8).

A review of early childhood education standards and policies for several countries and organizations attest to the important role the physical learning environment plays and its critical position as an aspect of quality in the education of young children. NAEYC (2019) identifies the physical environment as one of the 10 standards of program quality; the National Quality Standards for Australia lists physical environments as one of the key quality areas (Australian

Children's Education and Care Quality Authority, 2017). In a review on quality learning environments, UNESCO (2012) reported dimensions of the physical learning environment as key parts of checklists and standards for quality learning in the elementary grades for Denmark, Kenya, and Spain. Also, the United Nations Children's Fund (2017) identified physical elements of learning environments as an aspect of quality primary-school education.

The classroom physical environment fosters both young students' development and learning (Ferguson, Cassells, MacAllister, & Evans, 2013; Olds, 2001; Ralph & Eddowes, 2002; Reutzel & Jones, 2013). It influences how children behave as it sends messages about expectations. Because of this, teachers should be intentional and thoughtful about the type of messages sent through the classroom environment teachers create for children (Bredekamp, 2017; Bullard, 2014; McGinty, Radin, & Kaminski, 2013; Pointon & Kershner, 2000; Tanner, 2008). The learning environment design is also reflective of the teacher's beliefs (Hensley-Pipkin, 2015; Nislev, 2015).

Moreover, the physical learning environment is a medium for messages of care, safety, and behavior expectations. Furniture arrangement communicates the nature of interactions and learning that is expected to take place, whether individual, partner, or in a group (Guney & Al, 2012). Design of the classroom can communicate clear expectations for the students, and adequate resources and materials can help manage classroom behavior (Iris Center, 2015).

In addition to its effect on behavior, the environment also has an important influence on facilitating creativity and can be adapted to foster creativity. Warner and Myers (2010) identified the main variables in an environment that fosters creativity to be lighting, color, decorations, furniture, resources, sensory variables, space configurations, and class size. Developmentally appropriate physical learning environments look different for school-age children when

compared to those for younger children. They should encourage collaboration, be structured for different types of instruction such as individual, small-group, and whole-group instruction, and contain learning centers that align with curriculum areas (Bredekamp, 2017).

Philosophical Framework

This study is guided by the constructivist framework as informed by theorists such as Piaget, Vygotsky, and Dewey. According to the constructivist framework, children are active participants in their learning, and the learning takes place as they interact with their physical environment and social environment or with other people (Dangel, Guyton, & McIntyre, 2004; DeVries & Kohlberg, 1990). The physical learning environment is identified as one of the important components of a constructivist classroom (Guney & Al, 2012). There is no specific model of how a constructivist classroom should look, but the philosophical belief can be seen in the physical learning environment of the classroom. The environment communicates messages of what the teacher believes about how students learn (Dangel et al., 2004).

Teachers who are effective should be intentional and thoughtful when designing quality environments, so each child feels safe and empowered to learn (Henniger, 2005; McGinty et al., 2013; Phillips, Scrinzi, & National Association for the Education of Young Children, 2013). Intentionality in creating physical environments is consistent with developmentally appropriate practice, and effective teachers are as intentional in creating physical environments as they are with other areas of teaching practice (Bredekamp, 2017). They understand that the physical learning environment is as important as the curriculum and other aspects of schooling and that it contributes to the comprehensive environment that makes up the school (Tanner, 2008, 2015).

Jean Piaget

According to Piaget (1936) children are capable and active in constructing their knowledge. Such construction of knowledge is enabled by a supportive physical environment that gives children the opportunity to interact with the environment and construct new knowledge. Such an environment enables students to engage in interactions with materials to help them to develop or learn (Piaget, 1947). The physical and social environment plays a fundamental role in the development and learning of young children.

Children's interactions with their physical environment for learning cannot be over emphasized. According to Piaget (1964b), "To know an object is to act on it. To know is to modify, to transform the object, and to understand the process of this transformation" (p.176). Children interact with the materials available, and based on Piaget's quote, get to know the objects. This leads to active construction of knowledge and learning more about themselves. Children are active constructors of knowledge, so the environment cannot be ignored, as it is a fundamental part of children's learning. Children also learn more about themselves as they interact with their learning environment (Maxwell, 2000).

John Dewey

Effective teaching taps into an understanding of students' interest and knowledge they bring to the learning experience (Dewey, 1916). Designing physical learning environments, which is part of effective teaching, requires that teachers know the interests, ability, and background knowledge of the students with whom they work. To do this, the teacher should know the students as individuals and the aspects of the environment that enable each of them to learn.

Dewey (1916) also talked about the social environment which according to Vygotsky (1978) is important for development and learning to take place. Such a social environment can only be possible when there is a physical environment in place to complement it. He explained that the school is a special environment where adults control the education of students by controlling the learning environment. “We never educate directly, but indirectly by means of the environment. And any environment is a chance environment so far as its educative influence is concerned unless it has been deliberately regulated with reference to its educative effect” (Dewey, 1916, p. 22). Dewey’s statement emphasizes the importance of intentionally creating learning environments to foster children’s learning.

Dewey also discussed the importance of creating an environment where the learner can engage in problem solving and an environment that facilitates engagement in the experience of learning in collaboration with other students and the teacher. He believed in an environment where the student can make connections and engage in meaningful learning and not “ready made ‘ideas’” (Dewey, 1916, p. 188). In Dewey’s words, within such an environment learners and teachers play both the role of the teacher and learner interchangeably in the learning experience. He described conditions within the learning environment as having power to promote or stifle learning.

As well as facilitating learner engagement, a supportive physical environment helps students feel a sense of belonging because it will be meaningful and relevant to the students. As reported in the works of Dewey (1916), there is need for real-life materials in the classrooms that facilitate hands-on learning and other aspects of the physical environment that students can relate to and that challenge them to learn.

Lev Vygotsky

Vygotsky (1978, 2012) shared that interactions with other people are important for children's learning. Children's learning occurs as they interact with other people, and this belief shows children's capability to have and share ideas (Merewether & Fleet, 2014). The physical learning environment should give students an opportunity to engage in social activities and develop social skills that are important throughout their life. It helps students develop respect, collaboration skills, and other values that they need to be successful throughout their school experience and in the work place (McGinty et al., 2013). Vygotsky's position also justifies the importance of carrying out research with children because children develop through interactions with other people and the influence of their culture. Giving children an opportunity to share their experiences is in a way fostering their development (Merewether & Fleet, 2014).

Maria Montessori

Like Dewey, Maria Montessori's ideas were child centered. Montessori (1967) emphasized the idea that the environment should be prepared for the child's education. Like Piaget, she believed that children's thinking was different from that of adults (Crain, 2011). Closely connected to this is the role she attributed to the teacher as "the catalyst" between the child and the learning environment (Montessori, 1967, p. 30) and "the environment as the instructor" (p. 103). In her method, she regarded the teacher and the environment as partners in the child's learning. According to Montessori, children are naturally disciplined in an environment prepared for them, and the tasks that meet each child's needs help children engage in the activity (Crain, 2011). To Montessori the effective learning environment is one prepared by the teacher, based on the teacher's careful observation of the child and knowledge of the child.

Maria Montessori argued that informative observations should be done to develop an environment that was not restrictive to the learner. She proposed that such an environment consisted of child-sized furnishings and materials, allowing children easy access and free choice. She created special materials to be used for the education of children in specific areas, and the materials were all self-correcting. In her argument for self-correcting materials and a self-correcting environment she posited that this would enable students to transfer their learning or ability to self-correct to other areas of life as well (Montessori, 1967).

In her writing describing her method, Montessori also stated that another characteristic of an environment that supports learning is that it should be aesthetically pleasing to the student, materials should be interesting to students, and the environment should not be overstimulating with too many materials available. She explained that materials should be just enough to stimulate and sustain student interest. Montessori's ideas on the importance of the prepared environment were driven by her respect for children or image of childhood that children are different from adults (DeVries & Kohlberg, 1990).

Like Piaget, Montessori believed that children are not passive recipients of knowledge, hence the need to create an environment where they can naturally flourish. Central to her method is the interdependency of students' learning and the physical learning environment and thus the careful consideration teachers ought to have for both designing and maintaining an environment that fosters learning. The idea of giving second graders an opportunity to share their perceptions on their learning environment so as to provide classroom physical learning environments that are best for students is in line with Montessori's beliefs on the importance of observing the child's action to determine environment design decisions.

Second-Grade Students

Second-grade students are capable developmentally of answering questions, taking photographs, and describing their experiences. At this age, students are in the concrete operations' level according to Piaget's theory. They can make judgements, are not as egocentric as younger children and have the capability to give explanations or justifications for their position (Bybee & Sund, 1982). They also have developed problem-solving capabilities. Bredekamp (2017), stated that children of this age group should be actively included in designing their environments for learning.

The primary-grade landscape is different from preschool in that schoolwork is harder, and there are higher academic expectations that might discourage some students (Bredekamp, 2017). Another difference is decrease in choice and increase in competition, which is characteristic of the journey up through the grades in a school system (Eccles, Midgley, & Adler, 1984). Additionally, research also showed developmentally appropriate practice tends to decrease up through the grades (Buchanan, Burts, Bidner, White, & Charlesworth 1998; Vartuli, 1999). Research also shows decline in motivation for school is age related with a significant decline found between kindergarten and first grade (Eccles et al., 1984). These researchers argued this is partly due to changes in social environments as children move up the grades in a school system. It is important to understand how the physical classroom environment can help students thrive in academically-demanding schools. It is also important to learn about children's preferences and what their perceived needs are in their classrooms, although the relationship between the two is not completely clear (Pointon & Kershner, 2000).

Significance of the Problem

A review of literature shows that studying the physical learning environment in elementary schools to gather students' perceptions of the physical learning environment is an area in need of more research (Maxwell, 2000). Cleveland and Fisher (2014) and Bluyssen (2017) suggest that the research on classroom physical learning environments from the perspective of children who live and learn in the classroom setting should involve their active participation. Apart from interviews with children, such participation could be in the form of child-generated photographs, drawings, journals, and other forms of artistic expression.

Some of the few studies that have been conducted have revealed differences between teacher beliefs about aspects of their physical learning environment in relation to student learning and the perceptions of the students who used the spaces (Maxwell, 2000; Pointon & Kershner, 2000). The existing research helped teachers become more aware of differences between their beliefs and children's preferences. Currently, the research on young children's perceptions on aspects of their educational experience and their classroom's physical learning environment in particular is sparse in the United States.

In the past very little research was conducted with children actively participating in the process (Merewether, 2015). Merewether (2015) argued that growth in such research in recent years can be partly credited to the United Nations Convention on the Rights of the Child (UNCRC, 1989) and growth in the field of childhood studies. This study therefore seeks to contribute to the national and international research on learning environments conducted with young children in different parts of the world (Barrett, Zhang & Barrett, 2011; Johnson, 2003; Kangas, 2010; Kershner & Pointon 2000; Merewether, 2015). There is need to get primary students' perspectives because they are an important user group with different needs, which

might lead them to perceive their experiences with the physical learning environment differently (Maxwell, 2000). Teachers also need the information to design environments that are conducive for the learning of primary-age students and environments where young children feel they belong because they spend a significant part of their day in the classroom. Early childhood teacher educators may also need the information to better inform them as they prepare teachers who can then be intentional about designing learning environments that promote engagement and learning.

Purpose of the Study

The purpose of this qualitative multiple case study is to explore and understand the experiences and perceptions of second-grade students of their classroom's physical learning environment in six classrooms in three school districts in East Tennessee. The main research question that this study seeks to answer is:

What are the perceptions of second-grade students in three districts in Northeast Tennessee about their classrooms' physical learning environment?

Subquestions are:

1. What do students like about their classrooms' physical learning environment?
2. Where in the classroom do students prefer to spend their time?
3. When studying various content areas (reading, math, science) which aspects of the classrooms' physical environment do students think help them to learn?
4. Which aspects of the physical learning environment contribute to students' sense of belonging?
5. Which aspects of the physical learning environment do students prefer to be changed?

Definitions of Key Terms

For the purposes of the study the following terms are going to be defined:

Children's perceptions are their awareness or consciousness, interpretation influenced by classroom conditions or individual differences that can be due to children's prior experiences or personalities (Ryan & Grolnick, 1986). In other words, this includes how children "sense and experience" their world (Rasmussen, 2014, p. 463).

Classroom physical learning environment is the overall design and layout of the room that includes spaces, furnishings, and materials (Iris Center, 2015).

Constructivist theory is the general belief influencing educational practices that children are active constructors of their own knowledge (Ciamba, 2012; DeVries & Kohlberg, 1990; Loyens, 2007).

Developmentally appropriate practice (DAP) is an approach to teaching that is informed by research and involves understanding of where children are as individuals and as a group, and creating learning experiences that challenge students to learn more and give them success (NAEYC, 2009).

Learning is "a change in knowledge or skill that results from experiences or instruction" (Bredekamp, 2017, p. 103). It is not a passive experience according but involves children actively engaged in their development with their environment. Learning is negotiation of meaning influences by the physical environment, the learner, and the teacher (social context) (Fredriksen, 2012) "…learning develops with the increase of neural networks" (McGinty et al., 2013, p. 57).

Second-grade students in the United States' school system are children age 7-8 years.

Sense of belonging includes comfort and well-being (Ralph & Eddowes, 2002). In this study the term sense of belonging is used in the broad sense of feeling emotionally welcome, involved, and secure in the classroom.

Traditional approach to education involves instructional practices based on the belief that the teacher is the source of knowledge. In this approach the education experience is teacher-centered, and the learner has a passive role (Günüşen, Serçekuş, & Edeer, 2014).

Assessing the Pillars of the Physical Environment for Academic Learning (APPEAL) developed by Evanshen and Faulk (2019) assesses the design and use of the classroom environment for supporting learner-centered learning. This tool includes multiple descriptors of the physical classroom environment. These descriptors, or indicators, are rated along a continuum from teacher-centered to learner-centered practices. The scale measures the components of the environment which are related to developmentally appropriate practices for elementary-aged students.

Summary of Chapter 1

This chapter defined the classroom physical environment, arguing that it is important for primary-age students' learning. It also provided background information to the study by describing the educational context and expectations for rigor in the United States and other parts of the world. Additionally, it introduced the theoretical framework for the study, study questions, and explained the purpose of the study and problem statement. The remaining part of the dissertation proceeds as follows: Chapter 2 presents a review of literature related to the study, Chapter 3 is concerned with the methodology for the study, Chapter 4 presents findings of the research, and Chapter 5 focuses on the study summary, discussions, and recommendations based on the findings.

CHAPTER 2

LITERATURE REVIEW

Introduction

This chapter provides a summary of the literature review about the classroom learning environment and the variables impacting the design of the physical classroom environment in relation to teaching and student learning in the classroom. It also outlines key components and theories relative to the study. Traditional (teacher-directed) and constructivist (learner-centered) approaches to education, the physical learning environment, factors that influence the physical environment, impact of the physical classroom environment on student learning, multinational children's perspectives of their physical learning environment, and environmental rating scales are explored.

Traditional and Constructivist Approaches to Education

Approaches and methods of teaching young children have evolved over time with changes driven by new thought and prevailing needs of nations (Weiss, Knapp, Hollweg, & Burril, 2002). There seems to be change in some countries moving from teacher-directed learning to learner-centered approaches that involve learners more and require adaptation in the physical environment (Australian Children's Education and Care Quality Authority, 2017; Oberdörster, & Tiesler, 2008). Generally, two approaches to education influence the design and use of the physical classroom environment: traditionalism and constructivism.

Traditionalism

The traditional classroom landscape is influenced by the "one size fits all" belief (Ryniker & Shoho, 2001). This theory purports that all children learn in the same way or have the same needs, and they think and feel the same way as adults only lacking the quantity of

experiences adults have (DeVries & Kohlberg, 1990). Teaching in traditional classrooms is also influenced by the belief that there is truth that should be learned and because of that, students are expected to complete tasks and master specific knowledge (DeVries & Kohlberg, 1990). This is evident across some countries where the belief is that teacher-directed activities are the basis for student learning (Ying Hu, Fan, Leng Leong, & Li, 2015).

Traditional teaching in contrast to constructivist practice places the teacher as the director of student learning (Ciamba, 2012; DeVries & Kohlberg, 1990; Günüşen et al., 2014; Loyens & Gijbels, 2008). Because the focus is on retaining information, students engage in tasks not because they are interested but to complete the work. There are often rewards or reinforcements accompanying getting students to do the work. The type of motivation students have for doing work is more extrinsic than intrinsic. Research in literacy development for young children however shows extrinsic motivation is not long lasting or enough to sustain student engagement necessary for deep learning (Becker, McElvany, & Kortenbruck, 2010; Willingham, 2015).

Traditionalism is influenced by behaviorism – the belief that children's learning is molded by adults (Ertmer & Newby, 1993; Trawick-Smith, 2014). Features of a learning environment that are traditional include rows and column seating with the teachers' desk taking a prominent position in the classroom (Guney & Al, 2012). The traditional classroom does not allow for much social interaction between the teacher and the students or among the students because the teacher is regarded as the main transmitter of knowledge (Park & Choi, 2014). The focus is on the teacher, and there is no variety in methods of instruction or tasks (Anthony & Hunter, 2005). The classroom physical learning environment will therefore not include materials for active learning or other experiences where learners can independently explore and learn.

Constructivism

The central principle of constructivism is that the learner is an active participant in learning (Ciamba, 2012; DeVries & Kohlberg, 1990; Loyens, Rikers, & Schmidt, 2007). According to Loyens and Gijbels (2008), although there are several understandings of constructivism, there are two main categories under which each falls: a focus on the student as a constructor of knowledge or the individual's construction of knowledge in collaboration with other people. In general, in constructivist classrooms, learners actively participate and engage with other students as part of the learning process (Dangel et al., 2004).

Constructivist teaching is evident by the way furniture is arranged and by choice of materials (DeVries & Kohlberg, 1990). Such learning environments have spaces for individual and group learning and show that the teacher understands children have different intelligences and needs (Guney & Al, 2012). Constructivist practice values social interactions in the process of learning. Authentic learning or real-life experiences are also a feature of many constructivists' practices (Loyens & Gijbels, 2008). This is noted in Dewey's (1916; 1938) beliefs and teachings.

When students construct knowledge, they use their existing knowledge to interpret new knowledge (Loyens & Gijbels, 2008). The main theorist behind this belief is Piaget (1952), and this idea is evident in his concept of assimilation. The interpretation is also consistent with John Dewey's (1938) teaching on the importance of prior knowledge and experiences in the process of acquiring new knowledge and the physical learning environment being used as a tool to help students make connections between prior knowledge and new knowledge. Display of student work showing student learning and progress is an illustration of this (Evanshen & Faulk, 2013).

There is some evidence to suggest that many teachers believe constructivist practices are the most ideal for effective teaching in this century. This is exemplified in the results of the first

Organisation for Economic Co-operation and Development (OECD) Teaching and Learning International Survey (2009). Generally, the results showed that teachers in almost all the countries surveyed preferred constructivist teaching over traditional teaching. For instance, they believed that the teacher's role is that of facilitator, not direct transmitter of knowledge. More research on constructivist practices, especially from the students' perspective, will help such teachers in creating environments that are optimal for student learning.

Growing popularity in constructivist and progressive ideas in the educational field has led to the recent growth in research seeking to understand how the physical environment can be designed and used for student learning (Cleveland & Fisher, 2014). Loyens and Gijbels (2008) argued for a need to investigate how constructivist beliefs influence learning experiences and to evaluate the effectiveness of constructivist-influenced learning environments. Learning more about what happens in classrooms that have physical learning environments that align with constructivist beliefs from the students' point of view and finding out if it is effective from the students' perspectives is important information for teacher education.

The Physical Learning Environment

Theories influence how teachers design the classroom learning environments, and the environment reflects the teacher's philosophy or beliefs (Evanshen & Faulk, 2011; Fernandes, Huang, & Rinaldo, 2011; Pointon & Kershner, 2000). Development leads to learning (Piaget, 1952), and learning drives development (Vygotsky, 1978). Both development and learning are influenced greatly by experience (Bredekamp, 2017). Social, emotional, and cognitive development should be considered together because they are related (Bredekamp 2017).

Brain research findings point out that experiences and environments help children to develop cognitively, socially, and emotionally. According to Kovalik and Olsen (1998) healthy,

safe, uncluttered, aesthetically-pleasing environments foster children's brain development. Creating environments that foster learning requires knowledge of "how the brain functions and learns" (McGinty et al., 2013, p.51). This is in agreement with Piaget's theory that teaches that children's thinking is different from that of adults.

Support for Learning

The 1990's were labelled as the "Decade of the Brain" (Library of Congress, n.d.). Findings from brain research show the importance and need for exploration and hands-on learning experiences. Such activities engage the whole child and connect learning experiences at school to real-world experiences. Brain research shows that the brain responds to new experiences or information by adjusting to accommodate the new information as new neural networks are created (McGinty et al., 2013). Learning becomes a natural experience in such an environment.

Physical learning environments form a significant part of early experiences and determine the nature and quality of interactions that children experience in the classroom. For instance, the teacher's philosophy, values, and expectations are reflected in the seating arrangement and classroom physical environment (Fernandes et al., 2011; Guney & Al, 2012; McGonigal, 1999). Together with aspects of the classroom environment like the social emotional climate and routines and procedures, a high-quality classroom physical learning environment has a significant influence on student engagement, social emotional development, and positive learning outcomes (Abreu-Lima, Leal, Cadima, & Gamelas, 2013; Berris & Miller, 2011). It is therefore key to gain understanding of how the learning environment affects student learning. One way to do this is to focus on how environments "look" and "work" for the students in the classroom by studying the interactions that occur in the space (Dimidjian, 1983). Deeper

understanding of the learning environment and how it relates to the users is also important because research shows that quality learning environments are one thing that can be adapted by the teacher (OECD, 2009).

Research on the physical environment and how it affects human behavior has been conducted in different disciplines including architecture, education, and psychology. This interdisciplinary aspect will be seen in this review of previous scholarship. Including the contributions of other fields apart from education is in line with Olds's (2001) recommendation for an interdisciplinary approach where the expertise of professionals from different fields is involved in creating optimal environments for young children. The powerful influence of the physical environment on behavior is acknowledged in research practices; for instance, when doing interviews the researcher should carefully choose or create an environment where the participant feels comfortable and safe (Gill, Stewart, Treasure, & Chadwick, 2008). From the field of architecture several tools have been developed to assess school buildings, but there is not much on how the building characteristics relate to desired learning activities and experiences (Cleveland & Fisher, 2014).

Cleveland and Fisher (2014) hold the view that there is need to develop tools that can gather students' perspectives because they are the main users of the learning spaces. They also recommend the use of "formative evaluation methodologies" in learning environments' research with the goal of meeting 21st century educational beliefs (p. 25). In the same vein, Bluyssen (2017) in her review on how different classroom physical factors affect students, suggests involving children in studying about the physical learning environment in active ways rather than the commonly used "questionnaires or performance tests" (p. 1047). Such methodologies would be considered by educators as developmentally appropriate ways to assess children's views.

As discussed earlier, the classroom learning environment aspects that influence student learning are both design and usage related (Barrett, Zhang, Moffat, & Kobbacy, 2013). Aspects of the physical environment like the comfort level and sense of hominess have been found through studies to affect student learning and success (Barrett, Davies, Zhang, & Barrett, 2017; Barrett et al., 2013; Fernandes et al., 2011; Tanner, 2008). Research suggests the physical environment dimensions that are believed to influence learning the most are: space that gives opportunities for exploration, development, and independence; quality of space that includes such things as color, light, and materials; as well as bringing the outdoors indoors (Berris & Miller, 2011; Leung & Fung, 2005). Materials that are of interest to students that give choice and are accessible encourage student intrinsic motivation to engage in activities like reading (Allington, 2012).

Other features of physical environments that promote learning in young children include visual comfort, thermal comfort, acoustic comfort, well-defined space, individual quiet space, space for group activity, flexible seating arrangements, and clean and well-maintained safe spaces (Ahmad, Shaari, Hashim, & Kariminia, 2015; Barrett, Davies, Zhang, & Barrett, 2015; Barrett et al., 2013; Tanner, 2008; UNESCO, 2012). This then implies that the classroom learning environment is made up of several factors that are interconnected and dependent upon one another. Additional studies are needed to get a clearer and deeper understanding of how the classroom learning environment relates to student learning.

According to Pointon and Kershner (2000) researchers do not completely agree on aspects of the environment that have a direct influence on learning. Some of the reasons they give for this are the absence of a common description of effective learning, differences in school physical environments, diversity in schools, and lack of common agreement on how different

environments in schools and teaching and learning processes relate. The lack of complete agreement is on the influence of environmental aspects such as light, color, and acoustics on learning. This is probably so because it is difficult to isolate the different factors so that their specific influence on learning can be established without the possible influence of other variables (Barrett & Barrett, 2010; Barrett et al., 2013). This conclusion brings to light several factors that are important for research on the physical learning environment.

Factors that Influence the Physical Learning Environment

Factors that influence the physical learning environment in primary schools include different philosophies at the teacher level, educational policies, socioeconomic factors, cultural factors, environmental factors, and the interrelated and complex relationship among these factors.

Developmentally Appropriate Practices for Student Engagement in the Classroom

The three core considerations for practices that are developmentally appropriate are: knowledge of child development and learning, children as individuals, and knowledge of their cultural and social background (NAEYC, 2009). All three pillars are informed by research and theory. The physical learning environment is addressed in all three aspects of developmentally appropriate practice. For instance, all three should be considered in making decisions about appropriate classroom furnishings, materials, acoustics, and spaces in the classroom to provide students choice of workspace to ensure all children are engaged. This should be the aim because engagement leads to learning and prevents challenging behavior (Alter & Conroy, n.d).

The student should be the center and focus when making decisions about the physical learning environment because it has a great effect on their learning and development. An environment that is focused on the learner “considers both the developmental stage of the child

and the individuality of the process" (Evanshen & Faulk, 2011, p. 29). Such environments where the teacher is thoughtful about what is appropriate for the student, guided by knowledge of the stage of development of the child, and the needs for success with an activity, help students to be successful. When students are successful it positively affects their intrinsic motivation (Becker et al., 2010; Gambrell, 2011).

It is important to understand that children of different ages have different needs, and individual children, though similar in age or culture, have unique needs as well. By way of illustration, Berris and Miller (2011) suggested that flexible and quiet spaces foster young children's development by encouraging them to explore. Additionally, Barrett et al. (2013) found that younger and older primary-age children's learning progress was affected differently by the color of walls and floor. Primary-age students also learned more in spaces that were flexible, where different learning activities could take place. Flexible spaces allowing for choice, and designated spaces for learning in small groups, individually, or whole group is consistent with developmentally appropriate practice (Evanshen & Faulk, 2013; Tomlinson, 2014). It has been established that choice gives students a sense of autonomy that is a major element of intrinsic motivation (OECD, 2010).

Developmentally appropriate practice places the learner at the center of all pedagogical decisions. A developmentally appropriate physical learning environment is child-centered and consistent with constructivist early childhood classroom ideals where materials are accessible to students and there are clear connections between materials, the rest of the physical learning environment, and student learning (Dangel et al., 2004). Studies on different aspects of young children's classroom physical learning environment show the positive effects of designing

classroom learning environments that meet the developmental needs of specific groups of children (Marx, Fuhrer, & Hartig, 1999; Wannarka & Ruhl, 2008).

The physical environment is one aspect that can openly communicate culture (Noe, 2017). As stipulated by NAEYC, the physical learning environment should be culturally appropriate to meet the needs of the children in the classroom. Cultural competency can be shown in materials, artifacts, and other displays in the classroom (Curtis & Carter, 2003; Evanshen & Faulk, 2013). Results from Boykin et al.'s (2005) study suggest academic performance of fifth-grade African-American students from low-income backgrounds could be enhanced when the classroom context reflects their cultural themes.

Environmental Aspects Influencing Student Engagement and Learning

Research on factors that influence positive student engagement show support for an environment where students see the importance of what they are doing (Marzano, 2013). Previous research has established that there is an association among aspects of the physical learning environment like air quality, unwanted sound, lighting, and thermal quality and children's learning, performance in school, and general well-being (Bluyssen, 2017). Studies also show young primary-age student perception and sensitivity to these and other aspects like lighting and that these differ from those of older students and adults (Lercher, Evans, & Widmann, 2013; Mäkelä, Kankaanranta, & Helfenstein, 2014; Teli, Jentsch, & James, 2014).

Color. Studies on aspects of the physical learning environment sensory factors like light, color, temperature, and noise (Pointon, 2000) have enhanced our understanding of environmental factors that can foster student learning from an architectural point of view. Stimulating color can negatively affect student learning (Fisher, Godwin, & Seltman, 2014). Color affects children's nervous system, and blood pressure and can influence a child's perception of room size (Olds,

2001). Elementary students thought the white color of their school walls was unwelcoming, and one of the students said it was adult like (Maxwell, 2000). In another study with elementary school students light or white color on walls and bright displays had a positive effect on student learning progress (Barrett et al., 2017).

Results from a study with 3- 4-, and 5-year-old children seemed to imply that girls and boys have different preferences for color of walls or other parts of the learning space (Read & Upington, 2009). In this mixed method study children were asked to select classroom images in their preferred color. Boys and girls chose different colors with more girls choosing purple as their preferred first choice than boys. For all students red, purple, and blue were the most preferred colors and gray was the least preferred color. Unlike in other studies discussed earlier, findings from the study showed no relationship between age and/or gender and cool versus warm colors.

Research also shows color gives a sense of place (Read, 2003). Bright wall color also seems to encourage cooperative behavior, and warm colors offer a sense of safety and create a homelike environment (Read, Sugawara, & Brandt, 1999). This sense of safety and belonging helps to engage students in learning. When designing the learning environment, educators are encouraged to determine appropriateness of color by considering brightness, amount, and harmony with other colors already in the space (Olds, 2001). Color should be appropriate for the task (Barrett & Barrett, 2010). Color is very related to light and should therefore be considered in relation to light when designing spaces for young children's learning (Olds, 2001).

Lighting. Best practices and research state that light should be made to be ideal for the specific activity and space to meet the needs of the activity (Olds, 2001) and can be used to define space (Curtis & Carter, 2003). Effect of specific colors on students can be in combination

with light, textures, and materials that are in the same surrounding as the color (Read & Upington, 2009). Research also shows children are more likely to be affected by light in different ways than adults (Bluyssen, 2017).

According to Olds (2001) natural light has both psychological and physical effects on young children, affecting such things as their blood pressure and brain activity and can give young children a sense of security. Research also shows natural light influences emotions positively (Harmatz et al., 2000), and this can indirectly foster student learning. Studies also show that natural light had an influence on primary-age students' learning. Natural light has a positive effect on primary students' achievement (Barrett et al., 2013; Evans, 2006; Heschong, Wright, & Okura, 2002; Tanner, 2008).

Classrooms for school-age children gain access to natural light through windows, but not all young children's classes have windows or enough natural light leading to a need for use of artificial lighting. The amount of artificial lighting can influence student well-being and performance in school with brighter light having a positive influence (Aoki, Yamada, Ozeki, Yamane, & Kato, 1998; Lemasters, 1997).

Thermal Quality. Air temperature negatively influenced productivity, well-being, and office workers' motivation to work (Lan, Lian, & Pan, 2010). In a study with adults both high and low air temperatures affected workers negatively. Just as in adults, high temperatures have been found to negatively affect student performance in reading and math (Lackney, 1994). The influence of high temperatures on learning can also be indirect since research shows high temperatures can affect students emotionally (Donovan, Halperin, Newcorn, & Sharma, 1999).

Studies with adults are the basis for comfort levels used in schools, based on the assumption that children and adults have similar thermal comfort levels (Teli et al., 2014).

Findings from research with primary-age children however suggest that children's sensitivity to temperature is different from that of adults (Teli et al., 2014; Yun et al., 2014). A study with children 4–6 years old also showed girls' sensitivity to heat to be higher than that of boys with study results suggesting children's perception of thermal comfort also depends on the nature of activity in which they are engaged (Yun et al., 2014). Additionally, when 7–11-year-old students completed a survey on comfort level in the classroom they expressed preference for lower temperatures than those preferred by adults (Teli, Jentsch, & James, 2012).

Sound. Available literature shows sound or noise in the classroom can affect primary-age students' engagement, learning, and well-being. Research also shows sound levels need to be controlled in both teacher-directed classrooms and classrooms that are learner centered (Oberdörster & Tiesler, 2008). According to Evans (2006) crowding and noise level have been found to influence students' behavior. He argues that noise level and crowding are associated with learned helplessness in young children. Noise exposure also negatively affects short-term memory and caused annoyance among students in a study with third and fourth grade students (Lercher, Eisenmann et al., 2013).

Students can, however, be affected by noise differently depending on their age (Klatte, Hellbrück, Seidel, & Leistner, 2010; Lercher, Eisenmann et al., 2013) and gender (Lercher, Eisenmann et al., 2013) with younger children being affected more by noise than older children or adults. This view is supported by Shield and Dockrell (2004) who state that engagement of children under the age of 13 is more likely to be affected negatively by noise levels because they have not yet developed a capacity to block distractions so as to hear someone talking to them in loud environments.

While many studies found that noise affected younger children more than older children, Shield and Dockrell's (2008) study seemed to suggest older students, 11-year-olds, were affected more by noise when compared to younger students. Generally, findings on effect of noise or sound seem to imply a need for consideration of sound and sound levels in young primary-age student classrooms to encourage engagement and learning. Shield and Dockrell (2008) suggested that reducing classroom noise levels would ensure student learning.

Research also shows primary-age students prefer working in peaceful classroom environments (Barrett et al., 2011). Similarly, a positive effect was found on reading achievement and short-term memory when primary-age students were provided a quiet room away from a high noise space (Lercher, Eisenmann et al., 2013). Likewise, a German study with children of around 7 to 8 years of age found evidence that students' short-term memory on a task can be affected negatively by noise (Klatte et al., 2010). In another study involving 2,036 students between the ages of 6 and 11, students showed awareness of noises that negatively affect them both at school and home, with younger children expressing stronger effects of noise on their ability to hear classroom interactions. This study also showed young children's engagement in the classroom is affected by noise (Shield & Dockrell, 2004).

There is evidence to suggest that noise can affect student reading (Klatte et al., 2010), and a negative relationship was found between noise levels in the classroom and student scores on literacy and science in a United Kingdom study with 7- and 11-year-old students (Shield & Dockrell, 2008) even after controlling for socioeconomic factors. Findings from an Austrian study with third- and fourth-grade students showed a negative relation between sound exposure and students' short-term memory (Lercher, Eisenmann et al., 2013).

Arrangement of Classroom Space. There are mixed findings on seating that is best for young primary-age students. In a study done with primary-school students in the United Kingdom, most of the students who participated in the study preferred seating in rows and columns to seating at tables with some claiming that would help them to concentrate (Pointon & Kershner, 2000). This seems to coincide with research that shows that students engaged in more on-task behavior when sitting in rows than at tables (Hastings & Schweiso, 1995). Students however asked more questions in semicircle seating than in rows, and in Hasting and Schweiso's study (1995) more than half of the primary-school students who participated in the study preferred seating in groups to seating in rows.

This implies that seating arrangements should be flexible and accommodate different types of learning and activities. In another study on seating done with primary-age students teachers' questions directed at students differed depending on where students were seated (Moore, 1984). Research also showed sitting at tables seemed to negatively affect young students' ability to hear the teacher well especially when there was distracting noise in the classroom (Dockrell & Shield, 2004). This shows the important influence the setup of the classroom can have on interactions between the teacher and students, which is important for student learning.

In a review of empirical research on seating arrangement and the effect on student behavior and academic performance, Wannarka and Ruhl (2008) concluded that there is no universal or specific seating arrangement that fits all groups of students or activities. Seating arrangements should be flexible and designed to fit the behavior the teacher desires and activity in which the class will engage.

Similarly, their sentiments are shared by other scholars and researchers focusing on the physical environment and its effect on the learning of young students (Evanshen & Faulk 2011; Hastings, 1995). Wannarka and Ruhl (2008) also bring up another important factor to be considered when creating physical learning environments to support learning. From their analysis of literature, they stated that responses to aspects of the environment like seating arrangement are likely to differ for students of different age groups. This assessment by Wannarka and Ruhl (2008) points to the importance of creating environments that are based on developmentally appropriate practice to foster student learning.

Impact of the Physical Classroom Environment and Student Learning Environmental Aspects

Several studies have shown that the physical learning environment both at the school and at the classroom level influences learning for students in the elementary grades. One such study (Tanner, 2008) involved 24 rural elementary students. The researcher assessed the influence of the school physical learning environment on student achievement measured by the Iowa Tests of Basic Skills (ITBS), a test identifying third-grade students' year-to-year growth and performance in content areas. The school's physical learning environment was assessed using four sections of the Design Appraisal Scale for Elementary Schools. This is an instrument that assesses physical environments. The four sections were movement and circulation, large group meeting places, day lighting and views, and instructional neighborhoods (Tanner, 2008). A positive correlation was established between the school physical learning environment and third-grade student achievement ($r = .543$, $p = 0.006$) after controlling for socioeconomic status.

Although the study was done at the school level, components of the physical learning environment addressed by the scale used in the study are components that research has

established to be important for classroom physical learning environments (Barrett et al., 2015; Berris & Miller, 2011). These include components of instructional neighborhoods: spaces for small- and large-group areas, quiet and private spaces, and areas designed for specific learning (science and art). It also assessed for the presence of aspects like light, windows, and natural elements already established by research to be important (Becker & Mastrangelo, 2017; Evans, 2006). This study and others on the school environment show possible convergence between the school and classroom environments thereby showing we can learn something about the classroom physical environment from studies on the school learning environment.

In another study that set out to determine the influence of the physical learning environment on learning for primary-school students, 6 of 10 physical environment aspects were found to have significant correlation with the progression of learning in a study involving 751 students from 34 diverse classrooms in Blackpool, United Kingdom (Barrett et al., 2013). The design parameters assessed were color, texture, light, sound, temperature, air quality, choice, flexibility, connection, and complexity. The 10 parameters were identified from analyzing data collected through observations of classroom spaces, interviews with teachers, and measurement of aspects like lighting level, temperature, level of noise, and carbon dioxide levels. Student learning progress was assessed by comparing performance levels collected at the beginning of the year with scores at the end of the year in reading, math, and writing. The six elements found to significantly influence student progression were color, choice, connection, complexity, flexibility, and light. These elements explained 25% of variance on students' learning improvement.

The impact of the classroom and school environment on learning was also shown in a larger United Kingdom study involving students aged 5 to 11 years in 153 classrooms (Barrett et

al., 2015). The aim of the study was to assess how the classroom physical learning environment influenced learning in reading, writing, and math. In looking at the influence of the different content areas the researchers argued that was important because different content areas demand different skills, and elements in the environment foster specific skills. The study controlled for student characteristics like socioeconomic status, special education needs, English as a Second Language and teacher effects. The study focused on 10 classroom parameters, namely: sound, temperature, air quality, links to nature, light, ownership, flexibility, connection, complexity, and color (Barrett et al., 2015).

In the study a survey for the whole school and one for the classroom were used, and data were collected on 3,766 students in 153 classrooms using a subject progress measure on each of the three subjects over a period of a year. Results from the study showed small individual correlations between the 10 design aspects and learning progress and significant combined impacts on learning. Light and flexibility had significant influence on learning in all three subject areas; color and complexity influenced reading and writing but not math. Links to nature also influenced progress in writing, and ownership factor was significant for progress in math. The results showed the multidimensional nature of the physical learning environment (Barrett et al., 2015). The study also corroborates the results of previous studies on the influence of aspects like light, color, and flexibility on learning (Barrett et al., 2013; Berris & Miller, 2011; Evans, 2006; Warnaka & Ruhl, 2008).

Fisher et al. (2014) investigated how classroom display affected kindergarten students' engagement and learning. Twenty-four students participated in the experimental study in a laboratory classroom with two conditions. One was decorated with commercial materials and children's artwork with some of the materials not relevant to what the students were learning at

that time. The other classroom was decorated with only materials that were relevant to what students were learning at that time. Children participated in six lessons in the two conditions and took a pretest before the lessons and a posttest assessment after each of the six lessons. Trained coders observed student behavior and coded for on-task and off-task behavior demonstrated through children's eye gaze.

Results showed students spent less time engaged in the decorated classroom than in the scarcely decorated classroom. Posttest results showed that although students learned in both conditions, they learned more in the scarcely decorated classroom. Findings from the study show the importance of considering what is displayed on the walls and its influence on learning. These findings also suggest that engagement predicts learning because findings showed a negative relationship between the time students were engaged and their learning as evidenced by scores on the assessment. However, displaying student artwork in a school setting was found to positively influence students' sense of ownership of their learning in a study involving fourth- and fifth-grade students (Killeen, Evans, & Danko, 2003). The authors argued that student engagement is strongly influenced by their sense of ownership.

Collectively, results from these studies show the important role aspects of the physical learning environment have on primary-age student learning. They also confirm the interrelatedness of aspects of the physical learning environment.

Sense of belonging. Sense of belonging was analyzed for the first time in PISA 2015 because it is believed to be a major influence in student academic performance. It involves feeling welcome, feeling secure, and having choice (Australia Department of Education, Employment and Workplace Relations [DEEWR], 2009). Students' emotions are important in learning, and an environment where students feel they belong has conditions that help them feel

safe (McGinty et al., 2013). Sense of belonging is closely connected to attachment theory and Maslow's hierarchy of needs as one of the needs he identifies together with such things as water and food (Tanner, 2015).

For young children the sense of belonging is very important for their success in school. Sense of belonging is identified as an important component for children's development and learning that can be shown in physical learning environments for young children (DEEWR, 2009). It is connected to sense of place that emotionally connects students to the spaces they occupy and help them to learn (Brillante & Mankiw, 2015). This is in line with Strong-Wilson and Ellis's (2007) argument that the learning environment goes beyond what we see when we walk into a learning space to include how the learner feels about the space.

Display of students' work can help give them a sense of accomplishment and sense of ownership in their physical learning environments (Killeen et al., 2003; Maxwell & Chmielewski, 2008; Tanner, 2015). Even older students when asked about their feelings regarding differences in secondary-school and primary-school classrooms commented that they felt the secondary-school classroom belonged to the teacher while they felt the primary-school classroom belonged to them because the classrooms had displays of student work (Pointon, 2000). Students need to feel they belong in their classroom environment. Pictures on the wall and other displays help to create a sense of belonging (Pointon & Kershner, 2000; Guney & Al, 2012). Such classrooms give children a sense of ownership. One way of ensuring children feel a sense of ownership is by involving them in the creation of their classroom physical learning environment. This shows students that the teacher respects their input about the learning environment and that they play an important role in their own learning (Dangel et al., 2004).

Student well-being is closely connected to the physical environment (Mäkelä et al., 2014). According to Killeen et al. (2003) students develop a sense of ownership of their learning when they feel they can control their learning, when their environment is personalized, when they are involved in their learning, and when they have a sense of territoriality. In their study with fourth and fifth graders, students whose artwork was displayed permanently in the school or who knew that their artwork would be displayed in the future had a stronger sense of ownership compared to students in a school where their art work was not displayed.

Social interactions. The physical learning environment influences the social interactions that take place in the classroom, and therefore it is important to consider the role it plays in influencing social interactions since social development is part of cognitive development (Gandini, 1993; Vygotsky, 1978). According to Rasmussen (2014) findings from research on children's experiences in physical learning environments show that children view the social and physical environment as closely connected even more than how adults perceive the two. Intentionally created physical learning environments can foster social and emotional development of children especially when used together with play and relationships (Kirk & MacCallum, 2017). Piaget's teaching states the importance of social relationships for development to take place (DeVries & Kohlberg, 1990). Skills like self-regulation can be developed in an environment that is designed with a focus on developing such skills. Research shows skills such as self-regulation are important for engagement and success in school (Boyd, Barnett, Bodrova, Leong, & Gomby, 2005). A German study involving first- and second-grade students showed a possible negative effect of classroom noise on social relationships. These relationships among students and between students and the teacher in the classroom are important for academic achievement (Klatte et al., 2010).

Design of the spaces in the classroom are guided by the type of interactions intended for the people who occupy the space, and research shows the relationships between different layouts and social interactions. In another German study with fourth-grade students (M =10 years), seating arrangement was shown to have a significant effect on the question asking rate $p < 0.05$ and R^2 = 17.4% (Marx et al., 1999). More questions were asked when students were seated in a semicircle than in rows and columns. In the study, there seemed to be a no action zone in a semicircle seating arrangement, while in the rows and column seating arrangement there seemed to be zones that were more active than others. Students' participation and question asking was not influenced by where they were seated in the semicircle. Results from the study show the importance of creating seating arrangements that promote interactions that are important for learning. The findings show that seating arrangement is an important feature that educators should think about as they create environments that promote primary students' learning. It is interesting to note that interaction between the physical learning environment, in this case seating arrangement, seemed to vary for different subject areas as found in some studies (Barrett et al., 2017; Tanner, 2008). In Marx et al.'s 1999 study, student rate of question asking was lower in math than in German. This seems to imply the importance of separating the influence of the learning environment on specific subject area learning to be able to establish specific aspects of the physical learning environment that help young children learn in different content areas.

Students also showed preference for social interactions or opportunities to relate with other children in a study where children were asked to share about learning preferences (Johnson, 2003) and in a study of children in outdoor environments (Merewether, 2015). In the study with Australian 3- and 4-year-old children (Merewether, 2015), children showed they liked working with other children through photographs they took of their classmates playing in areas

where they liked to play. The researchers also observed the children engaging in learning and interviewed the children about their classroom environment.

The influence of the physical learning environment shown through these studies support Evans's (2006) conclusion in a literature review on how the physical learning environment affects child development. He asserted that this influence on interactions can come directly from the environment or through the adults who work with young students in the environment.

Influence of Reggio Emilia

The Reggio Emilia approach to early childhood education shows influence of sociocultural theory, Piaget, and the teachings of John Dewey (Churchill, 2014; Malaguzzi, 1998). This Italian approach that has influenced the field of early childhood in many countries is child-centered. The key tenets of the Reggio approach include the image of the child as an active constructor of knowledge and researcher, documentation, the role of the environment as a teacher, involvement of parents in development of curriculum and learning, involvement of community, research, and the teacher's role as a guide and co-learner (Hall, 2010; Schneider et al., 2014). Reggio Emilia's guiding principles are mirrored in the design of learning spaces and demonstrates their belief of how the environment fosters teaching and learning as a third teacher (Curtis & Carter, 2003; Strong-Wilson & Ellis, 2007). Materials and displays are intentionally used by educators to draw children's interest and encourage exploration (Isbell & Exelby, 2001; Strong-Wilson & Ellis, 2007).

As seen in the schools embracing the Reggio Emilia approach the belief is that children can express their work in many ways. Malaguzzi expressed that children have "a hundred languages" (Hall, 2010, p. 165). This belief of Reggio is seen in research methodologies that are centered on the child and use different methods to gain understanding of children's perspectives.

These include children's drawing (Merewether & Fleet, 2014), participant-generated photographs (Kershner & Pointon, 2000; Merewether, 2015; Rasmussen, 2004), open-ended questionnaires (Barrett et al., 2011; Kershner & Pointon, 2000; Mäkelä et al., 2014; Rasmussen, 2004), designs (Mäkelä et al., 2014) and children's writing (Kangas, 2010). The growing focus on involving children or doing research with children is in line with the Reggio Emilia view of the child as capable and a co-constructor of knowledge. Strong-Wilson and Ellis (2007) recommend involving children's active participation in creating their learning environment. Educators and children can work together to create environments that are effective tools for teaching and learning.

Teachers' and Parents' Perspectives

Studies have been done with parents and teachers to establish learning environment factors they consider important for learning. In a study aimed at gaining perceptions of teachers and parents on early learning environments in two low socioeconomic centers in Australia, researchers used interviews to gain parent and teacher understandings of the importance of the learning environment for children's development and learning. They also completed a Likert scale evaluating the quality of the center's physical environment (Berris & Miller, 2011). Participant assessment of the center based on the Likert scale was then compared to the quality of the center as evaluated by the Early Childhood *Physical* Environment Rating Scale (EC*P*ERS) developed by Sugiyama and Moore (2005). Both parents and teachers agreed that the physical learning environment was important for children's development. Their responses were categorized into four main themes: "emotional connection, experiencing design, hub for community integration, and future vision for early learning center" (Berris & Miller, 2011, p. 105).

Parents shared that they considered the quality of the physical learning environment in making judgements about the quality of the whole center second after the quality of the staff. Some of the environmental elements parents considered were displays, order, cleanliness, and environments that connected to the outdoors. Safety, size, and flexibility were other factors brought up by both parents and teachers. Participants' assessment of the physical environment of the center was generally in agreement with the quality of the center as measured by the EC*P*ERS. Parents and teachers also considered safety, display of student work, and cleanliness to be important for a school they considered to be safe and welcoming (Maxwell, 2000).

It is important for teachers and parents to be involved in research on how the environment influences learning and development. This is in line with one of Reggio Emilia's core values (Hall, 2010; Strong-Wilson & Ellis, 2007). Teachers and parents are important stakeholders in the quest for more understanding on how the classroom physical learning environment affects children's learning. There is need for collaboration in making decisions about design of learning spaces. The approach used to gain insights from the different groups of stakeholders should be friendly and at the level of understanding for all involved. Berris and Miller (2011) refer to this as "jargon-free" (p. 102). Teachers also have the power to create physical environments that can foster learning by encouraging interactions (Kirk & MacCallum, 2017). There is need to get children's perspectives to strengthen the research on physical classroom environments. This is an identified gap in research (Dockrell, Lindsay, & Lewis, 2000). There is need for more research obtaining the views of the children who use the classroom physical learning environment and interact with it in very different ways and on various levels.

Children's Perspectives

There has been some recent growth in research with children as co-researchers or having more voice (Quennerstedt & Quennerstedt, 2014). Some scholars attribute this rise in interest to the UN Convention on the Child, and growth in the field of childhood studies (Gill et al., 2008; Merewether & Fleet, 2014, Merewether, 2015). Their argument is from a child's rights perspective that children should be given opportunities to share their opinions especially on issues that affect them. A contrasting and more appealing reason is Rasmussen's (2014) argument that children's involvement should go beyond rights and goodwill, to be practical, thoughtful, and genuine.

Examples of studies with children include two Danish studies with children between 5 and 12 years of age. The purpose of the studies was to understand how children experience their everyday lives and the significance and impact everyday physical surroundings have on their lives (Rasmussen, 2004). In these two studies data were collected through child-generated photographs of places that are meaningful to them and walking interviews where children shared experiences and showed researchers places and told of spaces that mattered to them.

Research seeking students' attitudes or notions are important because they can possibly help in establishing whether the needs of the students are being met (Ryniker & Shoho, 2001). Additionally, research with children helps to give a deeper understanding that can affect practice and direct future research because much of the research available has not been done directly with children (Gill et al. 2008). Adding the view of students helps to gain more of an understanding of students' needs in relation to their physical learning environment that have an influence on their overall attitude toward the school experience (Barrett & Zhang, 2012).

Involving students in creating spaces that are important for them is gaining popularity in creating outdoor environments for children, and it gives children a "sense of belonging" (Sisson & Lash, 2017, p. 13). Young children have also been active participants in studies like one with 5- and 6-year-old children in Iceland, aimed at finding the children's perceptions on their experiences at the preschool and adding the voice of preschool children to the already existing definition of quality provided by stakeholders such as parents and teachers (Einarsdottir, 2005).

Multinational Children's Perspectives of the Physical Learning Environments

Some studies on children's perspectives on the spaces they use have been done in several countries including Finland, Australia, Denmark, the United Kingdom, and the United States (Barrett et al., 2011; Kangas, 2010; Johnson, 2003; Merewether, 2015; Pointon & Kershner, 2000). Some of the studies sought children's perspectives on the whole school learning environment including the outdoor learning environment, and a few focused specifically on the classroom physical learning environment. All the studies are relevant for this study because they primarily seek the perspectives of children, and they also contribute to understanding methodologies that are most appropriate for such studies. Findings from these studies influence methodological and other decisions for future studies.

Perceptions of the School

Among studies on children's views on school environments is a study carried out in the United Kingdom with 127 students and their teachers (Barrett et al., 2011). Participants ranging in age from 3 to 11 years were from two primary schools: one rural and one urban. The study used a grounded theory and case study approach. Open-ended questionnaires administered by the teachers were completed by 9- to 11-year-old students in the rural school and 8- to 11-year-olds in the urban school. The questionnaire asked students what they liked, disliked, and wished they

had in their school physical environment. The researcher did three workshops with 4- to 8-year-old students in the rural school. These were audio recorded because they thought the children's writing and reading abilities were not high enough for them to respond to questionnaires. Researchers also observed the school and took pictures of the rooms.

The classroom was one of the aspects that was most frequently mentioned by students as one of the things they liked. Although the study sought to find perceptions on the school-wide environment, 39% of students who completed the questionnaire stated that they liked their classrooms, which showed classrooms were important to them. Students also stated they did not like displays and equipment in the school that did not work well or that they could not use. Most used descriptive words such as: big, lots, safe, and color. Students expressed preferences for spacious, colorful, peaceful environments. Students however did not mention aspects such as light, noise, or temperature in the questionnaire, although the children in the rural school talked about how they did not like that the temperature in the classroom was not controlled when the researchers prompted them in the focus groups. Considering findings from previous research that identifies aspects like light, noise, and temperature to influence student achievement and well-being (Berris & Miller, 2011; Evans, 2006), the students' responses were a bit inconsistent.

Highest on the list of what students liked were spacious, colorful, and peaceful environments. There were differences between what students from the rural school and those from the urban school liked. This seemed to imply a variable that might need further study to establish whether the school social or economic characteristics might influence children's preferences as well as whether students' socioeconomic background might influence their learning environment preferences. A study with 800 older students from eight private and eight

public schools in Nigeria also found the students' perception of their school physical environment differed for students from urban and rural school systems (Asiyai, 2014).

Responses from the students in the United Kingdom study (Barrett et al., 2011) seemed to suggest that when the environment gives students a sense of ownership and makes them feel valued, this potentially boosts their self-esteem, which is similar to a finding in an earlier study carried out in the United States that showed a positive influence of school environmental personalization on student self-esteem (Maxwell & Chmielewski, 2008). Although the study focused on the physical environment of the whole school, features of the environment that children identified like space, color, and peacefulness have been established in the field to be important even in the classroom physical learning environment.

A similar study employing grounded theory as well involved 93 Finnish students from three schools serving typically-developing students. The participants were aged 10 to 12 years old (Kangas, 2010). Like the previous study, the objective was to establish students' perceptions of their ideal school learning environment that included the physical learning environment. Students who participated in the study were asked to write a story about the school of their dreams, identifying environment characteristics of such a school and the activities in which they would like to engage at that school. This methodology is empowering to students and gives them a sense of control over the study. It was appropriate to gather students' perceptions but could possibly be a challenge to students with low writing ability or who might not enjoy writing. The researchers used NVivo software to code the data.

Among other features of the school environment students desired, characteristics related to the classroom physical learning environment were identified from analyzing the students' writings. These included light, artwork, color, furniture, and other factors that the researchers

categorized as space and aesthetics. These aspects were identified by 49% of the students. In analyzing themes that emerged from the stories, the researcher summarized students' perceptions in one overarching or broad theme, broadening and empowering learning environments. Four elements of such an environment were: physical well-being and environmental comfort, educational and cultural well-being, socioemotional well-being, and the joy of learning, fantasy, and innovations.

In their interpretation of the research findings, the researcher conceptualized that an environment that will be best for students is one that will help them to learn and one that also makes them happy. Such an environment, according to their analysis, is culturally appealing and meets the students' socio-emotional well-being.

Perceptions of children and adults on their physical school environment were different on elements they considered to be important in a study involving 9–11-year-old students, teachers, and parents (Maxwell, 2000). The aim of the study was to identify characteristics of the school's physical environment that made it feel safe and welcoming. The researchers hypothesized that the different groups would have different needs. These were reflected in the findings of the study with 131 parents, 96 students, and 34 educators at an elementary school serving PreK–sixth-grade students. The study took a mixed-method approach, and the participants completed questionnaires and a few participated in focus groups. Most of the participants (79%) identified display of student work as one of the important features that made a school welcoming. Student perceptions differed significantly from that of teachers and parents on displays. Displays were one of the key five features of the welcoming school environment where there were significant differences between perceptions of adults and those of children. Students differed with adults in identifying the white color of the interior walls as something that was not welcoming. More

students than parents or teachers also stated that the indoor temperature was not welcoming, 58% compared to 47% staff, and 14% parents. Children tend to have perceptions that are different from those of adults on different issues (Gill et al., 2008).

An Australian study involved eight 3- and 4-year-old children in two classrooms at the same center and aimed at finding children's perspectives of their outdoor learning environment (Merewether, 2015). This qualitative study used photos, conversations, drawings, and observations. The researchers observed how children used the outdoor spaces, took child-guided tours around the center during which the children took pictures of spaces that were important, interesting, and special to them and talked about the spaces. They then used the pictures to guide conversations with pairs of students on the following day. Children also drew pictures showing their perceptions of the outdoor learning environment. Study findings were presented in the form of a documentation book with participant-generated photographs, drawings, parts of participants' conversations, and the researcher's interpretations.

The researcher identified four main themes about places that matter to children: places for socializing, places for observing, places for moving, and places for pretending (Merewether, 2015). The researcher inferred these themes from the data through the various means of data collection. Some of the inferences were from such things as the angle of picture, the content in the pictures, and analyzing children's conversations including their choice of words or names they used to describe different places. Findings showed that children valued places where they could interact with other children, places where they could engage in make believe, and generally places that met their different domains of development: physical, social-emotional, cognitive, and language; although the children did not identify the different domains, the themes developed showed this. These findings, though from a study with a small sample of younger

children, are significant in supporting the case for well-designed learning environments for children's development and learning. They also show that children are aware of their environments and do have preferences in those spaces that potentially affect or influence their well-being.

Perceptions of the Classroom

In a United States study with 214 fifth-grade students from six schools in the Mid-Atlantic region of the United States, the researcher used three instruments to survey students' learning preferences and their notions on their classroom physical learning environment in relation to their learning experiences (Johnson, 2003). Two of the schools were rural, two were urban, and two were suburban. The researcher used two instruments to measure students' preferences for individualistic, competitive, cooperative, or communal learning, and "preference for community beliefs and behaviors" (p. 508). An instrument, Perceptions of the Classroom Learning Environment Questionnaire, developed by the researcher, was used to assess students' perceptions of their classroom physical learning environment with students identifying what they liked best about their classroom. About 32% of the students identified an aspect related directly to the classroom physical learning environment like seating arrangement, classroom display, and look of the classroom.

While 18% of students in suburban schools and 15% in urban schools expressed preference for the look of their classroom, none of the students in the rural schools shared that they liked the look of their classrooms. Students' preferences, like in previously discussed studies, seemed to be influenced by the geographical location of the school and by gender. Findings also identified ethnicity as an influencing variable in children's preferences.

Results across geographical locations however showed that most of the students preferred learning in groups or with their peers to working individually. Gender, ethnicity, and geographical location of school seemed to have no significant influence on student learning preference and learning choice, with more than half of the students (75%) showing preferences for group learning over competing with other students, or learning alone. Students' mean score on the cooperative subscale was 3.98, mean score on the communal subscale was 3.16, and mean score on the competitive subscale was 2.75. The activities students liked the most were educational games, science experiments, and group activities. Activities they disliked the most were reading aloud, working alone, and note taking.

Findings from this study are significant because they suggest an important role the classroom physical environment plays in creating learning environments that primary-age students prefer. Environments where they can work in groups, interact with their supportive teachers and friends, and engage in active activities were preferred. A close analysis of the findings seems to imply an interdependence that primary-age students perceive among the classroom physical environment and the type of interactions and activities that go on in the classroom. This interdependence can be identified by closely analyzing students' learning preferences and perceptions of their classroom physical learning environment.

The studies discussed so far involve children in gaining understanding on what children think about their school and their outdoor or indoor learning environments. The studies use methods that are traditionally used in research with adults like surveys and interviews. They also use data collection methods such as photographs. In the Finnish study children wrote stories. In a related study with younger children the researcher used children's writing as one of several methods to tap into children's notions (Merewether, 2015).

In another study involving young children, data were collected through both traditional and child-friendly methods like questionnaires and designing models (Mäkelä et al., 2014). The study aim was to find what students considered to be effective learning environments that would fit requirements of the 21st century. The study included aspects of the physical learning environment among other general learning environment factors. The Finnish study involved 80 students ranging in age from 7 to 14 years. Participants completed questionnaires, co-designed models of spaces that they thought were ideal for a specific learning situation, and engaged in group discussions with the researchers. Findings from the study showed students, both younger and older, preferred spacious learning environments. Their designs also showed preference for colorful and aesthetically-pleasing environments. The results also suggested students preferred both traditional and nontraditional aspects of the learning environment. Good social relationships, safety, physical activity, and presence of nature seemed to be the most important aspects to the students.

A similar study was Kershner and Pointon's (2000) study with 9- to 11-year-old students in the United Kingdom. This qualitative study involved 70 children and three teachers. The aim of the study was to find students' views on their classrooms in relation to working and learning. They also wanted to find if the views of the students would be different among students, and if their views were like that of their teachers. Data were collected through individual and paired interviews, a questionnaire, and photographs generated by the participants that led to the creation of a photobook. Forty-eight students also completed questionnaires. Not all students were involved in the different data collection activities. Teachers chose activities that the students in their class would do. Students were also asked to create captions to describe their photographs. In discussing findings from the study, the authors pointed out a potential weakness in the rating

scale they had developed. They felt that some of the items were too long, potentially making it difficult for students to accurately read them and understand well enough to give credible results. This scale was developed by the researchers from the responses of the participants.

A Canadian study with kindergarten students explored the views of 16 participants in relation to the Reggio Emilia concept of the environment as the third teacher (Robson & Mastrangelo, 2017). The methods of data collection were observation field notes, participant-generated photographs, and interviews based on the photographs. Results from the study showed that participants thought learning centers, materials, documentation, pretend play, and communication helped them to learn.

Collectively, these studies show young children in different cultural contexts are aware of their learning environments and capable of expressing their preferences for the school and classroom physical learning environment. Moreover, the findings identify several important aspects regarding environments that children feel are important for their global learning environments that include the school, outdoor, and classroom physical learning spaces. Although the sample sizes in some of the studies could be considered a limitation, there is significance in the findings that are consistent in different contexts suggesting that spaces that allowed for choice, and social interaction where children felt safe, were important for students in the primary grades.

Educators and researchers in the United States, like John Dewey, have influenced educational systems for young children around the world. Additionally, significant research on learning environments for children has also been conducted in the United States leading to the development of internationally recognized tools like the Early Childhood Environment Rating Scale (ECERS), School-Age Care Environment Rating Scale (SACERS), and the Classroom

Assessment Scoring System (CLASS). However, research with primary-age children seeking to understand their perspectives of their physical learning environment is lacking in the United States and will contribute to the existing body of knowledge on the physical classroom environment. Although there has been a growth in research with children internationally, children younger than 8 years have not been involved as active participants as much as older children (Lansdown, 2004).

Environment Rating Scales

Quality in early childhood education is important to make sure that education and care will deliver expectations. Research shows the quality early childhood experience is important for the development of young children and has long-term and enduring influence on success in later life (Belfield, Nores, Barnett, & Schweinhart, 2006; Heckman, Moon, Pinto, Savelyev, & Yavitz, 2010; Lynch, 2007; Temple, Reynolds, & Miedel, 2000). To make sure that early education delivers, some standards of quality were developed based on findings from research and guided by theory. As Klatte et al. (2010) argued, the classroom learning environment is an important part of overall school quality and should be given high consideration. Some standards identify two main aspects/dimensions of quality: process quality and structural quality. These characteristics are believed to be vital for children's development and learning (Bredekamp, 2017; Slot, Leseman, Verhagen, & Mulder, 2015; Tayler, Ishimine, Cloney, Cleveland, & Thorpe, 2013). Multiple scales assess the three interdependent components of the learning environment: physical, social, and temporal (Iris Center, 2015) or both structural and process features.

An appropriate physical learning environment is one aspect of quality. It includes materials in the environment that make it possible for quality interaction, learning, and

development to take place. Process and structural quality are related, but process quality is more difficult to measure consistently, hence the need for development of observational tools. Scales developed to assess the quality of the learning environment, among other things, help to identify physical learning environment elements that are key to learning of primary-school children, as they are based on findings from research (Reutzel & Jones, 2013). Examples of assessments of environmental quality are a scale developed by Kritchevsky, Prescott, and Walling (1969); scales that focuses on spatial density (Henniger, 2005); and global scales that assess young children's learning environments like the ECERS, SACERS, and CLASS for school-age classrooms (Bredekamp, 2017).

ECERS

The ECERS is a global assessment of quality for preschool to kindergarten (2-5-year-olds) that has been used and adapted to fit different contexts. It includes seven categories or subscales: space and furnishing, personal care routines, language-reasoning, activities, interactions, program structure, parents and staff. These subscales measure both structural and process quality. Some of the items assess the physical learning environment. Space and furnishings assesses both materials and their use and does not separate the two (Ferguson et al., 2013). It was developed by Thelma Harms and Richard M. Clifford. It is designed to measure the physical learning environment and how preschool children interact with the environment. This shows the importance placed on the physical learning environment as a factor of quality.

The ECERS has been used in major studies like the Cost, Quality, and Child Outcomes Study (Peisner-Feinberg & Burchinal , 1997), and the National Child Care Staffing Study (Howes, Whitebook, & Phillips, 1992), and is accepted as a standard for measuring quality in the

United States and in other countries (La Paro, Thomason, Lower, Kintner-Duffy, & Cassidy, 2012).

SACERS

SACERS assesses before- and after-school programs for school-age children, 5-12 years old (Frank-Porter Graham Child Development Institute, n.d.). The scale has seven subscales, one of which is space and furnishings, that relate to the physical environment, and it was developed from the ECERS (Environmental Rating Scales Institute, 2017).

EC*P*ERS

The EC*P*ERS is a scale developed in Australia by Sugiyama and Moore (2005). The scale intends to measure how childcare physical environments promote the development and learning of the children who use them (Berris & Miller 2011). It assesses the quality of the building, outdoor spaces, planning of the center, and the areas where children spend most of their time (Sugiyama & Moore, 2005). This scale has been used in studies in Australia and New Zealand.

Design Appraisal Scale for Elementary Schools

The Design Appraisal Scale for Elementary Schools is a scale developed in the United States for elementary schools to assesses how the school physical design impacts student learning. This scale assesses four areas of the school's physical environment: large-group meeting places, daylighting and views, movement and circulation, and instructional neighborhoods (Tanner, 2008). Aspects of the scale were used in a study with elementary-school principals (Tanner & Langford, 2003). In another study the survey was used to establish a relationship between the school's physical environment and student learning (Tanner, 2008). The

researcher's interpretation of results from both studies describe a relationship between the school's physical learning environment and student learning.

APPEAL

For the purpose of this study, the APPEAL (Evanshen & Faulk, 2019) was used because unlike other scales described earlier, it has a narrower focus, specifically on the classroom physical learning environment factors that have been discussed in the literature review as having an influence on student engagement and learning. The scale was developed by Evanshen and Faulk and published in 2019. The APPEAL focuses on dimensions that seek to help observers evaluate the quality of the primary classroom physical learning environment on a continuum of traditional to constructivist or more child-centered elements.

The observation tool identifies six domains of the classroom physical environment namely: environment for meaningful learning, environment for social learning, environment for purposeful learning, environment for continuous learning, and environment for inquiry-based learning (Evanshen & Faulk, 2011). These domains support learning and are reflective of developmentally appropriate practice for elementary schools. Evanshen and Faulk (2011) developed a checklist to help teachers and administrators assess physical learning environments in an effort to better meet the needs of all children in the classroom. This checklist was further developed into a rubric known as APPEAL with an internal validity in the range of .60 and .83 on all six domains. In a field study the scale's overall interrater reliability was 88%.

The APPEAL, in an earlier form known as the Primary Educators Environment Rating Scale (PEERS), has been used in a study exploring first- to third-grade teachers' attitudes and beliefs to using the physical learning environment as a tool to support teaching and learning also addressing Common Core State Standards (Hensley-Pipkin, 2015). In this study the rubric was

used to evaluate the physical environment of classrooms where study participants worked identifying classrooms that were more traditionally designed and teacher focused and those that were nontraditional in design and student focused. She found that teachers' scores on the scale seemed to match how they described the role of the physical learning environment in education.

Summary of Chapter 2

This chapter presented an overview of literature related to the physical learning environments and its influence on the well-being and learning of students in the early primary grades. Key elements of the learning environment: guiding theories, influencing factors, perspectives of children on the environment, and environmental rating scales were also discussed. This review of literature shows a gap in research with young children in learning environments that are teacher-centered and learner-centered. This study seeks to fill that gap by seeking the perceptions of primary-age students who are younger than nine on their classroom's physical learning environment. The following chapter will describe the methodology for the investigation.

CHAPTER 3

METHODOLOGY

Introduction

This section discusses the methodology to answer the research questions and meet the purpose of the study. Discussion of theoretical influence, techniques, and procedures that were used to collect data, sample choice and characteristics, and analysis procedures are the foci for this chapter. Rationale for methodology decisions at each step is part of the chapter, showing among other things how each was thought to be the best fit for the inquiry.

This study was a qualitative, exploratory, multiple case study. Both methodology and analysis choices were made to meet the purpose of the study which was to explore children's understanding of their learning environment and to answer the research questions. Decisions were made and informed by established scholarly and recommended practices for undertaking research using the selected approach and partly by methodological approaches from some studies discussed in the literature review section (Creswell, 2009). Consideration was also made for methods that would work best when conducting research with young children.

The methodology employed in the study was influenced by the constructivist framework (Lincoln, Lynham, & Guba, 2011; Mertens, 2010) that stipulates that individuals develop their own meaning. The theory aided in gaining participants' perspectives from their context and seeking that understanding from several lenses (File, Mueller, Wisneski, & Stremmel, 2017). Stating the theory is important because stages of inquiry were influenced by this philosophical framework (Yin, 2014).

The researcher believed that seeking to find children's perceptions on their physical learning environment would possibly help in identifying the most influential factors of the

physical classroom learning environment for children in the United States. This will assist in further experimental studies on the influence individual variables might have. It will also help educators, designers, and even parents make decisions that are related to creating learning environments for children in the primary grades.

Research Questions

The study was designed to answer the following question and subquestions:

What are the perceptions of second-grade students in three districts in Northeast Tennessee about their classrooms' physical learning environment?

Subquestions are:

1. What do students like about their classrooms' physical learning environment?
2. Where in the classroom do students prefer to spend their time?
3. When studying various content areas (reading, math, science), which aspects of the classrooms' physical environment do students think helps them to learn?
4. Which aspects of the physical learning environment contribute to students' sense of belonging?
5. Which aspects of the physical learning environment do students prefer to be changed?

Research Design

Qualitative Research

Qualitative research tends to seek understanding of situations and events as the participants see them (Creswell, 2014; File et al., 2017; Fraenkel, Wallen, & Hyun, 2012; Ryan & Dundon, 2008). According to Maxwell (2005) qualitative research is suitable in achieving

goals related to understanding meaning from a specific group of people in a specific context because it generates linguistic data that reveals meaning from an individual level.

Accordingly, qualitative research was a fit for this study that involved seeking perspectives of participants in their situation, which in this case was the specific classroom learning environment of the student participants. Perceptions can best be understood through qualitative measures rather than through use of scales or surveys because qualitative measures generate rich descriptions (Denzin & Lincoln, 2003; Merriam & Tisdell, 2016). Such an approach helped to achieve the study goal which was to understand how children describe their learning environment and how they experienced this environment by studying the students in the context of their classroom experiences. Meanings that people ascribe to environments are not easy to define using such things as scales because of individual differences (Pointon & Kershner, 2000). Because individuals are unique and respond differently to their contexts, in-depth understanding of the influence of the physical learning environment on students would "require the particularistic scrutiny of case study" (Stake, 2005, p. 452).

Case Study Research

A case study approach was adopted to allow a deeper understanding into how children view their classroom's physical learning environment, what Flyvbjerg (2011) refers to as closing in on a context. It afforded the researcher opportunity to gather different kinds of evidence (Merriam, 1988). Although methodological aspects of case study were considered, the focus of this multiple case study was more on optimizing "understanding of the case than to generalize beyond it" (Stake, 2005, p. 443) because that was in line with the researcher's purpose, which was more of an exploratory study.

The case study strategy is not so much of a methodology but more about the object of study or the case or cases (Flyvbjerg, 2011; Greig, Taylor, & MacKay, 2013; Stakes, 2005). According to Yin (2014) what makes a case study is both the case and the methodology. An important characteristic of case study as a methodology is that it employs several "sources of evidence" to triangulate data and study a contemporary issue in a situation where behaviors will not be manipulated (Yin, 2014). In line with these positions, an important part of case study research is defining the case and boundaries of the study, which gives a context to the case (Flyvbjerg, 2011; Greig et al., 2013; Yin, 2014). Defining the case is important so the study can be placed in the prevailing literature (Yin, 2014). The case or unit of analysis in this study was four classrooms with different classroom environments. A case is a unit, and it is bound (Flyvbjerg, 2011; Mac Naughton, Rolfe, & Siraj–Blatchford, 2001; Yin, 2014). It is bound in the sense that the researcher identifies a particular case to study and places a line of demarcation around the unit of study. Case studies are intensive, allowing for generation of depth and richness through use of multiple methods of data collection and cross-unit analysis when doing multiple case studies (Flyvbjerg, 2011). The second characteristic of case studies was another advantage of using case study for this inquiry.

According to Yin (2014), case study design is suitable for "how" and "why" questions. Therefore, the study sought to answer the question "What are the perceptions of second-grade children about their physical classrooms' environment?", which is a "how" question in the sense that it sought to gain understanding of how a sample of a population perceives their environment. This was also in agreement with the assertion that case studies attempt to answer the question "What is going on here?" by focusing on the "particularities of lives in context" (Mac Naughton et al., 2001, p. 126).

A case study was an appropriate methodology for this study that sought to explore children's views because case study allows the use of "child-based ways of encountering children's perspectives in their own communication territory" (Greig et al., 2013, p. 213). The approach generated knowledge that was specific to a context (Flyvbjerg, 2011) that allowed deeper understanding of children's perceptions in two categories of classroom learning environments. Although knowledge generated from case study research cannot be generalized to wider contexts, findings from this study contribute to case knowledge (Flyvbjerg, 2011). Apart from depth, conceptual validity is high for case study methodology (Flyvbjerg, 2011).

In this study, the researcher used participant-generated photographs which are a child-friendly method. She also used language that was at the level of young children in interviews. A case study allowed the researcher to gain more understanding of the phenomena she wanted to explore (Patton, 2015). A case study provided a vehicle to study children's perceptions in their natural context, making it more context specific and allowing the opportunity to get detailed information (File et al., 2017; Pointon & Kershner, 2000).

Considering the type of research questions and being guided by what literature was available on different research designs, a multiple case study was deemed the best approach for this study. A multiple case study approach was employed because it increased the validity of findings and allowed analysis of contrasting cases, which was a feature of this study (Yin, 2014). Additionally, a multiple case study was preferable to a single case study because it made the uniqueness of a case more pronounced (Yin, 2014) and led to deeper understanding of the unit of analysis (Stake, 2005).

Pilot Study

After developing a study plan the researcher conducted a similar form of the study with a second-grade classroom in one of the three school districts where the final study was carried out. The pilot study was conducted several months before the actual study. The purpose of piloting the study was to test and improve the data collection methods and the researcher's skills (Creswell, 2014; Ravitch & Carl, 2016; Patton, 2015). Experiences from the pilot study led to several changes to refine the study. These included adjusting research questions, interview questions, sampling strategies, and equipment for photographs. Additionally, the process helped the researcher to refine aspects of the research plan such as the interview protocol and to make decisions related to resources required for the study. The experience also honed the researcher's interview skills and provided an opportunity to engage with the second-grade teacher in conversations related to improving the study. Furthermore, engaging in a pilot study allowed the researcher to gain experience in interpreting data collected from the three methods (Ravitch & Carl, 2016) which eventually influenced her data analysis plan on the larger study.

Population and Participants

The unit of analysis and context is very important in a qualitative study because it influences participants' experiences and the study findings (Stake, 2005; Tracy, 2013). A description of the population and sample, as well as justification for sample selection follows in this section.

Participants

The target population for the study was second-grade students in two city school systems and one county school system in Northeast Tennessee. One of the districts had eight elementary schools, and the two classrooms that participated in the study were located in school-wide Title I

schools. According to the United States Census Bureau website, one of the cities had an estimated population of 54, 076, and 92.4% of the population was White, 3.3% was Black or African American, 2.8% was Hispanic or Latino, 0.2% was American Indian and Alaska Native, and 0.1% was Native Hawaiian and other Pacific Islander. The other city had a population of 66, 778, and 85.9% of the population was White, 6.9% was Black or African American, 4.2% was Hispanic or Latino, 0.5% was American Indian and Alaska Native, and 2.8% was Asian.

The sample was 16 second-grade students from four classrooms. Sample selection for the study was a two-step process. In selecting the sample, one of the aims was to incorporate a variety of participants, and not to select a sample that was representative of the larger population as in studies aimed at generalization of findings (Stake, 2005). First, cases were selected, then participants (Merriam & Tisdell, 2016). The researcher used a purposeful sampling technique to identify classrooms to participate in the study. The specific purposeful strategy used is known as maximum or maximal variation sampling (Creswell, 2014; Patton, 2015), and it involved selecting cases or classrooms that differ on quality of the classroom's physical learning environment.

In the study, this method of sampling provided diversity in the classrooms and increased the chances for the influence of the physical learning environment to be more pronounced. This helped to gain wider views from the 16 student participants. The samples from these classrooms "illuminated" the research question (Patton, 2015). Once permission was gained from the school districts, principals, and classroom teachers, the researcher and an assistant used the APPEAL scale to rate 10 classrooms where principals and teachers agreed to participate in the study. According to the authors, the scale assesses the environment on a continuum of teacher-directed (traditional) and learner-centered (constructivist) classroom physical learning environments

(Evanshen & Faulk, 2011). This first stage sample selection can also be classified as outlier sampling (Patton, 2015) to gain understanding of how the two different classroom environments might influence students' perceptions of their learning environments.

Absolute inter-coder reliability on the APPEAL was established at 87% agreement on four of the classrooms assessed. After that, the researcher selected the two top-scoring classrooms and the two lowest-scoring classrooms as assessed by the scale. According to the scale the top-scoring classrooms were more learner-centered than the lowest-scoring classrooms. This created a "two–tail design" where cases for the study came from two ends of analysis of classroom learning environments according to the APPEAL, which allowed for contrasts in data analysis (Yin, 2014).

The researcher employed purposeful sampling to identify four participants to interview from each selected classroom. The purposeful sampling strategy used in the study was maximum variation or heterogeneity sampling (Creswell, 2014; Palinkas et al., 2015). This involved the selection of several cases different in some dimension (Creswell, 2014; Flyvbjerg, 2011; Patton, 2015). This was done to include variety in participants as the researcher studied the perceptions of the students in classroom contexts that are different so the participant's data can be more enhanced (Patton, 2015). This helped to gain wider views from the 16 student participants (Barrett et al., 2012).

She then asked the teacher to recommend four students to interview in each classroom guided by a criterion she provided that included: gender balance, being articulate, and able to comfortably share experiences. Working with the teacher in selecting participants was purposeful sampling in line with Yin's (2014) recommendation to select sample cases that would "most

likely illuminate" the study questions (p. 28). Stake (2005) also recommends considering access and hospitality of the context in sample selection to maximize the opportunity to learn.

Two boys and two girls were chosen to participate in each of the four classes. Sample selection addressed gender balance, addressing influence by gender as some studies showed that the way children are affected by aspects of their environment might be influenced by gender (Lercher et al., 2013; Marx et al., 1999). Purposeful sampling was appropriate in this situation where any of the students in the classrooms could be potential participants, but because of the limitation of time and resources, this could not be accomplished (Patton, 2015). In summary, four students from each of the four classrooms identified for this study constituted the sample of 16 participants. This was an adequate sample, one that was manageable and provided data to support the research questions. According to Yin (2014) sample size decision in case studies is "discretionary, not formulaic" (p. 16).

Instrumentation

There are three data collection techniques that were used to gather data in the study. This helped capitalize on the strengths of each method and provided a form of triangulation to enhance the credibility of the data (Yin, 2014). The researcher conducted semistructured interviews augmented by participant-generated photographs and contextual observations in each of the classrooms. The APPEAL Scale was used to determine the classrooms used for the study.

The APPEAL Scale

A classroom learning environment tool was used to select classrooms to participate in the study. The APPEAL is a scale used to assess elementary-school classroom physical learning environments (Evanshen & Faulk, 2019). The scale was in press when the researcher used it. Permission to use the scale was granted by the authors when the scale was in the process of

getting published. The tool, in rubric format, assesses the classroom's physical learning environment on a continuum of traditional, teacher-directed environments to nontraditional, learner-centered environments to support teaching and learning. It covers six domains to assess the physical learning environment. The six domains are: environment for meaningful learning, environment for social learning, environment for purposeful learning, environment for responsible learning, environment for continuous learning, and environment for inquiry-based learning.

This scale is designed as a rubric to measure the physical learning environment. It includes a range of teacher-centered and learner-centered indicators for the classroom's physical learning environment. Field testing of the APPEAL established an internal reliability that resulted in a range of .60 and .83 on all the six domains. This was determined by both Cronbach's alpha and Carmines' theta (Carmines & Zeller, 1979). Except for inquiry-based learning, all domains exceeded the level of .70 or above which psychometricians deem desirable for internal consistency reliability estimates (DeVellis, 1991; Nunnally, 1978). This was especially important because the domains include few items. Acceptable internal consistency has been established. In a pilot study, the APPEAL interrater reliability ranged between 79% and 95% on the scale's 43 indicators. Overall interrater reliability was 88%. Content validity was determined by a review of experts in the field who evaluated each indicator of the rubric with a score of 1-3, 3 being the indicator was very clear. Percentage of items rated at a level of 3 ranged from 77% – 91%.

One of the authors of the instrument helped in administering the tool and trained the researcher on how to use the APPEAL. Training sessions were done in kindergarten to third grade classrooms at a university laboratory school. Interrater reliability was determined through

practice using the tool in first- and third-grade classrooms in two of the school systems where the research project was conducted. Absolute interrater agreement was set at 87% on 4 of the 10 classrooms that were assessed. This helped to control researcher subjectivity on assessing some factors using the scale (Barrett et al., 2017).

The APPEAL scale has six domains and 43 items. Rating on each item is on three performance levels: novice, proficient, and accomplished with scoring at 1, 2, and 3 respectively. The maximum total score on all 43 items is 129 points, and the lowest is 43. The classrooms used as cases in the study scored totals of 114, 111, 85, and 79.

Interviews

Interviews are a common data collection method in qualitative research (Brinkmann & Kvale, 2015). A strength of interviewing as a method of data collection is that it is a natural way of gathering data (Peräkylä & Ruusuvuori, 2011). This study used semistructured interviews to capture children's perspectives. Semistructured interviews allowed the researcher to follow up with participants on issues that needed clarification or that presented themselves to be important to students. Interviews are adaptable and can allow for opportunities to probe or follow-up to participants' responses (Bell & Waters, 2014).

In designing interview questions, planning, and carrying out the interview, the researcher was guided by Greig et al.'s (2013) recommendations for appropriate practice in conducting interviews with children. These include providing clear instructions, carefully choosing context, obtaining the views of more knowledgeable researchers and teachers, and being careful about the impression the researcher might give in the interviews. The researcher used an audio recorder to record the interviews and to assure that important data were not missed. Field notes were collected on the interviews. This helped to capture both the verbal and nonverbal information

from the participants because according to Peräkylä and Ruusuvuori (2011), interview data is more than verbal language.

The interview protocol was designed with influence from Robson's (1998) five-point model (as cited in Mac Naughton et al., 2001) and Ryan and Dundon's (2008) five stages of developing participant rapport in interviews (see Appendix A). It was critical to establish participant rapport which was important in finding data that would be detailed and deep from participants and vital for the study (Ryan & Dundon, 2008). Developing the protocol included guidance from Turner (2010) and Jacob and Ferguson (2012).

In line with Robson's (1998) model (as cited in Mac Naughton et al., 2001), the interview included an introduction that consisted of the researcher introducing herself, talking about confidentiality and the purpose of the study. The next step of questions aimed at establishing rapport. Questions included ones like, What is your favorite color? What is the best toy you have? How old are you? When is your birthday? Do you have any pets? What kind of pets? The main questions of the study followed (See Appendix A). Following the main questions were two questions aimed at creating a relaxed atmosphere before participants took pictures. Examples are: What did you do last summer? Did you do any traveling last summer? Can you tell me about your favorite places to visit? Do you have a cellphone you can use when you want to take pictures? What do you use when you want to take pictures? These questions were followed by the closure.

Ryan and Dundon (2008) outline five stages that are similar in logic to those outlined by Robson (1998, as cited in Mac Naughton et al., 2001). They are: "opening the interview, searching for a common ground, establishing empathy, embedding rapport, and closing the interviews" (pp. 446–447). The first three stages involve developing rapport and helping

participants gain understanding of the purpose of the study and identification of their role in the study. In the fourth stage, the researcher focused on questions directly related to the study while making sure to maintain the relationship through good listening and responding to the participants. For the last stage, Ryan and Dundon (2008) recommend closing the interview bearing in mind that the relationship with participants should continue beyond the interview. In this study the researcher closed each interview by thanking participants for their time and the information they provided, explaining that the information would be very valuable for the study. She also told participants that she would be coming back to their classroom on another day to see how they used their learning environment. She felt it was important to prepare the students for her next visit, the observation phase of the data collection process, so they would not see the researcher as an intruder and knew beforehand what to expect.

Location for the interviews was in the students' classroom. Interviewing in the classroom helped students answer questions easily because they could look around the classroom to think about appropriate responses. Being in the physical environment also helped them recall experiences they wanted to talk about because students who participated were likely to be in the concrete operational stage according to Piaget (1960, 1964a) and might not be able to think abstractly.

Semistructured interviews allowed the researcher to probe for more information by asking specific questions (Creswell & Guetterman, 2019). To address reliability and validity issues, the researcher conducted interviews for students in the same classroom around the same time of day and in the same location whenever it was possible. A disadvantage of interviews as a data collection method is that it gives the interviewer power over the interviewee because interviewers control the setting, they ask the questions, and determine interpretation of the

responses. The researcher thought participants could feel that there was a power imbalance (Brinkmann & Kvale, 2015) because of the nature of relationships involving adults and children (Merewether & Fleet, 2014). To control for this, the researcher offered participants choice for seating during the interview and gave them an opportunity to ask questions at the beginning of the interview and at the end.

Participant-generated Photographs

Additionally, data were collected through photographs that the students took in their classrooms to supplement the interview data. According to Prosser (2011) visual methods can augment interviews and serve as a supplement for a limitation of interviewing: young children may not articulate as well and therefore limit the amount of information elicited from the interview. He argued that interviews are biased toward people who are articulate and can only provide data related to the questions asked. When used in this way, participant-generated photographs may improve the validity of study findings (Prosser, 2011). When used with young children, photographs can also be used to stimulate participants' memory and opinions on a research topic (Rasmussen, 2014).

Methods used to collect data should be friendly to children and help them express their perspectives (Clark & Moss, 2001; Greig et al., 2013). Use of participatory visual methods such as student-generated photographs is gaining popularity in many disciplines (Prosser, 2011). The methods were influenced by Moss and Clark's (2011) Mosaic approach which uses various modes to gather data. They have been used successfully in research with children of different ages in a variety of different countries, for instance, in Australia with 3- and 4-year-old children (Merewether, 2015), in Cyprus with 4- and 5-year-old children (Loizou, 2011), in Canada with kindergarten-age children (Robson & Mastrangelo, 2017), in Ghana with children around 11–14

years of age (Agbenyega, 2008), and in the United Kingdom with 9-11-year-old children (Kershner & Pointon, 2000). Participant-generated photographs help give students power to share their experiences (Agbenyega, 2008). It also helps with reduction of power relations that can influence development of relationships between interviewer and interviewees, which is important for gaining credible information (Prosser, 2011; Ryan & Dundon, 2008).

Visual methods of collecting data help participants feel more at ease and act as intermediator between the researcher and participants, thus helping the participants provide more information (Prosser, 2011). Using photographs as data collection in this study helped to provide an alternative voice to verbally quiet students (Rasmussen, 2014). Another advantage of photographs is that they "freeze detail" and "concretize" it (Rasmussen, 2014, p. 448). In this study, photographs provided data that could be referred to throughout the data collection and analyzing process, and that assisted in constructing the students' meaning. Photographs are also empowering to participants because we live in a visual culture mainly because of the development of technology. The method was therefore consistent with the current time and was more natural to participants.

After each interview the researcher asked students to go around the classroom and take pictures of their favorite parts of the classroom's physical environment. The idea of taking pictures was used successfully in a previous study with fifth- and sixth-grade students that led to the production of a photobook (Kershner & Pointon, 2000). In the current study all students were asked to talk about their pictures and how the spaces in their photos helped them to learn.

Focused Observations of Student Participants

The researcher's role in the observations was that of a nonparticipant. The purpose for this phase of data collection, observations in the classrooms, was to collect more information that

supported emerging themes. Observations in this study were used to validate evidence from interviews and to add any information that may have been missed during the interviews. Only the four student participants per classroom, for a total of 16 students, were observed. Observing provided an opportunity to get first-hand information as it occurred in the setting (Creswell & Guetterman, 2019). According to Bell and Waters (2014), observations can help to find out if the students will do what they say they do in interviews. Strength of observations include that they are an opportunity to understand the context that contributes to a complete picture of the experience. The researcher captured some things that the participants might not talk about in an interview and might be so used to that they do not share it as a response to the interview question. In addition, experiencing the context helped the researcher in analyzing the data because she had impressions from the observations (Patton 2015).

The study made use of anecdotal observations that included the observer taking notes that are descriptive. This fits with this study because it helped to provide details into the behaviors of students in their classroom environment, and such notes offered more insight to assist with bringing to light the behaviors (Mac Naughton et al., 2001). For observations to be effective, one should predetermine what to observe (Bredekamp, 2017). To make sure observations are focused the researcher used a template developed from the study questions (See Appendix B). The template also has provision for notes on behaviors that the researcher might determine to be important for the study during the observation experience.

Children behave differently in different contexts and times of the day, so the observer attempted to carry out all observations during the same time of the day in the same context or give detailed descriptions in observation notes that helped in interpretation.

Data Collection Procedures

The first step in the study was to seek approval to conduct the study in one of the school districts. An initial verbal consultation took place with administrators, in a school district in close proximity to the researcher, who encouraged the researcher to submit a formal request for approval to conduct the study in their school system. After that an email was sent to the district official in charge of research approval for the district in October 2017 introducing the study and requesting guidelines for submission of a study proposal. The district provided guidelines for a required research proposal. Upon approval of the dissertation committee, the researcher then submitted a formal study proposal to the identified school system in January 2018. Prior to undertaking the study, ethical clearance was sought from the ETSU Institutional Review Board (IRB) and was granted in February 2018. Upon obtaining clearance from IRB, the researcher sought permission from principals or directors of each school that had second-grade classrooms in the school districts. In the first school district permission or recruitment of schools was done through their district office. In the proposal submitted to the district, the researcher provided detailed information in writing about the study, describing the purpose, time the researcher would spend in the classroom, respect of the study site, and sample questions to be used during the student interviews (Creswell & Guetterman, 2019).

Full approval was gained from the first school district in April 2018 after modifications to the initial proposal to address concerns the school district had with the first plan. Documents inviting principals to allow their classrooms to participate in the study were sent through the school district in August 2018. Four second-grade classrooms were recruited in the school district from August 2018 to the beginning of October 2018. Because the researcher had a limited time to do the study, she decided to extend the study to two neighboring school districts

to recruit more classrooms and meet the requirements of the study proposal. At the beginning of November 2018, she had recruited 10 second-grade classrooms. Because of the amount of time it took to recruit, the researcher, together with one of the authors of the scale, administered the APPEAL in classrooms as soon as the teachers communicated their interest in participating in the study concurrently with further efforts to recruit more classrooms. Figure 1 shows the sample selection and data collection process.

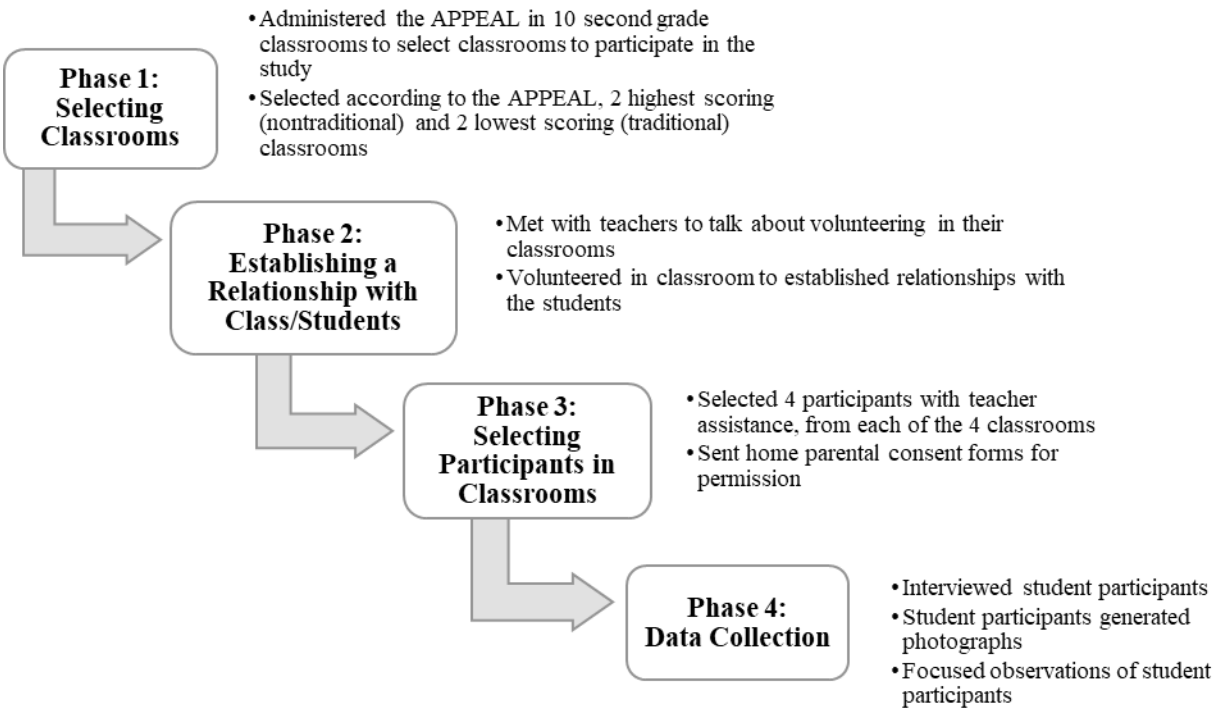

Figure 1. Sample selection and data collection process

Phase 1

Principals contacted the researcher granting approval and sharing information on teachers in their schools who were interested in having their classrooms participate in the study. The researcher then contacted the second-grade teachers in schools where principals granted approval to explain the study to them and seek their approval to administer the APPEAL scale in their

classrooms. Ten teachers agreed to have their classrooms assessed. Once teacher approval was gained, the researcher scheduled days to visit the classrooms to administer the APPEAL. This took place after school when students were not in the classroom. One of the authors of the scale worked with the researcher to administer the APPEAL scale in each of the 10 classrooms. Interrater reliability was established to a criterion of 91% agreement before administering the scale in the 10 classrooms.

The researcher compiled results from the APPEAL environment assessments and identified the two classrooms that scored the highest on the APPEAL and the two classrooms that scored the lowest on the APPEAL. She then contacted principals and teachers of the identified classrooms to inform them about the next phase of the research.

Phase 2

Meetings with the teachers were also aimed at starting the process of participant selection and establishing relationships with the teachers and students. During the meetings the researcher explained the research process and gave each teacher a binder with an outline of the research process, a set of the consent packet, and the researcher's contact information. The researcher and the teacher agreed on a schedule for the researcher to volunteer in the classroom for 15 hours. A few days after the meeting the researcher brought a copy of the volunteer schedule and data collection schedule to be added to the binder. With the classroom teacher and principal's approval, the researcher volunteered for 15 hours in each of the selected classrooms. Establishing relationships with participants and study site personnel is an important step that influences the depth of data collected in a study (Maxwell, 2005).

Phase 3

During the process of volunteering in the classroom, the researcher sought the teachers' recommendation of four participants in each classroom. The guiding criteria included students who were articulate, students who were comfortable talking about their classroom's physical environment and equal number of boys and girls. Before collecting any data, the researcher sought informed consent from parents and assent from students. Consent form packets were sent to parents of students selected for the study in sealed envelopes. The consent form packet had a brief letter of introduction that described the study and purpose. It also included the consent form and a copy of the assent form that would be shared with student participants. The letter also explained to parents that the researcher would be grateful if they would allow their child to participate in the study because it would help her gain an understanding about children's experiences in school with the intent to provide additional information about creating environments that better help children learn and develop. She provided a folder to each classroom teacher in which to place signed consent forms that were returned by parents. All the documents shared with parents had been approved by the ETSU institutional review board with an approved language level deemed appropriate for parents in the school systems.

The consent forms also explained clearly that participants' names would not be linked with data gathered as pseudonyms would be used. The document explained that parents had the right to withdraw consent at any time during the study. The researcher's contact information was provided on the consent form with a statement explaining to parents that they could contact the researcher if they had any questions.

Phase 4

The next phase involved gathering data through interviews, participant-generated photographs and participant observations by the researcher. Prior to each interview, student participants provided consent by completing a simple assent form that described the study in language they could understand. The researcher also explained to the participants what she would be doing and why she needed the information. In addition, confidentiality of the information that was collected was explained. Before each interview, the researcher explained to participants that all the interviews would be audio-taped and that they would be asked to take photographs after the interview. Additionally, participants had an opportunity to see the equipment that was to be used (the recorder and the tablet for photographs).

The researcher conducted interviews with the selected students at the end of the volunteer period. Each interview was scheduled for about 25 minutes. Follow-up probes and/or questions were asked depending on participant responses. Right after the interview participants were asked to take five pictures of their favorite parts of their classroom. Following picture taking, participants and the researcher talked about each of the pictures the students took for not more than 10 minutes. Forty minutes was requested for this process. Students were asked questions like, "Could you please tell me a little bit about the photograph?" The responses were also audio-taped, and the researcher took notes highlighting the photographs the student talked about, noting expressions and any other impressions the researcher gained as the student answered questions. Children's pictures are complicated, and allowing participants an opportunity to talk about their pictures helped the researcher gain a more accurate interpretation (Pyle, 2013; Rasmussen, 2014). This process also helped to provide young children an "approachable starting point of structures and processes that are often hard to describe" (Rasmussen, 2014, p. 458). In this study

the researcher assumed that aspects of the physical learning environment that children found meaningful might not be easy for some students to verbally describe. Pictures therefore provided an additional means of sharing participants' thinking about their classroom's physical environment.

Two, 1-hour long observations were conducted in each of the classrooms within a week of the one-on-one student interviews. The observations were focused on the student participants. The researcher observed four students in each classroom for behaviors that showed what they like about the environment, the spaces in which they spend time, and general behavior that may add new themes. Being focused or "maximizing leverage" helps to get the most out of observation time (Patton, 2015). Activities by the students were recorded in field notes on a focused observation-guiding template created by the researcher (see Appendix C). The researcher took observational notes on such things as the places students spent their time, activities in which they were engaged, and whether the student looked engaged or not in the activity.

Validity and Reliability

Credibility and equitability of this study was very important as in all qualitative research (Mac Naughton et al., 2001). To ensure the credibility of the research findings the researcher adopted strategies guided by understanding of validity and reliability in qualitative research and recommendations from various qualitative research scholars. Triangulation and peer debriefing were employed. Because qualitative research places the researcher in the position of the main instrument of inquiry (Tracy, 2013), the researcher also focused on her skill and integrity because it determined the quality of data the study generated (Creswell, 2014; Patton, 2015) In qualitative research the way validity, reliability, and bias might be defined is closely connected

to the researcher's attention to "established trustworthiness" and "authenticity of purpose" throughout the process of inquiry (Patton, 2015, pp. 656-685). In line with this assessment, the researcher was consciously aware of the importance of credibility and trustworthiness when making decisions at each step of the research process.

Ensuring and maintaining validity and reliability during the research was also guided by Guba's (1981) model of assessing trustworthiness of qualitative research. The model has four components: truth-value or credibility, applicability or transferability, consistency or dependability, and neutrality or conformity (Brantlinger, Jimenez, Klingner, Pugach, & Richardson, 2005; Shenton, 2004). To ensure truth-value, the researcher put effort to spend time with the participants to build trust and to gain more understanding of the context. During the 15 hours of volunteering in each classroom, the researcher used opportunities that were available to interact with students.

Ryan and Dundon (2008) argue that investing time prior to the interview to develop rapport with participants helps them to trust the researcher and understand the purpose of the research and their role in the study. This will help to elicit information that is valuable to the research. They argue that such a relationship should be "open, engaged, and trusting" (Ryan & Dundon, 2008, p. 446). According to Patton (2015) taking steps to ensure that the evaluator can relate meaningfully and effectively to individuals in the evaluation setting is important for quality. Relating meaningfully in this case was important for rapport building and to help verify validity of research findings.

Although the goal for the study was not to generalize findings, the study should be transferable. To achieve applicability the researcher provided description of the school districts and participant demographics so that readers and researchers would understand the context of the

study. Consistency was attained by providing detailed information on the research process and procedures followed in the research report. To be able to provide detailed information on the process and procedures, the researcher kept a research journal with details such as dates, interview sites, field notes, and a personal reflective journal on the process. She also created an electronic document that she constantly updated to record details of the research process. This helped in the creation of an audit trail that increases the credibility of study findings (Creswell & Miller, 2000).

According to Patton (2015), the trustworthiness of the researcher is the main influence on the standard and quality of the study. One of the challenges that the researcher had in this study was that of subjectivity or neutrality (Shenton, 2004). Bias is likely to occur in different stages of case study, so she tried to attend to it (Yin, 2014). Also, interviews by their nature are subjective, and researcher biases can influence the interview process (Bell & Waters, 2014). Bias might also influence the researcher's interpretation and analysis of data. To control for biases in this study the researcher continuously engaged in reflection after each interview and had an outside person look at coding and analysis to assess for potential bias. Developing awareness of personal biases and monitoring for the biases is an important part of qualitative research to establish validity (Glesne, 2006). To help with discussions on biases related to analysis with other people, the researcher wrote analytic memos to explain thinking as suggested by Tracy (2013). To address and avoid biases associated with the interview technique, she constantly reflected and kept a field note reflective journal to question her thinking and actions throughout the process (Bell & Waters, 2014).

The researcher's experiences, which are different from those of the participants, could also influence the way she interpreted data. According to Denzin (1989) every setting has a

unique language with meanings that are different from what you might find in another context. Because the researcher comes from a different culture than the participants, language in this sense could be a factor. To make sure the researcher interpreted participants' language well, she constantly engaged with research assistants familiar with the language and meaning for clarification where she was confused. Spending time at the study site also helped to build the researcher's understanding of the culture of the different classrooms.

Triangulation

Triangulation is "a process of using multiple perceptions to clarify meaning, verifying the repeatability of an observation or interpretation" (Stake, 2005, p. 454). For data triangulation in this study, the researcher used three methods of data collection: interviews, observations, and participant-generated photographs. Triangulation helps to verify the credibility of research findings in qualitative research (Bell & Waters, 2014). It includes getting evidence from different sources to increase the believability of findings (Tracy, 2013; Yin, 2014). It also yields a detailed data that can lead to thick description (Denzin, 1989).

Using several data collection methods helped to give a complete picture of children's perceptions of their physical learning environment and strengthen findings. For instance, use of participant-generated photographs to supplement interviews helped cover for some of the weaknesses of interviews and as a result improve the validity of the study findings (Prosser, 2011). According to Greig et al. (2013) interviews with children of this age involve cognitive abilities of language, thought, and memory. Because this might be too demanding on some children, student-generated photographs and observations were used to help connect with such students and gather their perspectives. Using several data collection methods also helped in capturing participants' "shifting realities" (Greig et al., 2013, p. 104). Intentional "convergence"

of findings from several sources helps to strengthen qualitative studies (Creswell & Miller, 2000, p. 126).

The researcher and an assistant gained reliability in scale administration prior to participating in administering the APPEAL rating scale for selecting the cases studied and to make sure they met the criteria of high- or low-scoring physical environments as measured by the instrument. Investigator triangulation was implemented in this study through the use of multiple researchers at the first phase of sample selection. Additionally, theory triangulation is evident in this study. Although the general framework guiding the study was constructivism, several theories like Vygotsky's (1978) sociocultural theory of cognitive development, and Piaget's (1960, 1964a) cognitive theory were used to guide the study. These theories helped the researcher to interpret the data from this study. Involving more than one school in the study also ensured site triangulation. Table 1 shows how the research questions were answered by the different sources of data.

Table 1

Research Questions and Sources of Data

Research Question	Interviews	Participant-generated photographs	Observations
1. What are the perceptions of second-grade students in three districts in Northeast Tennessee about their classrooms' physical learning environment?	X	X	X
1.1. What do students like about their classrooms' physical learning environment?	X	X	X

Research Question	Interviews	Participant-generated photographs	Observations
1.2. Where in the classroom do students prefer to spend their time?	X	X	X
1.3. When studying various content areas (reading, math, science), which aspects of the classrooms' physical environment do students think help them to learn?	X	X	X
1.4. Which aspects of the physical learning environment contribute to students' sense of belonging?	X	X	X
1.5. Which aspects of the physical learning environment do students prefer to be changed?	X		

Ethics

Ethics are unique to each study and among other things refer to questions of right and wrong (Creswell, 2014; Fraenkel et al., 2012). There are special ethical measures to be considered in doing research with young children (Beattie, 2015; Greig et al., 2013; National Association for the Education of Young Children, 2011; Society for Research in Child Development, 2007). The participants in this study were children 7 and 8 years of age. Several ethical issues had to be addressed because of the nature of the study (like face-to-face interviews) and the age of the research participants. These included informed consent, assent, rights to withdraw, privacy and confidentiality (Creswell, 2014; Merewether & Fleet, 2014).

Informed Consent

Informed consent is an ethical standard to be maintained in research. This involves making sure participants and legal guardians are fully aware of the study and participate voluntarily (Christian, 2011). Complete information on the study was provided as part of the process of seeking consent. The researcher designed consent forms that provided study information, explained to parents that they had a right to refuse to allow their children to take part in the study, and that the children had the right to stop participating in the study at any time during the research, and there would be no negative consequences if they decided to quit.

When seeking consent, the researcher explained to the parents the nature of the study and that she might need to revisit the classrooms after the main phase of data collection because she may require more discussion or data collection for clarification or to gain more support for emerging themes (Glesne, 2006). The researcher also explained to participants how confidentiality was to be maintained and made her role as the researcher clear to students. The researcher saved and stored the recordings under pseudonyms before coding them to ensure the confidentiality of the research data (Christian, 2011).

Assent

Although children of this age could not give consent to participate in a study, they could give assent. The researcher described the research purpose to teachers and all the students who participated in the study. She also communicated to participants that they had a right to withdraw at any time during the study. Prior to starting each interview, the researcher sought children's assent and explained that they had a right to withdraw at any time during the study. She also monitored children's body language during the interview process for signs of withdrawal of assent and was prepared to stop the interview if a participant's body language showed that.

Privacy and Confidentiality

The researcher saved and kept the recordings under pseudonyms before coding them to ensure the confidentiality of the research data. Electronic data were kept on an encrypted flash drive and a safe site on the ETSU network, and hard copies were stored in a locked cabinet.

Data Analysis Procedures

Data analysis began at the same time with data collection (Patton, 2015). According to Merriam and Tisdell (2016) beginning data analysis at the same time with collection allows the researcher time to reflect. This process helps in making the research more focused and increases the chances of getting data that is illuminating. Merriam and Tisdell (2016) argued that it gives opportunity to adjust questions, review literature in light of emerging findings, and helps identify developing themes.

Storage and Organizing Data

Clear organization of data and a clear analysis plan is important especially considering the huge amounts of data that the case study typically generates (Merriam & Tisdell, 2016; Patton, 2015). In the study, data were labelled and organized by data source, class, and participant.

Organizing and storage of data through the data analysis process was also done with the help of NVivo® software (NVivo, n.d.). The software not only helped to prepare for analysis, but it also helped store, sort, and represent the data through visuals (Creswell & Guetterman, 2019). To get familiar with the software and decide whether it was the best fit for use in the study, the researcher attended 3 hours of online training with QSR International, the creators of the software. Training was through three webinars: Meet NVivo 11 for Windows overview, Meet NVivo: Introduction to content analysis with NVivo 11 for Windows, and Using NVivo as a

research tool. The researcher also enrolled in a short online course to get more familiar with the software and its use.

Analyzing Interviews and Observation Notes

The researcher transcribed interview data from audio recordings. Transcription was verbatim because this helped to provide context to the responses that could be missed if transcription was not verbatim (Poland, 1995). Transcribing interviews helped to engage more with the data, a step that helps with analyzing the data (Merriam & Tisdell, 2016; Patton, 2015). It is also considered a part of the analysis process by some scholars (Braun & Clarke, 2006; Brinkmann & Kvale, 2015). In the transcripts the researcher captured nonverbal and verbal communications like pauses, laughter, and emphasis on words that will add context and depth to the information and help in getting valid interpretation of the interviews.

Interviews and observation data were coded by assigning codes that are in line with the research questions and guiding theoretical framework (Merriam & Tisdell, 2016).

Analyzing Photographs

The same approach was taken with the photographs and photograph interviews. The researcher studied the photographs for codes, then themes that might be similar or different from what was in the interview data. First, each participant's pictures were analyzed by sorting them into different categories depending on the object or areas in the pictures, then counting and recording the number (Rasmussen, 2014). Yin (2018) recommended such practice in the early stages of analysis to help in identifying patterns or insights in data. The analysis started with analysis of individual students in each case, then cross-case pattern analysis of each group of students in the different classrooms. The last step the researcher took in analysis of data for the

study was layering and interrelating themes. This helped provide details, adding rigor and more understanding to the study (Creswell & Guetterman, 2019).

Generally, the approach to analysis that the researcher took was inductive and comparative (Merriam & Tisdell, 2016). The focus was on the subquestions and the codes that were in line with the questions as suggested by Yin (2018). Content analysis involving identifying, initial coding, classifying and labeling primary patterns started at the participant level across all three forms of data collected (Patton, 2015). This process was a cycle with repetition of some stages through the process.

Open Coding

The researcher first engaged in several cycles of precoding and by close reading of printed copies of the interview transcripts, observation notes, and field notes several times as recommended by Ravitch and Carl (2016). The reflective process generated notes and a few open codes that were recorded on transcripts and in a memo. The researcher read through all main interviews first followed by studying pictures and picture interviews (discussions). Lastly the researcher read through observation and field notes. The second group of cycles involved reading across each participant's data set.

Precoding was followed by engaging in coding, identifying and assigning codes to sections of data. This stage of the process was done in NVivo data analysis software. The codes developed at this stage were all inductive, comprising of in vivo codes and others deemed by the researcher to substantially represent meaning in the data (Ravitch & Carl, 2016). The labels developed were words and phrases that were mainly descriptive (Corbin & Strauss, 2015). A second cycle of reading was done centered on the research questions (Ravitch & Carl, 2016). More codes were generated and revised at this stage. An additional tag was added to the coded

data identifying the research question each piece of the coded data answered. These codes represented ideas that the researcher concluded were important and in line with the research questions.

Axial Coding, Developing Categories and Themes

Coding was iterative and involved revision, renaming, and identifying of new codes. The researcher's focus at this stage was to create "narrow and specific codes" (Ravitch & Carl, 2016, p. 250). The codes were then grouped into categories. A descriptive framework based on the original subquestions was used to organize the developed categories and the supporting data (Yin, 2018).

Constant comparison and developing codes started from the beginning followed by categorizing the emerging findings (Field et al., 2016). Constant comparative methods involved comparing one segment of data with another (Merriam & Tisdell, 2016). In this case constant comparison was of data from interviews, observations, and photographs. It was also comparison of the same data sets or units such as interview transcripts from the same case (classroom) and across cases. There was also comparison of each excerpt of data with codes that had been developed already (Leech & Onwuegbuzie, 2007). This process was repetitive, and revisions of categories were done when necessary as different data sets and segments were compared (Yin, 2018). This was the next step after coding of data sets. The researcher compared data and looked for ways the data from different sources and cases was connected (Ravitch & Carl, 2016). Themes were developed from the codes and categories using the research questions as guidelines. Tables and other visuals generated in the NVivo software were used by the researcher to look closely at the data, codes, and emerging themes. The researcher read through the data and codes to make sure the themes were a true reflection of the data (Ravitch & Carl, 2016).

Additionally, she engaged in discussions with an assistant researcher and one of the committee members on codes, categories, and themes that she had developed. These conversations led to reflections and revisiting of the data to make sure the researcher was not biased in interpretation (Silverman, 2017). A fellow doctoral student also coded some of the transcripts independently before engaging with the researcher as a way of making sure the codes were valid (Ravitch & Carl, 2016).

The researcher did within-case analysis of the data and then a cross-case analysis following some of Yin's (2018) suggestions for a cross-case synthesis. This involved analyzing patterns and identified themes within the classrooms (cases), and within the two groups of classrooms. This was followed by cross-case analysis that identified and discussed relationships found across the cases. This was a similar process, but this time the focus was across case studies (in high- and low-scoring classrooms on the APPEAL).

Summary of Chapter 3

This chapter discussed the methodology for the study. The design of the research, study population and sample, instrumentation, data collection procedures, data analysis plan, and validity, reliability, and ethical issues related to the investigation were explored. The chapter that follows presents the main findings of this study.

CHAPTER 4

STUDY FINDINGS

This section reports findings from the study. A brief background to the study opens the chapter providing participant characteristics, a brief discussion of the data analysis process, and an overview of categories and themes generated. A detailed presentation of findings in two sections follows sharing the students' perceptions of the classrooms' physical learning environment beginning with within-case analysis at participant level in each case, followed by a cross-case analysis and an overview of findings. The report follows a multiple case study question-and-answer format (Yin, 2018) and cross-case synthesis analytical technique (Yin, 2018) where each case is treated separately, and then findings are combined across the different cases. The first two sections of the chapter are each divided into five sections derived from each of the subquestions of the study.

Reports on each case start with a brief case description providing contextual factors to set a foundation for a more comprehensive understanding of findings. This first section is more of a narrative of each participant's findings (Creswell & Guetterman, 2019). To get a complete picture, data from the different relevant sources (interviews, picture interviews, pictures, and observations by the researcher) are provided to show how each subquestion was answered. Figure 2 shows the sources of data and the process.

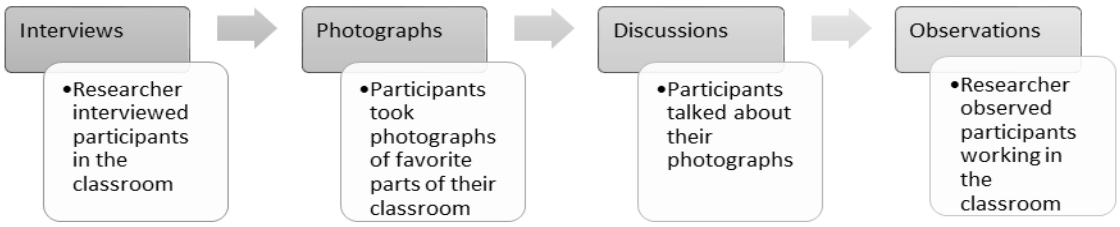

Figure 2. Data collection

In line with the qualitative research principles, thick, rich descriptions that include participants' words and photographs are provided for each account to show respect and uniqueness of each participant's perceptions. Photographs shared were labeled using the participants' words or a close interpretation of their words derived from their descriptions of the pictures. Staying as close to the participant's original words and interpretations also helped to bring in the voice of the participants (Patton, 2015) and ground findings in the young students' words, which is a central aim to the study. Specifically, the chapter shares how each of the following research questions was answered in turn.

Main question:

What are the perceptions of second-grade students in three districts in Northeast Tennessee about their classrooms' physical learning environment?

Subquestions are:

1. What do students like about their classrooms' physical learning environment?
2. Where in the classroom do students prefer to spend their time?
3. When studying various content areas (reading, math, science), which aspects of the classrooms' physical environment do students think help them to learn?
4. Which aspects of the physical learning environment contribute to students' sense of belonging?
5. Which aspects of the physical learning environment do students prefer to be changed?

Participant and Case Characteristics

In all, 16 second-grade students from four classrooms participated in the study. Of these participants, eight were boys and eight were girls. Twelve participants attended school in a city

school system, and four attended in a county school system. All participants were Caucasian Americans. Evanshen and Faulk's (2019) scale, Assessing the Pillars of the Physical Environment for Academic Learning (APPEAL) was used to determine case selection. It is a reliable, valid tool used to assess the physical classroom environment for evidence to determine where it falls on a continuum of teacher-centered to learner-centered. For the purpose of this study, names of the cases followed this feature of the scale.

The four classrooms are Teacher-Centered A (TA), Teacher-Centered B (TB), Learner-Centered A (LA), and Learner-Centered B (LB). T classrooms (described as more traditional or teacher-centered in design) were the two lowest scoring on the scale, and L classrooms (described as more learner-centered or constructivist in design) were the two highest scoring classrooms according to the criteria of the scale. Participants are also named according to their classrooms. For instance, TA1, TA2, TA3, and TA4 were the four participants from the teacher-centered (TA) classroom.

Each participant's data were compiled into a set. A set of data or case record was compiled and stored in the NVivo software (Merriam & Tisdell, 2016). Participant data sets, field notes, and memos from the data collection process and analysis were used to build a description about each case in relation to the research questions. This description is shared below as the within-case analysis following Patton's (2015) advice against "trivial and mundane" descriptions (p. 605).

Within-case Analyses

Learner-centered Classroom A (LA)

LA is the classroom that scored highest on the APPEAL scale, and according to the scale this indicates a more learner-centered (constructivist) physical classroom environment. The class

had about 25 minutes of free choice time every day right after outdoor recess. During this time students could choose to work at different centers and stations in the room. The researcher observed the participants on different days during this time and during indoor recess for a little over 2 hours. There were four student participants in this classroom. LA1 and LA3 are girls and LA2 and LA4 are boys.

What do students like about their classrooms' physical learning environment? This section presents results from analysis of data sets from each student participant in learner-centered classroom A (LA) as collected through interviews, pictures, and observation.

Student LA1. The five photographs that LA1 took in response to the prompt, "Can you take five pictures of your favorite parts of the classroom?" were reading bathtub, ladder up the loft, families, reading loft, chair, and timecards. She talked at length about the reading area in the classroom emphasizing her interest for reading and how comfortable the area was. One of her comments showing her interest in reading was, "Well. I love to read, and you read up there" (see Figure 6). In addition to this when she was telling me about her photographs, she shared that she liked the colors in the reading area. LA1 was pointing at the blue boarder around the reading loft and said, "I really like the colors though too here. It's actually the same pattern down here…You can see that in this picture" (see Figure 5). This was unique because she was the only participant across all cases who talked about color in sharing her perspectives on her classroom's physical learning environment.

In discussing the reading area, known as the loft, in the classroom, she shared, "It's just really comfy too. And, umm I can probably fall sleep up there if I could, and I really like bunk beds; I don't know why." Additionally, in describing the place she used words like bed, lounge, bathtub, mattress, and sheets that seemed to show that she liked places that had a homelike

feeling. She talked about such elements in both the main interview and the discussion about her photographs. She shared a statement during the discussion on one of her pictures that is very similar to the interview excerpt above. She stated, “It’s really comfy up there. When I was little once when my sister was taking me to her second-grade class to see stuff, when I was really little, she let me go on the loft, and I fell asleep up there.” All five photographs that LA1 took were of the reading area though focusing on different aspects of the area (see Figures 3 -7). These included a picture of a ladder that went up to the reading loft (see Figure 4), a reading tub (see Figure 3), and a reading chair (see Figure 7). Observation data showed that LA1 seemed to like spaces where she worked alone or with small groups.

However, when the researcher asked LA1 if there was something she disliked about her classroom she shared she did not like that the “trashcan is by the door so I have to get up and walk all the way over there.”

Figure 3. Reading bathtub

Figure 4. Ladder up the loft

Figure 5. Pictures of families

Figure 6. Reading loft

Figure 7. Chair and timecards

Student LA2. LA2's five photographs to the prompt, "Can you take five pictures of your favorite parts of the classroom?", were reading bathtub, electronics and sail-boats, cubbies room, enclosed space, and reading loft. In response to the interview questions about what he liked and what he disliked about his classroom, LA2 identified the reading loft (see Figure 12) as the space he liked the most commenting,"I would say it's the most comfortable and..it's fun to read in." He described parts of the loft that he liked commenting, "There is a bath tub that you can read in and two chairs." LA2 also liked computers. When he talked about one of his pictures (see Figure 9) he said, "Because I like electronics and that's mainly where all of them are umm I like playing Prodigy©, and we sometimes play Prodigy© on that iPad®, and we charge our iPads® over there to play Prodigy© and other stuff like Raz-Kids™, Checkers ..." As he talked about his classroom he looked very happy, and when the researcher asked if there was anything he did not like about his classroom he responded with an emphatic "No". In Figures 8 to 12, LA2's shared his favorite parts of his classroom's physical learning environment.

Figure 8. Reading bathtub (for science experiments)

Figure 9. Electronics and sail boats

Figure 10. Cubbies room

Figure 11. Enclosed space

Figure 12. Reading loft

Student LA3. In response to the prompt, "Can you take five pictures of your favorite parts of the classroom?", LA3 took six photographs that were the table seat, paper, math center, reading loft, SMART Board®, and a technology station. She shared these as her favorite parts of the classroom. In her comments she shared that the math center (see Figure 15) and loft (see Figure 16) were her best places. In talking about the math station, she said "Because I love math, and it's the math station." In response to the interview question asking what she liked about her classroom physical learning environment she said she liked the loft, "Because it's for reading, and I really love reading." In talking about her pictures, she shared that reading was her second favorite thing to do. In addition to the math station, she also shared that she liked the table (see Figure 13) where they did most of their math.

She took a picture of the SMART Board® and technology station and shared that she liked it because she watched movies that are fun, and "that's where I get most of my wiggles out because we do GoNoodle®."

Observation data also showed evidence that LA3 liked to play games and engage in art-related activities with some of her peers during free choice time and indoor recess. In one instance, the researcher observed LA3 at a table by the loft creating paper puppets. After that they played with their creations and seemed to be telling some sort of story with the puppets. They worked on the project with LA1 for some time getting paper from the place she captured in her photograph (see Figure 14). In Figure 17, LA3 shared a photograph of the SMART Board® as one of her favorite elements of her classroom's physical learning environment.

Figure 13. Table seat

Figure 14. Paper for art and writing

Figure 15. Math center

Figure 16. Reading loft

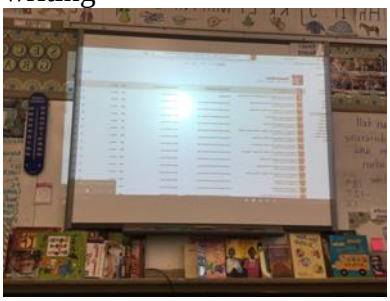

Figure 17. SMART Board®

Student LA4. The photographs that LA4 took in response to the prompt, "Can you take five pictures of your favorite parts of the classroom?" were the reading loft, his seat, library, math and social studies center, and toys and paper. According to LA4 engaging in outdoor and indoor recess activities help students to "get smarter because if you are learning how to build and there is blocks out there, so you can learn how to build different stuff, different designs. And umm it's sort of a challenge to get you smarter because you have the blueprint in your head." In

the interview he shared that what he liked the most about his classroom was recess and went on to explain that recess was outside the classroom, but the activities were similar for recess outside and free choice time inside the classroom. LA4 started the response by showing that he understood my question but wanted to provide a perspective that I might not agree with. His response started with, “Umm probably there is a reason for this. Recess. You know why?” and then went on to describe why recess was important and why he liked it.

LA4 described the importance of play after sharing it was one of the things he liked about his classroom. He said, “Did you know that umm you can’t live umm actually you can but umm you won’t be very smart if you have never played before.” Then he talked about one of the spaces he liked in the classroom explaining that he liked to “Build there sometimes because no nobody hardly goes there, so I have a little private spot so nobody can just run through and knock down my castle or something.” LA4 did not take photographs of this place that he talked about.

He had two photographs of stations or centers. These were the toys (see Figure 22) and the math and social studies center (see Figure 21). When he talked about the toy station picture he said, “Over here because there is lots of toys, and that’s where I usually get to play in free choice. We have puzzles, blocks, papers, many things, games.” LA4’s observation data also showed that he spent a lot of the free choice time playing at the rug or other parts of his classroom with toys and other manipulatives. The data however showed when he engaged in these activities, he was always with his peers.

LA4 also liked places that were quiet when working and shared that he did not like a certain table close to the front because “it gets pretty loud, so it’s pretty hard to focus.” He talked about the table throughout the interview as something he did not like about the classroom, a

place he did not prefer to work, and a place that was not healthy for his sense of belonging. The five photographs LA4 took to depict his favorite parts of the classroom are shared in Figures 18 to 22.

One of LA4's pictures was a picture of the class library (see Figure 20) and when talking about the picture LA4 said he liked that, "Even if you are not on a level you can do it…read it in free choice." Free choice was a time when students in the classroom were free to choose any activity they wanted.

Figure 18. Reading loft

Figure 19. My seat

Figure 20. Library

Figure 21. Math and social studies center

Figure 22. Toys and paper

Table 2 shows a summary of the spaces and materials identified by LA participants in the photographs they took and related comments.

Table 2

Spaces/Materials Identified by Participants in LA Classroom

Space/materials identified in pictures	Number of participants	Comments
Reading loft and other reading area	4	That's the loft I really like it ...I love to read, and you read up there (LA1) It's really quiet and you can peacefully read (LA4)
Displays	2	Paper sail-boats (LA2) Picture of families (LA1)
Enclosed space/small space	2	Because nobody hardly goes there (LA4)
Computers and tablets	1	Because I like electronics, and that's mainly where all of them are (LA2)
Cubbies	1	Every single day we enter, especially after a bad day, I just think that it's a new day; I can have a better one (LA2)
SMART Board®	1	Watching new videos on it (LA3)
Assigned desk/ seat	1	My seat because it's my seat, and I usually work there, and it's pretty fun (LA3)
Art and writing materials	1	I love art (LA3)
Math center	1	Because I love math, and it's the math station (LA3)
Toys	1	Blocks and toys for building (LA4)
Library/books	1	Where I get my new books when I finish a book, and even if you are not on a level you can do it…read it in free choice (LA4)
Spaces for science	1	The bathtub that I was talking about I would do experiments in it (LA2)

Space/materials identified in pictures	Number of participants	Comments
Social studies center	1	There is more games where you can learn about states, and there is some books, and that's my favorite team there Clemson (LA4)

Where in the classroom do students prefer to spend their time? Findings shared in this section were collected from interviews with participants, participant-generated photographs, and observations by the researcher of the participants working in their classroom.

Student LA1. In regard to where LA1 preferred to work, she mentioned she had three favorite places in the classroom: "There are like the mailboxes, the library where you get the books, and I just like the loft too" and repeated the same idea when she talked about her pictures. Interestingly, the places she talked about were all connected to the loft.

LA1 described herself as someone who liked comfortable places like the loft as one of her three favorite spaces for working. In addition, she used the word "little" five times in talking about one of the spaces in which she liked to work. This was when responding to the interview question asking where she liked to work in the classroom. She said, "Little like place, little space, just this little part here, little place by the table." Her use of the word 'little' was mainly in relation to a space where only one or two students could work. She alluded to this space when she talked about one of her pictures (see Figure 4) showing me the location of the space beside the ladder in the picture.

She said, "It's like this little place by a table, and it's just a little rectangle where you can like work over there." The places she liked to work at were also evident when she responded to the interview question asking where she did not like to work at in the classroom. She shared, "I

used to not like working at my spot because it was so close to the morning message …and my chair was like right there, and there was a bunch of kids crowding around there, so I had to like climb over people to get to my seat." It was also evident during observations by the researcher because she seemed to prefer spending time working in spaces where she would be alone although she worked with other students a few times. Twice during observations the researcher saw her working on a tablet at a table by the computer station.

Student LA2. Seeking to understand where LA2 preferred to work showed he disliked places where a lot of people worked. He used the word crowded many times in referring to such places. The conversation on where he liked to work in the classroom revealed that LA2 felt they did not have a lot of choice on where they could work. The first thing he said when the researcher asked where he wanted to work in the classroom was, "I don't think so because we are only allowed to work at our table or at the rug, so we don't really have choices to work at." Interestingly after asking where he would work if he had choice he mentioned a different place, "Probably the back near the mailboxes because it's an enclosed space where not many people at a time can get to, so I could work without any distraction." He added that he would not like working at the table or rug, which are the two places he had earlier mentioned as the places where they are allowed to work, "Because that's where most people would work. And I don't want to be crowded around or have a lot of distractions."

LA2's preferences for places to work were also evident in his photographs. He took two pictures of spaces that "are enclosed" and helped him to focus. In commenting about the two spaces, he referenced to the number of people that could work in each of the two spaces. He said the enclosed space (see Figure10) only had space for two people, and only three people were allowed to work at the loft at a time. Interestingly, during the researcher's observations of LA2

working in free choice time and recess, he did not work in a space that was not crowded. The spaces he worked at always had other students working there as well. For instance, LA2 worked at the rug many times constructing structures with peers or beside his peers and playing computer games with friends. A possible explanation for this is that LA2 probably did not consider free choice time as work time. This is evidenced in his comments shared earlier that they are only allowed to work at their desks or at the rug.

Student LA3. In response to the interview question asking where she did not like to work in her classroom LA3 said, "I wouldn't really want to work in the loft because like I would be kind of scared. It's tree high." It is however interesting that LA3 took a photograph of the top part of the reading loft as one of her favorite parts of the classroom and shared that was because she loved reading, and the loft was for reading. Her comments seemed to imply that LA3 was afraid of heights so would not like to work at the top part of the reading loft and her connection to the loft was because of her interest in reading but not because of its structure. This inconsistency may be because LA3 did not consider reading as work and regarded work as something very different.

LA3 shared that if she had choice she would like to work in the cubby room because "It's a quiet place. I really like that". Her preference for spaces without distractions was however a bit different from that of other participants because one of her comments implied that comfortable spaces were distracting to her. In talking about the loft she said, "I would be too distracted. Like there is a pillow there, so I would be too distracted…yet comfortable."

LA3 commented that the loft would not be a good place to do art because it was not designed for that, and art materials would stain the mattresses. Her first photograph was her assigned seat. Observation data showed that LA3 spent more than half of the observation time

working on different activities at the rug. She would bring materials for these activities to the rug and worked there with her peers.

Student LA4. LA4 shared that he preferred to work in places that were quiet and had no distractions. Like LA1 and LA2, he identified a small space by the mailboxes as a place he liked to work, giving similar reasons to those given by his peers. He shared that it was fun, and it was "Like a little secret hideout." Additionally, he shared that they were required to work at a table close to the teachers if they had a lot of work to catch up. According to LA4, it was hard to focus while working at the space because teachers worked at that space, and activities like cutting made it a loud space from which to work. Interestingly, during one observation the researcher observed LA4 working at the teacher's table for about 15 minutes. This was the table that he also referred to as table 1. During part of the observation time he was doing a math activity, and the rest of the time he was writing a book summary. The other students were working on different activities because it was free choice time.

When studying various content areas (reading, math, science), which aspects of the classrooms' physical environment do students think help them to learn? Findings shared in this section were collected from interviews with participants, participant-generated photographs, and observations by the researcher of the participants working in their classroom.

Student LA1. LA1 seemed to feel learning with her peers was important as evidenced by where she worked during observations by the researcher. When she talked about science learning, she shared the same preference as other participants for a space with a lot of room and added that would help her "to use things." During observations by the researcher LA1 played a math game at the white board with participant LA2.

In describing one of her pictures she commented on two time cards in the picture that the teacher used as “math warm ups for a few days” (see Figure 7). Commenting on the idea of this small display she said, “There is a blank, and then you write the time you think it is, and every five or so minutes you go to a teacher, and they check it and you keep going. That’s pretty much it. But not everyone is crowding at one, or everyone is crowding at two, but you can spread out.” In some of her data, LA1 showed she felt crowded spaces negatively affect her learning. She shared about a space that she felt was very conducive for her when writing and doing math, “It’s just like this little space where you can just sit down and see everything, but it’s not like super big. It’s just easy to focus on one thing because there is nothing else around you to distract you.”

Comfortable spaces were very important for LA1’s learning in literacy-related activities. This was very prevalent in all sources of her data especially in relation to the reading area in the classroom. An example of this was noted in her comment during the interview in response to the question of where she would choose to read a book. She said, “It’s just like this comfy spot where you can lie down and just read your book. It’s amazing (she said this with emphasis). You can read your book.”

Student LA2. LA2 discussed that he preferred to write at a place on the “left of the reading loft where there is not much that could distract me.” One of his comments was that a place with lots of room and not many distractions was good for math learning. These comments seemed to suggest that places that helped to focus on learning because of their location and structure were important for his learning.

In addition, he talked about the reading loft in his interview and took a photograph of the loft as one of his favorite places for reading. When he talked about the loft, he commented that it was a very comfortable space. For science learning in one of the observation sessions, LA2 was

involved in a science activity at a table with peers and a student teacher visiting the classroom, and he looked very engaged. The participant also spent a lot of time constructing with blocks and other materials and playing a math game on the white board. When he shared where he would do a science project he talked about using a bathtub, “where it couldn’t get messy.”

When he talked about a picture he took of the computer area (see Figure 9) in the classroom, he shared that he played games on the computer, and he liked playing Prodigy© and Raz-Kids™. The two applications he mentioned are for math and reading.

Student LA3. Observation data showed that LA3 spent a lot of time engaging in science and math-related activities using different materials. For instance, she spent about 30 minutes constructing a complex structure with plastic construction toys at the rug with two of her peers. She also worked with materials from the science station at a table with a friend and played a dominoes game with friends.

When she responded to interview questions related to where she would read, she stated that the top of the loft was her favorite place for reading because it was comfortable. LA3’s data seemed to be contradicting because she shared in one part of the interview that comfortable places are distracting to her. It seems possible that because she loved reading, she did not get distracted by the comfort of the loft. In addition, she shared she would like to read under a table because, “That’s the most dark spot that I would do it...” and “it’s not too hot, not too cold. It’s just right. It’s like dark. So, I like dark spaces.” She also shared that she would like to do science in a room at the back of the class because it was dark.

One of her photographs of favorite places was her assigned seat (see Figure 13), and she also identified her seat as an ideal space for math, “Because there is a perfect spot that I do something, and that there is a specific spot that I have to sit, and it’s really flat surface.”

Student LA4. One of LA4's photographs was of the math and social studies centers (see Figure 21). He shared that the social studies center had "more games where you can learn about states, and there is [*sic*] some books…" and the math center had "math games and all kinds of stuff." This showed that LA4 thought games were important for learning different content areas. Most of the time when the researcher observed LA4 working in the classroom, he was playing a game at the rug and one time in the loft with friends. When he was working at the rug, he built structures with different construction toys, and he worked on it for a long time taking a break and coming back to work on it. Another time he was at a table close to the loft playing a math game with a friend.

For writing, LA4 said he would prefer doing it at his own table especially when there was not a lot of activity going on in the classroom at which he would prefer working from the back room where, "It's easier to focus because there is not much noise like screaming or something falling down." The same applied for reading and math. He would prefer reading at the top part of the loft because, "It's really quiet and like you can read, relax, and nobody can bother you." For math, he shared that he preferred any quiet places like his table during math because, "Usually everybody is quiet in the whole room."

For science and math learning, LA4 preferred to work alone at his own desk because, "I can work there where I am far apart from different people." When he talked about his seat in one of his photographs (see Figure 19) he said he liked doing math at his seat, "Because it's my seat, and I usually work there, and it's pretty fun."

One of his photographs was the social studies center, and when asked about it he pointed at a part of the photograph and said, "And that's my favorite team right there, Clemson." I also observed LA4 playing on the floor in this area. That seemed to provide more evidence that LA4

was drawn to this space because of his personal interests and the other learning experiences the place afforded.

Which aspects of the physical learning environment contribute to students' sense of belonging? Findings shared in this section were collected through participant interviews, participant-generated photographs, and observations by the researcher of the participants working in their classroom.

Student LA1. The most revealing point in LA1's data that showed aspects that contribute to a sense of belonging was when she talked about one of her photographs. This photograph was of family pictures of all the students in the classroom displayed in the popular reading area. She pointed at each family in the picture and talked at length about them, sharing a lot of details. In part of the long description she said, "This is our families' thing…but then there is everybody's family pictures. Oh, not all. N moved away, but, this is O's, this is C's, this is W's, this is J's my best friend..."

This connection with her peers was shown during observations by the researcher too because she worked with her peers and seemed to enjoy it. For instance, she constructed structures with blocks at the rug with friends, played the game "hangman" with three peers, and she showed a lot of joy dancing and laughing when she got a point during the game. The researcher also observed her playing at a table by the loft making things with paper, scissors, pencils, and tape and exclaiming, "My new creation!", as she showed it off to friends. One day the researcher observed her playing a game of states with friends on a tablet. During the game she commented, pointing at the map, "My poppy lives here."

The loft came up as the place that had the most aspects contributing to her sense of belonging. This was mainly because of the homelike elements and the connection to family

elements in the space. LA1 used three words and phrases to describe how she felt in the loft. These were, “really calm, relaxed, and happy.”

Student LA2. Spaces that helped LA2’s sense of belonging were spaces that helped him to calm down or that were inspiring. In response to the interview question related to this question, he shared that the cubby room helped to make him feel good. In describing how the place helped him to feel good he said, “We go there every single morning, and every day there is a new opportunity to do something new. So, I just ...especially after a bad day, I like going in there and knowing that’s a new day.” He shared that there was nothing about his classroom physical learning environment that made him not feel good. An analysis of LA2’s comments regarding crowded spaces in other pieces of data can be interpreted as an indication that spaces that are crowded could possibly negatively influence LA2’s sense of belonging. He also talked about a display of their project work in one of his photographs (see Figure 9) “we did a project on making sail-boats and sail-carts and those are some people’s.”

Student LA3. Aspects that contributed to LA3’s sense of belonging were connected to her interests. Her data showed she was interested in math, reading, and art. The part that made her feel good was the art station commenting, “I love art, so it’s kind of makes sense for me to love where the art stuff is.” In describing how she felt about the art station, LA3 used the words “happy”, “comforted” and “exquisite.” The math center was one of the photographs (see Figure 15) LA3 shared. During observations, LA3 spent time working on different art activities with her peers at a table close to the math station, and she looked engaged. She also shared that she liked the whole classroom.

Student LA4. To answer the question on aspects that help with LA4’s sense of belonging, he talked mostly about the reading loft. He said, “If you are on the top you are pretty high and

everybody down at the bottom…so everybody at the bottom sounds pretty quiet so you have a nice pretty place to read." He further explained that many things around the reading loft "are technically sort of protecting you from the sound."

LA4 shared that such places helped him to relax and not be "annoyed by some people and all that stuff." Observation data showed that LA4 seemed to feel relaxed in spaces where there was not a lot of activity or other students. The researcher observed him lying down at the top of the loft a couple of times during the observation period. LA4 would work with other peers on different activities around the room and go up the loft. During all these times he would be lying down on the top part of the loft or playing with one or two friends. One of his photographs was of the reading loft (see Figure 18). In the interview he shared that he did not feel good at the table close to the door because it was very busy and loud.

Which aspects of the physical learning environment do students prefer to be changed? Findings shared in this section were collected from interviews with participants and conversations with participants about their photographs.

Student LA1. LA1 shared that she wished for nothing to be removed from the classroom's physical environment but wanted to add an invention. "This is an invention that I really wanna make...but where it's like, where it can like, it speaks to you and it helps you with stuff. Like it will help you with your work." She shared that this invention would help her get help faster from the teacher when she needed it, "Because I won't have to raise my hand…because it hurts just to sit there for a long time like this. You know it hurts…"

Student LA2. In regard to what he would prefer to be changed, LA2 wanted adjustments that would help provide more room to the classroom and the loft area, "Enough for each kid to have their personal space and not be able to touch anybody." LA2 used the word crammed four

times in response to the related interview question explaining how he felt at different points in the classroom and why he felt there was need for more change. He said he would add more room in the classroom because at times it can be crammed, “When like we were doing a …project and high school kids came in, and I felt really crammed.”

Student LA3. In the conversation about what she wanted to be changed about her classroom, LA3 shared that she wished they would add a free candy machine to the classroom and more opportunities for movement. She wanted to have more recess time because her favorite thing about recess was that she got to stretch and she liked to stretch because she did “a lot of gymnastics” and she said recess gave opportunity to “get my wiggles out.”

Student LA4. LA4 desired to have a table close to the door removed because, “It’s hard to focus there.” He referred to this table many times during the interview as table 1. Like LA1, the participant wanted an invention to be added to the classroom that would add to active engagement. He shared his idea to, “put a little solar system thing and so you could learn about the solar system and the planets because you can like sit down and see it evolve around, around you in circles.” LA4 even had a suggested location for the invention that was by the reading loft at the back part of the room that was quieter than the rest of the room.

LA Case Summary. Generally, participants in this classroom preferred to work in quiet spaces that made it easy for them to focus. The most favored spaces were also spaces that offered some privacy or opportunities to work alone. Comfort was important for all.

Participants in this case showed varied perceptions of their classroom’s physical learning environment. Their notions differed mainly due to personalities and other aspects related to participants’ individuality. There were, however, a lot of similarities in their perceptions. There were spaces that were popular with all participants like the loft, and also the need for private

spaces surfaced. They all seemed to like the opportunities for active engagement that their classroom's physical learning environment provided for them.

Learner-centered Classroom B (LB)

This section presents results from analysis of data sets from each student participant in the second learner-centered classroom (LB). The sources of data shared here include interviews, observations, and photographs. Two hours of observations were carried out in the classroom during reading stations' time, math stations' time, and indoor recess. This classroom did not have a free choice time where students could choose activities, materials, and where they wanted to work. However, the first observation was during an indoor recess period when the class could not go outdoors because it was too cold. The teacher told the students to work from any area they wanted as long as it was available. The second and longer observation was during math time where students were working at their tables much of the time. They started off with a math review worksheet working individually, then they all came to the rug for a review, and then went back to work on different math and writing activities at their assigned seats. LB2 and LB3 are girls, and LB1 and LB4 are boys.

What do students like about their classrooms' physical learning environment? This section presents results from analysis of data sets from each student participant in learner-centered classroom (LB) as collected through interviews, pictures, and observation by the researcher.

Student LB1. LB1 took six pictures in response to the prompt, "Can you take five pictures of your favorite parts of the classroom?" The pictures were of the writing center, rug, library, classroom display, math station, and math materials. When he was talking about one of the pictures (see Figure 28) he said, "This is our part 2. These two (see Figures 27 and 28) go

together because they are like learning stuffs." LB1 provided detail about each of his pictures emphasizing how materials in each area were important for the learning of the students in the classroom. For instance, he said, "Over here these are like puzzles for playtime, these are supplies, this is science, these are cubes that we can use for math…these are little learning games."

LB1 liked that students sat at tables or the main seating arrangement in the classroom. Part of his response to the interview question asking what he liked about his classroom was, "Although there are a lot of like groups…where people are like involved, they still learn, and they correct their mistakes. Like everybody does that." His comments seemed to imply that LB1 believed the way seating was set up in their classroom was important. Observation data also showed LB1 spent time at the rug working on his laptop with LB3 and another peer. Although instances like these required students to work individually, he would talk with peers about what they were working on.

As he continued talking about the classroom's seating arrangement he shared that he liked the seating allotment by the teacher. He responded to my question asking what he liked about his classroom with, "I am going to say the way that we have the tables situated where we have people… the people that and we they are not going to get too crazy with." [*sic*]

The photographs of LB1's favorite places seemed to be of an outgoing person who liked areas to work with other students but also areas to work alone. He seemed to like a balance between areas that were high activity and areas that were low activity. Two of the spaces in his pictures were quiet areas: the writing center (see Figure 23), and the reading area (see Figure 24). In talking about the reading center, he asserted "There are pillows right here, and then down here there are reading buddies ...are little stuffed animals that you can get out and read with."

He shared photographs of different materials for math and science learning (see Figures 25, 27 and 28) and also a picture of a classroom display (see Figure 26). He shared that he liked the displays because they helped him to learn. For instance, at one point he stated that his classroom was perfect and went on to provide examples of displays, “She (referring to his teacher) has examples like writing goals, like how we do our plans...” Displays in the classroom were something that LB1 showed he really liked about his classroom because they helped him to learn. His photograph of the writing center (see Figures 23) illustrates some of the displays that he talked about.

Figure 23. Writing center

Figure 24. Library or reading area

Figure 25. Rug

Figure 26. Classroom display

Figure 27. Math station

Figure 28. Math materials

Student LB2. The photographs that LB2 took in response to the prompt, “Can you take five pictures of your favorite parts of the classroom?” were the calming zone, library, by the rug, morning station display, computers, and her book box. One of LB2’s pictures (see Figure 29)

was of an area in the classroom where students could go to calm down. She referred to the area several times as “the calming zone.” She shared that she had used it before, and she talked about that space with joy. LB2 liked that she had a space in the classroom when if students “need a break like if you get kind of like frustrated” they could go to that area.

She talked about how she liked different places and how materials were organized and easy to access. When she described the reading area that was one of her pictures she said, “These are the chapter books. It tells you that they are chapter books; there is fiction, animals, science and so forth…and then if you flip it to the back it will say like mysteries.” LB2 liked aspects of her classroom environment that related to her personal interest. She shared that she liked reading, and the library that was one of her photographs (see Figure 30).

LB2 said she liked the library because she could read books at different levels and because of the comfortable aspects or homelike elements like pillows. LB2 also liked computers (see Figure 33) mainly because she could play on her favorite applications. As she described her picture of the computers she said, “Whenever we come back from RTI and we have extra time for …we get to play on our computers...” She liked playing games in the classroom and having fun activities. When she was talking about a picture of the rug area (see Figure 31), she shared that she had missed taking a green box where the teacher kept surprises for the students. She said, “We don’t know what is in that yet.”

One of LB2’s photographs was her book box (see Figure 34). She shared that she liked it because, “If you run out of room in your seat sack then you can put some of your stuff like your books in there. And then if you bring headbands you can put them in there. You can use it for like storage and stuff.” The reading area was a place she could have a private space to work. The researcher observed LB2 sitting at a table close to the writing center working on her computer

for close to 15 minutes. She worked on her laptop most of the time when she had free time and worked from her desk wearing headphones. As she shared what she liked about her classroom she talked about how she could use whisper phones in the reading area (see Figure 30) to read silently and to the stuffed animals in the center. One of her pictures was the morning station display (see Figure 32), and she shared how the chart helped her to know what to expect or do each day, "So, one will be right here, two will be right here, and three will be right here, and four will be at the bottom, and five will be at the top, Oh I, so, it tells you where you are going that day." She also liked the writing area where she could write the stories she read in the chapter books.

LB2 liked the toys and other materials for play in the classroom. In response to the interview question regarding what she liked about her classroom she shared that she liked art materials and puzzles that they could play with during recess. She shared a picture (see Figure 31) of resources for play that were close to the classroom's whole group area. She talked about how she used some of the blocks during indoor recess time, "The geoblocks basically you can build stuff with it so, if you wanted to build a house you would take those square boxes …the square blocks you take it and put it in a shape and then you may continue building. Make it tall." LB2's pictures are shared in Figures 29 to 34.

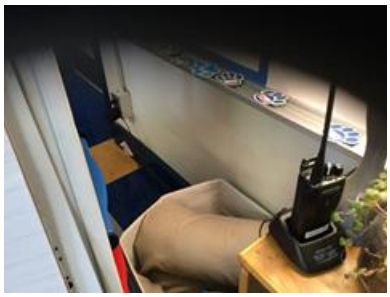

Figure 29. Calming zone

Figure 30. Library/reading area

Figure 31. By the rug

Figure 32. Morning station display

Figure 33. Computers

Figure 34. LB2's book box

Student LB3. The photographs that LB3 took in response to the prompt, "Can you take five pictures of your favorite parts of the classroom?", were library and displays, classroom pet, small groups materials, rug, writing center, and the screen of a computer. In the interview LB3 shared that she liked her computer. This was consistent with data from observations and her photographs (see Figure 40). One of her pictures showed the screen on a computer (see Figure 40). During indoor recess the researcher observed LB3 working on the laptop from the writing center (see Figure 39) and she left when she was called to finish up some work from the teacher's table. LB3 said she liked computers because, "It's fun to play on, and I get to go on reading every day." She however said she did not like that the teacher limited the sites they could visit on the computer, and they did not get as many opportunities to do coding on their computers.

When she talked about one of her photographs showing her seat and the classroom's whole group space (see Figure 38), she pointed to an area in the classroom and said, "This is our book box where we keep where we keep our stuff and the seat sack." She also liked the classroom pet that was in one of her photographs, the fish tank (see Figure 36). Another area that was connected to her interests was the writing center (see Figure 39). She shared that she liked the writing center because they got to draw penguins.

Her pictures and interview showed she liked displays that she had a part in creating. She shared that she did not like a small group chart in the classroom because she did not make it. "I do not like that…the small group chart, I didn't make it." This seemed to contradict data in the discussion of her pictures where she shared that she liked a display of words they were learning (see Figure 35). She also took a picture of small-group materials and information (see Figure 37) as one of her favorite parts of the classroom. Unlike the other participants, LB3 did not talk much about her photographs.

Figure 35. Library and displays

Figure 36. Classroom pet

Figure 37. Small groups materials

Figure 38. Rug

Figure 39. Writing center

Figure 40. Computers

Student LB4. The photographs that LB4 took in response to the prompt, "Can you take five pictures of your favorite parts of the classroom?" were book boxes, carpet, teacher's table, reading area, and writing center.

When he talked about his picture of the writing center (see Figure 45), he shared he could write and draw pictures at the center and at the library or reading area. He stated that, "You can read whatever you want." In the interview, he added that the library was his favorite part of the classroom, and it was important to him, "Because if kids want to learn about animals they just want to read a book they can go there." LB4 liked that there was a wide selection of books to choose from.

He shared that he liked availability of a variety of materials in the classroom. According to LB4, one reason he took a picture of the area at the carpet (see Figure 42) was because, "When you need materials or if you are just wanting to play a game you can go there and grab." Additionally, when he talked about his picture of book boxes (see Figure 41) he said, "You could just go there and grab your book box that has your name on it."

LB4 talked about aspects of the environment that made him happy in both the picture discussion and the main interview in regard to what he liked about his classroom environment. When he talked about one of his pictures (see Figure 44) he said, "That one was my favorite parts of the library because that's all the books where… can make you laugh and happy."

In the main interview and in talking about his pictures he described the teacher's table (see Figure 43) and the carpet (see Figure 42) as two other places that made him happy because he would be close to other people. During an observation session when the students had an opportunity to choose where to work from, LB4 worked from a table that was not his assigned space briefly then spent much of the time at the carpet. He worked on his laptop sitting side by side with LB1 and chatting frequently. He seemed to be focused working at the carpet with the friend.

According to LB4 he liked that there was a sense of trust in the classroom. He shared this aspect of the social environment although my interview question was directed at the physical environment. He shared, "The part that I like the most is that everything that a kid says here if they don't want it to get out of the classroom…stays in the classroom…" LB4's photographs are shared in Figures 41 to 45.

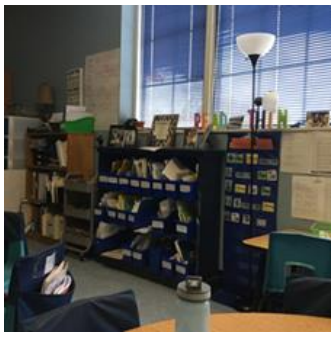

Figure 41. Book boxes

Figure 42. Carpet

Figure 43. Teacher's table

Figure 44. Reading area

Figure 45. Writing center

Table 3 shows a summary of the spaces and materials identified by participants in the photographs they took and related comments.

Table 3

Spaces/Materials Identified by Participants in LB Classroom

Space/materials identified in pictures	Number of participants	Comments
Reading area	4	"We have the pillows, and then you can like make a little area with them" (LB2)
Displays	3	"You could see we have reading strategies like the long e, and then magic e, long a…" (LB1)
Rug	3	"We do mostly anything" (LB1)

Space/materials identified in pictures	Number of participants	Comments
Writing center	3	“There is like these examples. Then there is paper “(LB1)
Book box	2	“If you bring headbands you can put them in there” (LB2) “Book box that has your name on it” (LB4)
Computers	2	“We get to play on our computers…and we have a few apps we can play on (LB2)
Teacher’s table	1	“They are always there to help, and it always makes you feel good if there is a teacher around” (LB4)
Calming zone	1	“Like if you need a break, like if you get kind of like frustrated, you can go over there” (LB2)
Classroom pet	1	“He is a pet” (LB3)
Math station	1	“We sometimes even play with them or use math with them as in building tenths” (LB1)

Where in the classroom do students prefer to spend their time? Findings shared in this section were collected through participant interviews, participant-generated photographs, and observations by the researcher of the participants working in their classroom. This classroom did not have a free choice time where students could choose activities, materials, and where they wanted to work. However, one of the observations was during an indoor recess period when the class could not go outdoors because it was too cold. The teacher told the students to work from

any area they wanted as long as it was available. The other observations were during math time and reading station time where students were working at their tables much of the time.

Student LB1. LB1 identified three areas in the classroom where he liked to work. These were the reading area, the writing center, and his assigned seat. He called these places his top preferences and referred to them as "good good little spots to work at" and added that he found the places relaxing. He went on to share about a space where he read each morning. He stated that the space was hidden, and although there were two students who worked close to his hidden spot, "We have never actually sat and chatted when we read." When he used the words "little" and "hidden" he said them with some emphasis.

LB1 also shared that he felt relaxed at his table because he, "Got lots of friends over there." LB1's preference to work in places where he was in close contact with friends is something that the researcher observed especially on the first observation when students had indoor recess. He worked on his laptop at the rug, sitting with some friends throughout that observation. In describing why he liked the writing and reading space he said, "Here you can write about whatever you want to write about. Over there you can pick a book." During an observation after LB1 finished assigned work, he went to pick a book from the library and took it to his desk to read. After some time he went to the writing center and wrote a letter.

Student LB2. In the interview LB2 shared that she liked to work at the tables and the writing center. Both places were places that had limited seating. The writing area for instance was designed for a maximum of four students at a time. It is interesting that although she mentioned the writing center and the tables as one of her favorite places at which to work, they were not in her pictures. In the interview LB2 emphasized that she did not like to work on the rugs. She, however, did state that she could write on the rug if she had a clipboard. Observation

data supported that LB2 seemed to prefer working alone or in places without a lot of people, because these were the spaces she worked from most during the observations. The spaces she worked from were mainly the writing center and her assigned seat.

Student LB3. LB3 seemed to like to work in spaces where there were not a lot of people. For instance, she said the writing area was one of her favorite places to work at, and she had a photograph of the area (see Figure 39). She said she liked Smiley (the classroom pet) and seemed to have a strong connection with the classroom pet. She mentioned in the interview that Smiley hides a lot. During observations when students had indoor recess, she chose to work on her computer at the writing center from which no other students worked. When she was talking about her preference for the computer area she said, "But sometimes when people mess with me on computers. I get little, I get a little frustrated." During observation she talked with a peer once in a while as she worked, but much of the time she worked by herself.

Another area where she liked to work was the rug because there were a variety of activities she could do from there. When she talked about her picture of the rug she said, "There is a lot of choice that we like..." and went on to list some of the materials they could access at the rug area. These included markers, crayons, scissors, and a treasure box. She also stated that she liked the rug because they got to watch videos on the SMART Board®.

Student LB4. In relation to where LB4 preferred to spend his time, observation notes showed LB4 worked at a table close to the rug area and then the rug area playing on his computer during indoor recess. During an observation session when the class was working on an assigned math task at their tables, LB4 talked with a peer sitting next to him for some time, and he seemed to be helping her with the work. When he moved to the rug area, he went to sit close

to LB1, and they were playing games on their computers. He looked very engaged in the activity and seemed to enjoy it. There was a group of four boys at the rug.

The rug was one of the pictures LB4 took (see Figure 41), and when he talked about the space, he said it was good to work at the rug because, "If you have a buddy they might be sitting in front of you like my buddy." In response to the interview question asking where he liked to work in the classroom, he identified the teacher's table because, "If you need help, one of the teachers are there to help you."

When studying various content areas (reading, math, science), which aspects of the classrooms' physical environment do students think help them to learn?

Student LB1. In answer to the question of classroom physical learning environment aspects that he felt helped him when learning various content areas LB1 shared how the library offered choice by providing, "over a hundred books over there. From fiction, chapter books, scary chapter books…there is a lot of good books over there." He also felt the rug where, "We do mostly anything" was important. His data showed that they used the space for learning in all content areas and for whole-group and small-group instruction.

LB1 felt places that do not have a lot of distractions helped him to focus on learning. These places could be private spaces where a few students can work at a time or away from where most students would be working. Writing "away from people …it would actually kind of help because you wouldn't really be able to chat with anybody." When he talked about his picture of the rug (see Figure 25) he said he sat close to the teacher so he would not be distracted by his peers who might be chatting with friends. He pointed at the spot and said, "So, I sit here, so I can kind of hear better and a lot of people are back."

LB1 shared that he preferred doing science at the table, “Because we are all doing it as a group, and we can kind of talk about how we are doing it.” He added that was how they did science projects in the class. In relation to reading, he talked about the reading or library area and shared, “If you are just over there you kind of feel a little bit warm…in your heart doing something like that, and it’s also calming” (see Figure 24). One of the important aspects of the physical environment to him was lighting and other homelike elements like rugs. He shared that a place in the classroom that had all these aspects where he preferred to do math, reading, and writing was the reading area. The following was part of his description of the place, “It’s like during the summer, and it’s like sometimes I feel like I am at the beach, and it’s sunset because of the way that the lights are set and stuff. And it’s like you are on the sand. You are like enjoying it.”

The rug and lighting of the reading area made the space so calming for him, and he liked it so much as an individual. That was what drew him to the place. He explained that learning math was “sometimes hard when you get frustrated,” but the environment in the reading area helped to calm him down.

One of his pictures focused entirely on classroom displays (see Figure 26). Although the display was above the sink, LB1 made the effort to capture it very closely and clearly, and during his discussion about the photograph he shared,

> The reason I selected this part as a taken picture is because you could see we have reading strategies like the long e, and then magic e, long a digraph, long o digraph, long i digraph or controlled words like …then the r words right here.

In addition, during the interview he talked about how anchor charts at the writing area helped him to write by providing examples and clear guiding steps, “…right here she has examples like

writing goals, like how we do plans, opinion piece, and then what you do after the opinion piece, and it really just explains what you do…and then here is type of plans…"

LB1's data showed he felt displays in his classroom were a significant support for learning and provided clear guidance. In addition, he discussed that the displays were created by the teacher with students. This was evident for instance when he talked about one of his photographs (see Figure 26) and said,

> Ms. Dee just doesn't write this and put them up there. We say these words out. Because we, because this, these are sometimes what we do in phonics. So, we will bring on our thoughts. Ms. Doe will write them down. Call one of us if we raise our hand. Then we fill up the charts.

Observation notes also showed that LB1 engaged with different materials during the little time they had choice. Three of his five pictures had different materials for learning, demonstrating how important LB1 felt materials were for learning (see Figures 24, 26, 27). When he talked about a picture of the rug (see Figure 25) he said, "Over here these are like puzzles for playtime, these are supplies, this is science, these are cubes that we use for math, these are blocks that we will probably use for playtime...these are little learning games. And then beside that puzzle the rest of that is literacy..."

Student LB2. Data from LB2's photographs showed she felt private comfortable places were important for reading. "Right here we have the pillows and then, then you can like make a little area with them... where you can sit down and then there is [*sic*] stuffed animals underneath that it's in that green basket over there. It says reading buddies. You can take one out and read to it." She identified elements that make an environment feel like home. During most of the time the researcher observed LB2 working, she seemed to have preference for places where she could

work alone. The researcher observed her several times working at her table wearing headphones when other students worked from the rug or other places where several students were working together. In addition, she shared that she liked reading at a spot between the light and science books because, “You feel kind of safe, and it’s like a secret.”

When she was talking about her photograph of the reading area (see Figure 30), she shared that they had science books in the reading area, and there were pictures on book boxes in the library to show they were science books. During observations, when the class was working on an individual math assignment, the researcher observed LB2 walking over to the math area to get a hundreds chart. None of the other students seemed to use any of the math learning aids. In both the picture discussion and main interview, LB2 talked about whispering phones and other materials in the reading area as aspects of her classroom that she considered as important for reading.

LB2 also shared that she believed the writing center was an ideal place for writing because, “You will have some paper stocked up if you run out. And then if you gonna [*sic*] draw pictures you have markers, colored pencils, crayons again.” She shared that she would prefer doing math at the teacher’s table because that was the best place where she could easily access different learning resources that were displayed close to the area. She identified different math learning aids she could access from the place, “If I need a hundred chart they are right over at that table. ...and you can see the number line really good…. You also need a bunch, a lot of math posters we have. So, we have that one and that one.” She shared that the display had subtraction and addition strategies, strategies to help with story problems, and line plots.

LB2’s response and discussion on the displays also showed what she thought helped her in math learning. She shared that the displays were made by the teacher with the class. Talking

about one of the graphs she said, “We did that, how many teeth one day because we were writing on a little, cause we did this thing where we counted how many teeth we lost …so in the line plot each x is one person.” As she talked about each of the different displays, it was clear that she knew how to use them because she gave examples. In addition, like most of the participants, LB2 believed that a lot of room and a place that could be easily cleaned was important for science learning.

Student LB3. LB3 identified the writing area as a good place for writing and reading because, “We read, we think, we write, and we learn. Right there, see, that’s read, think, write, and learn…” She pointed at the displays in the writing center that provided strategies about writing and reading. In addition, she shared that she liked computers because, “We get to go on Epic!©, and I get to watch scary books on Epic!©.” LB3 stated that she “Did not like to work at library because it’s too boring of reading.” This seemed to contradict her earlier statement that she loved reading when she was talking about the computers. This discrepancy could be attributed to the idea that she did not like reading hard copies of books but liked reading on the computer because she had options to listen to books.

She liked seating that allowed for movement. She shared that she would like reading at the teacher’s chair because, “It can rock. And these chairs can’t rock.” She added that the teacher’s chair was an ideal place to read because, “No one can step on me and reach over me.” LB3 also felt her table was an ideal place for math and science. She however did not provide much detail on why she preferred the table.

Some of her data seemed to show she preferred working with other people. When she talked about her photograph of the rug she said she liked that her teacher, “read to us on the rug,

and we sit and listen." One of the pictures (see Figure 37) she took was related to their small groups, and she pointed that she did not like it.

Student LB4. He shared that the book boxes made reading materials and other materials like different types of paper easy for him to get. He shared, "If you want to read what you picked out, you could just go to there and grab your book box that has your name on it," and "There are special papers like number chart paper, papers that you need for science and math." The SMART Board® also provided support for math learning for LB4. When he talked about his photograph of the SMART Board®, he said, "If they are gonna show something that you are gonna do at math that they sometimes they do it on there, and it's bigger than what you are seeing on the chart paper."

When he talked about writing and reading, he shared that he would prefer to write from his table with his friends and probably at the writing center. He also preferred reading at a table with a friend. This was an interesting finding that also showed a distinct difference in LB4 in preferences for writing and reading when compared to the other participants. While other participants preferred private and quiet spaces for writing and reading, he preferred doing so at a table with friends. He shared that writing at his table helped him, "Because if I need help I know who to ask and… I aren't [*sic*] kind of scared that they won't help me."

He added that he liked reading at a table with his friend, "Because my friend that sits over there, he has been my friend all the way since kindergarten." The same idea was evident when he talked about what he felt helped him in math learning. He shared that he would prefer doing math at his table because there was a teacher who came in during math, science, and literacy time and he, "really like sitting with her because she is always nice to everybody." He shared that he preferred doing science at the teacher's table because the teacher was available to help

him if he needed help. Similar to the other participants, LB4 felt science learning required a lot of room, and the rug was an ideal place for science.

Which aspects of the physical learning environment contribute to students' sense of belonging?

Student LB1. In response to the question of what he liked or disliked about his classroom LB1 said that he liked that there was a lot of kindness in their classroom. Although he seemed to understand that the question required that he talk about the physical environment, he mentioned the social environment of the class showing that was something very important to him.

Comfort was important for LB1's sense of belonging. For instance, he talked about a place in the classroom they referred to by the name of a continent or "the cool down spot" and described the different items in the place that helped him to calm down. He explained that the area helped him to calm down and added, "If you wanna know this about me. I actually love soft things." In another part of the interview he explained that the lighting in the reading area helped him to calm down when he got frustrated.

Student LB2. Having personal items in the classroom seemed to be very important for LB2's sense of belonging. She described her picture of the rug and shared an experience she had at the rug that was current. She talked about how she used blocks at the rug earlier that day,

> So, like today I was playing with them, and I have a puppy dog...stuffed animal it's in my backpack. And I made it a little house. I put a little wall kind of, and then I made a bed, a bathroom, a living area, and then I made a huge house, a huge cake, and they would go yum, and the next day they would eat the rest, and then I would I would throw put back I would put it back in the basket because they ate that layer of the cake the layer of the cake. And they also had like their bowl and two bones.

Her first photograph was of her book box, and as she discussed that picture, she mentioned how it provided extra storage for her personal stuff like headbands.

Student LB3. During the interview LB3 identified working at her table, the writing center, and computers as something that made her happy. When she was responding to the question related to sense of belonging, she took a piece of paper and wrote some of her responses. These included, “At my table, or at table” and one “at writing.” She used the words happy and shy to describe her feelings when working in different parts of the classroom. One notable finding in LB3’s data was her discomfort working in crowded places or places where a lot of other students worked.

One clear example found in many parts of her data was her dislike for the reading area that was a very popular area amongst participants across cases. In the interview she shared that she did not “feel good” at the pillows that were items in the reading area. She explained that she felt shy when she lay down, “Because there is a lot of people around.” LB3’s discomfort was probably a result of personality preferences or because she had just been in the classroom for a few weeks and did not feel emotionally comfortable working in spaces where she came in close contact with the other students like the reading area although there were elements in the area that were homelike and provided physical comfort.

Student LB4. LB4 felt the classroom environment helped him feel he belonged to the classroom. Responding to the interview question he shared the classroom was, “The best classroom I could ever be in. It’s the best because the teachers in here are really good to us, and everything is made to look happy.” During most of the time the researcher observed LB4 work, he looked very relaxed and happy and worked with his peers and teacher especially at the rug or table.

He seemed to thrive on the opportunities the classroom arrangement provided for working together in areas like student tables and the rug where several students could sit together and work. This was evidenced by data from his pictures, observations, and the interviews. When he talked about one of his pictures (see Figure 43) he said, “I took a picture of the teacher’s table because they are always there to help, and it always makes me feel good if there is a teacher around.” When he talked about a picture of the rug he said, “My other one was the carpet because everybody that you know sits there, and it just makes you feel happy.”

Sense of belonging was evidenced in his photograph of the book boxes with students’ names on them. Although his main idea seemed to be that it made it easier to read, he seemed to take pride in the idea that these were items that belonged to the students because they had their names on them. Additionally, LA4 said he chose the place he reads at each morning because, “It’s nice and quiet. And it’s dark enough, and it has enough light and enough dark.” His lighting preference showed his uniqueness, while the idea of quiet spaces was common across participants. LB4 explained that he chose to read under that table because, “No other table is a table I feel most comfortable, because that one is where I sit and where all my buddies sit.”

Which aspects of the physical learning environment do students prefer to be changed? Findings shared in this section were collected from interviews with participants and conversations with participants about their photographs.

Student LB1. LB1’s response to the interview question on what he wanted to be changed about his classroom environment was that he felt that the classroom was “just perfect,” and he went on to point at displays around the room explaining how they helped him to learn. There was no indication in LB1’s interview, picture, or observation data that he preferred for anything to be changed in his classroom.

Student LB2. LB2 felt the location of the bathrooms was not convenient because she has, "to run outside to get to the bathroom." Adding a bathroom to the classroom was the only thing she desired to be changed.

Student LB3. LB3 did not provide much information on what she wanted to be changed about her classroom even with probing. She mentioned she did not want anything to be added. She, however, mentioned the draft book as something she seemed to want removed from the classroom environment. Draft books are used to teach young students the process of writing.

Student LB4. LB4 wished for nothing to be changed. In responding to the interview question, he highlighted what he considered made the environment perfect. The response showed he believed aspects of his classroom environment were meaningful and accessible, and they also contributed to a sense of belonging. He mentioned that the environment was good because, "If you forgot something, like if you forgot one of the writing goals, it's over there…and we were doing simple notation and you forgot it's up there."

LB Case Summary. Meaningfulness of the physical environment was a prevalent construct across participants in classroom LB. This was most evident in displays, the writing center, and the reading area. One unique thing about this case was that participants generally thought their classroom physical learning environment was perfect and did not need any adjusting. Three of the participants in the classroom seemed to like collaborative working experiences. Although the teacher told students to sit away from their friends, the students seemed to like working with their peers or wanted to sit close to peers. All four participants sat close to peers at one point at least during the time they were working at different places on their laptops. They seemed to look happier when they worked at different activities and places than when the teacher gave them work sheets, and they had to work alone from their desks until they

completed the assigned work. Participants' individuality was very evident in the differences in how they used and interpreted their classroom physical learning environment.

Teacher-centered Classroom A (TA)

This section presents results from analysis of individual data sets from each student participant in teacher-centered classroom A (TA) as collected through interviews, pictures, and observation. TA is the classroom that scored lowest on the APPEAL scale, and according to the scale this indicates a more traditional physical classroom environment. Seating in this classroom was in rows, and all the students' seats faced the center of instruction, which was the interactive board area beside the teacher's table. There were four student participants in this classroom. TA1 and TA2 were boys, and TA3 and TA4 were girls.

What do students like about their classrooms' physical learning environment? Findings shared in this section were collected through participant interviews, participant-generated photographs, and observations by the researcher of the participants working in their classroom.

Student TA1. TA1's pictures that he took in response to the prompt, "Can you take five pictures of your favorite parts of the classroom?" were a calendar, a small desk connected to the teacher's table, his desk, a corner in the cubbies room, and the classroom's reading area. He identified the focus in each picture in a very short conversation with the researcher. In talking about the pictures, he added more insights on the things that he liked about the classroom environment.

TA1 said he liked spaces that allowed him to work without distraction. For instance, in talking about the picture he took of the desk connected to the teacher's desk (see Figure 49), TA1 said, "and then this one I love about is that you can work without getting distracted." In talking

about a picture he took of his desk (see Figure 48) he said, “And then that’s my like... I took it because no one can cheat.” He said spaces close to the teacher mattered to him because they helped him to see the board clearer and provided space where he could work without distractions.

He expressed in the interviews that what he liked the most about his classroom was the teacher, his friends, computers, and sitting at a table close to the teacher or the SMART Board®. Spaces that he liked were also connected to fun. He stated that the reason the teacher was one of the things he liked about his classroom was because, “She makes us have fun Friday on Fridays.” Regarding computers, he said “you can do learning games on them (computers). You can do Freckle© and Xtra Math™.” These two responses were confirmed in one of the pictures he took of the cubbies room focusing mainly on a frisbee (see Figure 47). It is interesting however that he did not take a picture of computers like the other participants in the classroom. His two other pictures were of the reading area (see Figure 46) and a calendar (see Figure 50).

Figure 46. Reading area

Figure 47. Cubbies room

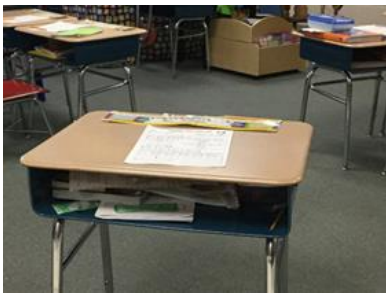

Figure 48. TA1's desk

Figure 49. Desk near the teacher

Figure 50. Calendar

Student TA2. The photographs that TA2 took in response to the prompt, "Can you take five pictures of your favorite parts of the classroom?" were art supplies and his desk, computers, cubbies, a table, and library. In the pictures of his favorite parts of the classroom TA2 identified two spaces that were similar to those identified by TA1. These were the reading area (see Figure 55) and cubbies (see Figure 53). His comments on the reading area mirrored TA1's to some degree. He talked about the reading area as one of his favorites because it was a comfortable space. He liked the cubbies as a space where he could get private time with a friend. He said,

> And this is the cubbies. We do get a lot of people, but there are sometimes some spots that I would like to go to in the cubbies. Like right here sometimes me and my friend C may, we would place a jacket at the hook and then make enough room for us to like get under. Because then it's like, because then it's like quiet, and we can have like some alone time with each other.

The concept of privacy is one that stands through all the different sources of data collected on TA2.

TA2 also picked the computer area (see Figure 52), a place with art materials (see Figure 51), and a table close to the classroom entrance (see Figure 54) as three of his favorite spaces in the classroom. TA2 stated he liked the table, "Where like my friends and stuff would meet up to read with each, to each other." He identified the art area and his desk as a place he liked because, "I like to, you get papers in drawers over there, but I mostly get papers and make them into paper planes, and I take the papers to my desk… Well, sometimes I would take it to my desk because lots of people like to go over there." In this excerpt he was saying he took art materials to his desk because a lot of students sometimes worked from the art area, and in those situations, he would work from his desk.

TA2 also said computers (see Figure 52) and indoor recess were some of his favorite spaces. He said computers had his favorite learning games in response to the interview questions seeking understanding of what he liked about his classroom's physical learning environment. Early in the interview, he added that he liked "…drawing, making stuff, making pictures." He then confirmed this by taking a picture of art materials and his desk as the art working space (see Figure 51) as one of his favorite parts of the classroom.

The reading area (see Figure 55) came up as one of the spaces he liked in the classroom. It was also in one of the spaces he photographed. He seemed to be drawn more by the seating that is comfortable. He did not talk about the cubbies area much during the interview, but it was interesting that he talked about the secret spaces in the cubbies area that he liked with some emphasis during the picture interview as shown in a previous quote. He also said he liked art, so his favorite place was the space close to the art supplies.

Figure 51. Art supplies and TA2's own desk

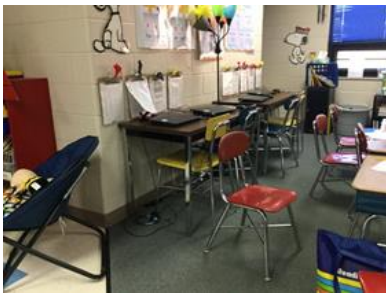

Figure 52. Computers

Figure 53. Cubbies

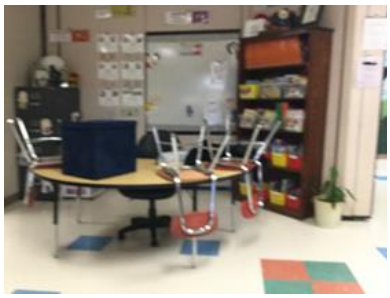

Figure 54. Other table

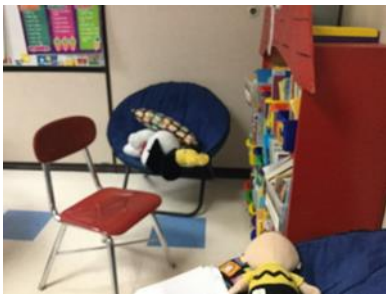

Figure 55. Library

Student TA3.The photographs that TA3 took in response to the prompt, "Can you take five pictures of your favorite parts of the classroom?" were reading area, comfortable chair, computers, teacher's table, and a place with paper and other materials. Like TA1 and TA2, TA3 focused on computers (see Figure 58) and the reading area (see Figure 56) as the spaces in the classroom that she liked. According to TA3 the reading area appealed to her because of the comfortable seating. She stressed the importance of comfortable seating throughout the classroom by using the word "comfy" or "comfortable" 11 times in the interview and in the conversation about her pictures.

TA3 showed she valued comfortable seating in the spaces she liked. These included comfortable seating in the reading area, the teacher's comfortable chair (see Figure 59) that she sat on when she got a chance, and a comfortable black chair at the table close to the entrance (see Figure 57). She mentioned that she liked that the chair had wheels, and she could rock on the

chair. This was a dimension to seating that threads through many of the participants' words in this study. In addition to comfort, students liked spaces and seating that allowed for movement. Like the other participants in her class, computers were a favorite place because she could play games there. TA3 also shared a photograph of materials for writing (see Figure 60) as one of her favorite parts of the classroom.

Similar to TA1, she identified her teacher as one of the things she liked in the classroom. She shared that she had recently moved to the new school, and the teacher was important to her because her previous teacher, "yelled at me, and I kind of felt scared." She also identified friends as a favorite element in the classroom because, "I just like that I can make new, I can make new, I can make new memories with my friends here."

Figure 56. Reading area

Figure 57. Comfortable chair

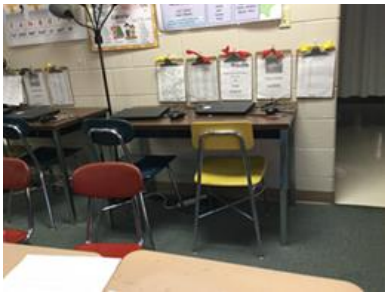

Figure 58. Computers

Figure 59. Teacher's table and chair

Figure 60. Paper and stuff

Student TA4. The photographs that TA4 took in response to the prompt, "Can you take five pictures of your favorite parts of the classroom?" were the reading area, computers, math

station, ELA station, and a table where several students could work together. She identified the experiences she had in these spaces as her focus. Talking about her picture of the computers (see Figure 65) she said, “This picture umm is of the computers. I really like it because I can look up stuff that I don’t know.” For the math station (see Figure 64) she said, “This is the math game area. Umm It’s, it, helps me spend more time with my friends and helps them to learn more math and helps me to learn more.” She stressed that the reading area (see Figure 62) was one of her favorite spaces because she liked, “taking one of the stuffed animals and reading with it.” The availability of stuffed animals in the reading area helped her learn. Additionally, two of her photographs were an area with language games and materials (see Figure 63) and one of the two students’ tables in the room (see Figure 61).

Like the other participants she pointed out the importance of the people in her learning space in response to a question on what she liked in the classroom’s physical learning environment. She said she liked that, “People are very nice in this classroom to each other” and in talking about her teacher she says, “She really explains what we are doing really well, so I can understand it.”

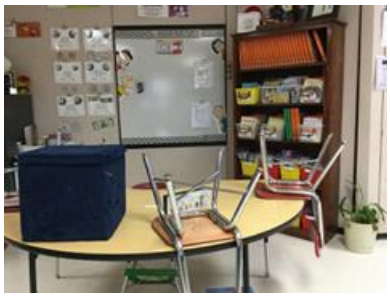

Figure 61. Table

Figure 62. Reading area

Figure 63. ELA station

Figure 64. Math station

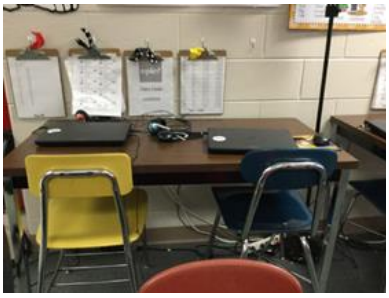

Figure 65. Computers

Table 4 shows a summary of the spaces and materials identified by participants in the photographs they took and related comments.

Table 4

Spaces/Materials Identified by Participants in TA Classroom

Space/materials identified in pictures	Number of participants	Comments
Reading area	4	Comfort (chair and space) and easy access to books, reading to stuffed animals (TA4)
Computers	3	Games, Look up stuff (TA4 and TA3)
Table with several seats	3	Comfortable chair, reading with friends, doing science (TA2, TA3, and TA4)

Space/materials identified in pictures	Number of participants	Comments
Assigned desk/seat	2	No one can cheat, can see the board good (TA1)
Cubbies	2	Privacy, games (TA1 and TA2)
Teacher's table	2	Comfy chair, liked to help teacher (TA3) Work without distractions (TA1)
Art supplies	1	Organized and liked materials, liked art and took materials to work from his desk (TA2, TA4)
Math station	1	Spend time with friends, learn math by playing games (TA4)
ELA station	1	Games are fun (TA4)
Displays	1	Tells what day it is (TA1)

Where in the classroom do students prefer to spend their time? Findings shared in this section were collected from interviews with participants, participant-generated photographs, and observations by the researcher of the participants working in their classroom. There was not a lot of choice for students to work from in this classroom. However, there was a small degree of choice students were given by the teacher on some activities during station time like reading a book or playing a math game. Students could bring materials or worksheets to different parts of the classroom during these activities. When the researcher observed participants working in such

areas that were not their designated seating, her assumption was that they were places in which they preferred to work.

Student TA1. According to TA1 he preferred to spend his time in different spaces as shown in his pictures. The researcher's observations of TA1 confirmed this when the researcher observed him working in the classroom. He communicated that he enjoyed playing in the cubbies. He mentioned the cubbies as a place he preferred to work from, and interestingly in his discussion of the space, he did not talk about the actual cubby space but pointed out at a frisbee as, "One of my favorite things to play with." His picture of the cubbies room (see Figure 47) was only of a corner that housed the frisbee.

Interestingly all the areas he identified in the interview were close to the teacher. During the few instances the participants could choose where to work from during center time, TA1 spent a significant amount of time working from a rocking chair that was at a small desk connected to the teacher's main work table/space. His explanation during the interview provided more insight on why he preferred working from a desk close to the teacher or why the teacher's space was ideal for him to work. He stated that he preferred working from a space close to the teacher's office and a table at the front row. Lighting was an important aspect in the area he preferred to work from. He stated that the spaces he preferred to spend his time, "Are closest to the teacher's office. Because they have more light." He however pointed out that he disliked working from a space by the window, "Because if it's sunny the sun gets in your eyes." Although the areas he identified were both close to the teacher and had just the right lighting he needed, he pointed out that it had to be in moderation and "only want when it's like shady." None of the spaces TA1 selected were spaces the researcher observed him working from when the teacher assigned seating.

In the interview TA1 shared that he wanted to sit at the front table, but when the researcher asked him if there were spaces he did not want to work from he identified the same place adding, “Like if you are in the front row that means you are not listening, and she (the teacher) calls that the front row boat. When you go in the back row that means you are listening.” The conflicting discourses seemed to show up.

Student TA2. For TA2, he preferred to spend his time sitting in one of the chairs in the reading area. Despite probing during the interview, TA2 shared that there was no space in the classroom that he did not like working from. TA2 did not provide any more spaces that he preferred working from even with prompting during the interview. Observing TA2 at work in the classroom and an analysis of the pictures he took of the favorite parts of the classroom seemed to suggest that the spaces TA2 preferred to spend his time are spaces that were comfortable, spaces that provided privacy, and where he could work as an individual most of the time (see Figure 51, 53, and 55).

The researcher observed TA2 working in the classroom, and in all the observations he was usually working alone even when he was in a space where he could work with other students. One very illuminating incident was when the researcher observed TA2 working in the library area. TA2 was sitting in one of the chairs, and there were three other students reading in the same area. After sitting in the chair for close to 5 minutes, he moved from the chair and sat on the floor between the book shelf and the chair. He then pulled the chair he was sitting on closer to create a small space under the chair for himself. The researcher also observed TA2 working alone for long periods of time at a table close to the entrance to the classroom. Apart from the incident that he was reading while sitting on the floor, TA2 worked sitting at a rocking chair close to the teachers’ table, and almost most of the time sat in the comfortable chair in the

reading area during station time. In response to the interview question asking about the places he liked working from he said, “We don’t well ... sometimes, sometimes, I would like to go over here and sit in these chairs and read.”

Student TA3. TA3 identified a table close to the door, and just like in the discussion about the areas of the classroom that she liked, she chose seating that was comfortable as a feature in spaces where she liked to work. She talked about a table close to the one she liked working from as a place she did not want to work from in the classroom. Her explanation during the interview brought to light her preference. Talking about the table, TA3 said, “I don’t really like working at that table. Here close to the door. There is too close... I feel like it’s too close …Like to N’s (peer’s name) desk.” In this quote TA3 was explaining that the table was too close to another student’s desk.

Although TA3’s interview data seemed to imply that she liked working in places where she could work alone, her observation data showed that she seemed to sometimes like working with other students. During observations the researcher saw her, in one instance she worked with friends in the cubbies area on a math game, and in another instance she worked from a desk on an art-related activity. She also chose to sit at the rug when the rest of the class was working at their tables during a whole-group instruction session.

Student TA4. TA4 preferred working close to the teacher and liked spending her time in spaces that were not crowded. TA4 identified cubbies as a place she did not like working from, “Because everyone goes in there.” In discussing about spaces close to grown-ups TA4 shared that she liked working in spaces close to adults because they were safe spaces. She said, “I just feel safer when I am close to the grown-ups.” The researcher observed her working close to the

teacher's table during a time the class was reading, and she also worked from her desk during another observation when the teacher told them they could choose where to work from.

When studying various content areas (reading, math, science), which aspects of the classrooms' physical environment do students think help them to learn? Findings shared in this section were collected from interviews with participants, participant-generated photographs, and observations by the researcher of the participants working in their classroom.

Student TA1. When working on reading, math, and science related activities, TA1 identified three different seating spaces that included his assigned seat, the cubbies room, and a desk connected to the teacher's table. TA1 identified these spaces as spaces that offered individual work space and helped him to concentrate better.

During the interview he compared the "solo desk" with the reading area where we had the interview. He said he would write best, "Probably up there (the desk connected to the teacher's). Like, if like because I can like concentrate better because sometimes like when I am over here people like, try to talk to me, so I get distracted, but no one can talk to me up there so." Cubbies were also ideal, "Because you can a, when it's quiet, and it's quiet and you can ...like you can read more by yourself." He said the desk close to the teacher was also best for science projects because, "Up there, at that desk so I can really concentrate and put it together."

Apart from the interview data, TA1's pictures showed the areas he talked about as he shared about the pictures he took of his favorite parts of the classroom. In his picture of the cubbies and discussion, TA1 talked about the cubbies as a space where he could play.

Student TA2. In talking about aspects that helped him learn, he mentioned a table. In the interview he said commenting on a table close to the entrance to the classroom, "Because it's not really a popular space. Most people would sometimes come over here (to read)." The reading

area where we were seated during the interview was a place designated for reading, but TA2 in this statement was saying he would rather sometimes work at the table closest to the door because it was not as busy.

During the observations TA2 spent a lot of time reading a book alone in the space he identified during the interview, the table by the door. The researcher also observed him creating a private space in the reading area when the teacher had assigned his group to read from the reading area. The table closest to the door was also one of his pictures (see Figure 54). "Umm like somewhere where like it had quiet," were his words when he talked about aspects important for his learning.

According to TA2, math required a lot of concentration so spaces and conditions that allow for focus on learning were important. He said he would read at either the reading area or the table closest to the door when it was quiet or when there would not be a lot of other students working from the table. In the interview he said, "Umm like... maybe like right there (reading area) in one of those chairs… like one of these chairs. One of these comfy chairs (writing)." Additionally, in talking about science learning, he mentioned the reading area as a place he would like to do science activities, "Because probably that's gonna be easier for me to sit down and be relaxed." He identified the reading area as a place used by many students at a time earlier when talking about best spaces for his reading. He talked about the reading area as a good place for science mainly because of the comfortable seating available in the area.

Student TA3. When talking about aspects that she thought helped her in writing she said, "I just want a comfy chair. It just makes me, I feel like it makes me work better. When I am in a very comfy chair, to roll around and then go back and forth." Apart from the seating being comfortable she also liked seating that rocks and stated it helped her work better. Some of the

spaces that she discussed, photographed, and in which the researcher observed her working provided more information on aspects she thought helped her learn. One such space was the reading area that had a comfortable chair and was arranged in such a way that books were easy to access from the seat. In talking about that space, she said, “I like reading a book right here. Because I am near a box and I can just.” She reached out to get a book as she talked.

When she talked about math learning she said, “I just want to do it at my desk…I am used to doing math at my desk.” In talking about her pictures, she stated that she liked books. Her personal interest was closely related to the area in which she preferred to read and write. For science learning she stressed that, “If I was doing an exploding project, I would just do it right there… (pointing at the floor). Because if it went on the floor I could, like just clean it up easily. But if it went on chairs I would have to scrub and scrub till it came off.”

Student TA4. TA4 was different from the other participants. For writing she mentioned that she liked to write at her desk because, “I feel really comfortable at my desk when I am writing or anything like that, umm maybe because that’s like the really organized place that I really like. Because I am, usually like, I don’t like unorganized areas.”

On aspects that helped TA4 learn math and science, she said she would do science, “Over there because there is no carpet, and it’s a table space. Because science projects are messy, and we need a big space for all that mess too.” For reading she chose the reading area, “Because like, say I am in well, my reading level is P, and if I were close to the book shelf, I can just grab another book and read it.” Her comments regarding reading were very similar to TA3’s in that both participants said they would do it at the library where they could easily access books.

TA4 also said working from her desk helped her to learn, “Because I can see the board clearly from my desk. Right back there, right back there, if I sat over there. I think it will be the

best spot to sit. Right there on the carpet. Because it's close to the board, and I can see it." Like TA3, she identified her desk as a place that helped her to learn math.

Which aspects of the physical learning environment contribute to students' sense of belonging? Findings shared in this section were collected from interviews with participants, participant-generated photographs, and observations by the researcher of the participants working in their classroom.

Student TA1. TA1 shared that he did not feel good near the bathroom door because students in the adjacent class would, "Look over while you are working, and sometimes we do the same sheets so they can like, cheat." His preference to work alone was evident in his data. He shared that he liked the cubbies because they had enough light and were quiet. He stated that the cubbies made him feel good and cozy.

He looked happy in the classroom during the first observation and seemed to feel like he was part of the class, and he felt comfortable. He however walked around the class a lot and did not seem to spend much time on activities during one of the observations. He seemed to be "lost" in the classroom and did not seem to find his own place where he could be engaged fully like the other students.

Student TA2. TA2 thought being away from other students helped him learn. "Sometimes when I am around somebody that they will be loud and stuff, and they get people in trouble. I would like not like to sit there anymore. I would like to go somewhere else." Observations data showed him working alone in quiet spaces. He used the word quiet several times in the interview and when talking about his pictures. For instance, when talking about his picture of the cubbies he said, "Because then it's quiet, and we can have like some alone time."

Student TA3. TA3 liked drawing and playing on the computer. She shared,

> Well I just like art, like I like making stuff. I like making stuff for other people and myself. Umm, art is just my thing, and when I just wanna take a break from my art sometimes I just wanna go to the computers just play a game or something.

She also said there was no space in the classroom that made her not feel she belonged in the classroom.

Student TA4. TA4 felt there were some important factors in the physical learning environment that nurtured her sense of belonging in the classroom. One example was the space close to the windows. She commented that, "It's because I love the outdoors; I love the outdoors, and it makes me feel safer when I look outside. It makes me feel like calm, safe where I am. Not around any danger or anything." She added that, "Ever since I read Henry Box Brown... it has been really comfortable for me because in the book he says 'free bird happy bird' and it really inspires me." This showed a strong sense of emotional well-being when she used the words "calm and safe." She felt comfortable and free like the bird. It is interesting that she gave an example of a book she read because in her interviews she talked about her love for reading.

She also commented that being alone made her not feel good. During observations TA4 was usually working with other students on a game or working near other students on individual work when she had choice for seating. Aspects that were important to her sense of belonging came up in other interview questions that were not asking about sense of belonging. At the end of the interview when the researcher asked her if she wanted to add anything to what we had talked about she said, "I really feel safe here…maybe because I really like this classroom. It makes me feel, it makes me feel like I am at home. My class acts like a big giant family. We are usually all kind to each other."

Which aspects of the physical learning environment do students prefer to be changed? Findings shared in this section were collected from interviews with participants and conversations with participants about their photographs.

Student TA1. In regard to aspects of the classroom environment that he preferred to be changed, TA1 noted that he did not wish for anything to change in the classroom. Earlier in the interview and during discussions on the pictures he took, he however mentioned that there were spaces without adequate lighting and where it was easy for other students to cheat. At one point in a conversation about his pictures, he mentioned that he preferred working from the desk close to the teacher because it had enough lighting, and he could see better than when working from his assigned seat.

Student TA2. Regarding aspects of the physical environment that TA2 preferred to be changed, some evidence was found showing that he preferred the classroom environment to be adapted to include some of the things he liked. He responded to the question regarding what he wanted to be added to the classroom without any pause or hesitation, showing his love for dinosaurs and possibly something that was always on his mind that he wished he had in the classroom. He further provided more detail on his love for dinosaurs explaining that he had a big bag of dinosaur-related resources at home, and he would love to have items related to "Jurassic World and books on Jurassic Park," and his favorite book was *Jurassic World Fallen Kingdom* which was in the underworld and was indestructible**.**

The details he went into and the enthusiasm he showed in describing how he acquired some of his dinosaurs and the dinosaur movies he watched showed his love for dinosaurs and why he wanted them in the classroom. He expressed his desire to have some of the displays in the classroom removed and replaced with dinosaur posters because they did not use the posters.

TA2 shared that he had a big bag of dinosaur-related materials at home, “Like pictures of dinosaurs and then you could read about that dinosaur.”

Student TA3. Like TA2, she wanted some displays related to her personal interests to be added to the classroom. She wanted displays that made sense to her and were related to her interests to remain in the classroom. She said “If this was my classroom I wouldn’t put Old Charlie Brown stuff (with emphasis). I love Charlie Brown, but I wouldn’t put Old Charlie Brown stuff. I would put like, just horses. I like horses, anything related to horses I like. Ponies, unicorns, horses.” She continued explaining that she would keep posters that were related to happiness and gave an example of one that said, “Happiness is being too sick to go to school but not too sick to watch tv.”

Student TA4. During her interview TA4 shared that she would like more seating added to the reading area so more students could come to the area to read. This finding added to other findings in the data collected on her showing her preference for learning experiences involving working with or being close to other students. She also added suggestions to remove a display in her classroom, “Because we never use it,” and she thought the teacher had it in the classroom, “maybe because her last class actually used it.”

TA Case Summary. Comfortable seating was a common thread for participants in this classroom. For instance, in talking about the reading area TA1 said, “And then I like to read over there. Yeah because there is comfortable chairs.” TA2 also identified the reading area as a favorite because, “It just makes me feel comfortable.” Another participant, TA3 shared that she liked sitting in the teacher’s chair, and she liked a chair at another table because they were comfortable.

All participants in this classroom took a picture of the reading area as one of the places in the classrooms they liked. They all shared in one way or the other that they liked the library because it was a comfortable place. In addition, some of the participants highlighted the aspect of easy accessibility of materials and variety as aspects that made them like the library. All the participants mentioned computers as an area they liked in the interviews, although only three took a picture of the computer area as one of their favorite places in the classroom. However, a closer look at the focus of the participants when sharing what they liked about the reading area showed they all liked a homelike environment that was comfortable.

A variety of perspectives were expressed by participants regarding where they preferred to work at in the classroom. During the interview most of the participants took a few minutes to think and respond to the related question the first time. The hesitancy in responding was apparent in how the participants started their response.

All the participants who shared their ideas on what they wanted to be changed about their classroom environment identified something related to displays and felt the displays were not relevant to their learning. Additionally, all the aspects they shared regarding what they wanted to be changed were related to their personal or individual preference, interest, or personality.

Teacher-centered Classroom B (TB)

This section presents results from analysis of data sets from each student participant in teacher-centered classroom B (TB). The sources of data included interviews, observations, and photographs. Two hours of observations were carried out in the classroom during reading stations' time. This classroom did not have a free choice time where students could choose activities, materials, and where they wanted to work. During the time the researcher observed, groups of students rotated in four different reading stations. One station was reading books at

their level on the rug, another was reading or listening to books on the computers, reading with the assistant teacher at a table, and reading with the classroom teacher at another table.

However, when students were done with their assigned reading or were transitioning to the teacher's station or waiting to be called, they could pick a book and read it at an available space, and they could also choose seating. For instance, one of the middle tables and the rug were usually available for extra seating during this time. There was a small table in the classroom where students usually did the computer reading stations. This table was open during one of the observation sessions, toward the end of station time for about 10 minutes. Two of the participants, TB1 and TB2, had a small window of "free choice time" of about 10 minutes during the time the class was observed. TB1 and TB2 are boys, and TB3 and TB4 are girls.

What do students like about their classrooms' physical learning environment? Findings shared in this section were collected from interviews with participants, participant-generated photographs, and observations by the researcher of the participants working in their classroom.

Student TB1. The photographs that TB1 took in response to the prompt, "Can you take five pictures of your favorite parts of the classroom?" were art and supplies area, phonics materials, computers, math materials, and books. During the interview TB1 did not talk much even with probing about what he liked about his classroom environment, but his pictures and the brief conversation on his pictures contained data on what he liked.

TB1 shared materials and spaces that enabled active engagement in learning. For instance, he identified displays like the calendar, literacy-related materials (see Figures 66 and 67), and some math materials (see Figure 69) as part of what he liked about his classroom. He showed a connection between displays and the interactions that took place in the classroom

related to learning and contributions to the classroom community. He shared that he liked doing the calendar, and "we do jobs..." He said, "Materials help me to do a lot of stuff." It seemed that TB1 knew that materials in the classroom were not just for display but were to enhance his learning. Like almost all the participants in the study, he identified computers (see Figure 68) as one of the things he liked about his classroom environment. He explained that he liked computers because he could read on the computer.

He liked materials because they allowed him to engage in activities he liked. An example of this is the picture of the book (see Figure 70) that he took because he liked to read the books. In talking about one of his pictures showing a rug he commented, "We play, we can play with cubes" and in talking about another space he used the words "stuff with our friends." The two excerpts are examples from TB1's data showing the concept of a learning community. The five photographs TB1 took are shown below.

Figure 66. Art and English Language Arts supplies

Figure 67. Phonics stuff

Figure 68. Computers

Figure 69. Math materials

Figure 70. Books

Student TB2. The photographs that TB2 took in response to the prompt, "Can you take five pictures of your favorite parts of the classroom?" were math materials, display, hundreds chart, book area, and computers. TB2 identified materials like clocks (see Figure 71) and blocks

that help in learning. He also liked displays like the hundreds chart (see Figure 73) and a display with information on coins (see Figure 72), which were two of the photographs he took of his favorite parts of the classroom. In discussing the coins display he said it, “shows how we know our cents and stuff,” and in talking about the hundreds chart he said, “We can actually know what we are doing.” These two quotations and others on materials clearly demonstrate that he believed that the displays provided support for learning. His words in talking about one of the pictures (see Figure 72) showed he took the picture with a clear focus in mind. He said, “These are pencil boxes. I didn’t mean to take a picture of that. I was trying to get this perfect coin chart.”

All the displays he photographed were displays that were not commercial. In addition to displays, he talked about clocks and blocks and took a picture of clocks and blocks (see Figure 71) and said, “You can get clocks if we are working on time…” TB2 could connect the materials to different kinds of learning, and it seemed from his comments that they were part of the reason why he liked that about his classroom environment. He explained that computers provided choice in reading, and that was why he liked them.

> And that you could read books. You can get normal books, you can get the read-to-me books or video books and the... I mean audio, audio books. Those don’t give you a picture of the book, but it gives you, it tells you what’s in the book and what it’s about. And the read-to-me is just pictures and reads to you.

To TB2, computers offered variety and choice of books. He also took a picture of the classroom book area (see Figure 74).

What he shared was related to his individual preference when reading. This individual’s preference was also highlighted in another way. In talking about the picture he took of the

computer area (see Figure 75) he said, “But this one over here is the computer area, and I like that area very much because that’s the first group my group gets to go to, so I like it really good because you can go on to Epic!©.” He also showed individuality in relation to seating during the interview, “over there at the down table because you don’t really, you can actually stretch your legs out at …” Figures 71 to 75 are the photographs TB2 took.

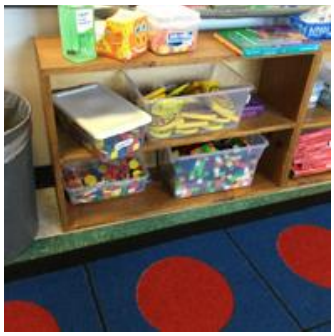

Figure 71. Math materials

Figure 72. Display

Figure 73. Hundreds chart

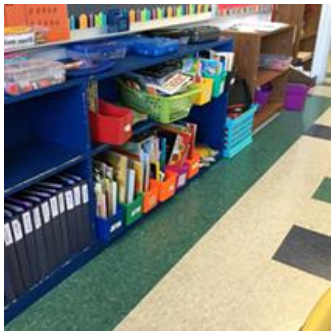

Figure 74. Book area

Figure 75. Computers

Student TB3. The photographs that TB3 took in response to the prompt, “Can you take five pictures of your favorite parts of the classroom?” were a place with personal items, phonics and math learning area, small table, reading station, and computers. In response to the interview question on what she liked the most about her classroom’s physical environment she said, “When we sit down on the carpet and learn phonics. When we get our dry erase boards, and we

get our markers, and she tells us a word, and we write it…" She liked the carpet because it gave her an opportunity to work with her teacher and the rest of the class on something she liked.

One of her pictures and discussion on the picture showed that she liked spaces connected to her interests. She took a picture of the rug (see Figure 77) and described it as a place where the class normally did phonics and mentioned that she liked phonics. In the picture discussion she said, "And then this one because this is where we normally do our phonics, and I like studying new words." The connection of places she liked and her individual interests were also shown when she talked about the computer space (see Figure 80) during the conversation about her pictures, "And then computers because it's because that's where my favorite book is, and it's umm it's Cinderella Rex. It's a really funny story." Although the book was on a program on the computer, she talked about the computer as an item in the classroom connecting her to her personal interest. She described dry erase boards and markers as materials that helped them learn phonics.

In talking about her first picture (see Figure 76), she shared that it was of a space "where Ms. Z keeps all the gifts we give her. Me and my friends call that the cozy corner." The fact that TB3 and her friends had a name for the place showed they felt emotionally connected to the space, and they felt they belonged to the space. One of TB3's photographs was of the reading station (see Figure 79) and a small table (see Figure 78) that she talked about at different points during the interview.

Figure 76. Personal items

Figure 77. Phonics and math learning area

Figure 78. Small table

Figure 79. Reading station

Figure 80. Computers

Student TB4. The photographs that TA4 took in response to the prompt, "Can you take five pictures of your favorite parts of the classroom?" were a place they read in small groups, the SMART Board®, computers, book area, and a picture showing materials for different activities. When she talked about a picture of the SMART Board® and rug (see Figure 82) she said, "That's where we get to... we grab those stuff, and we get to do activities over here."

Throughout the conversation on her pictures and interview, she used the word "we" as she talked about the places and materials in her classroom that she liked, showing that she liked working with other students. In the interview she said, "I like where we, in the morning when we sit down for morning meeting, we pass around that stick over there, and we, and we talk about what we did for the weekend."

She also said she liked when the teacher gave the class rewards for good behavior or special holiday activities, “Like if we did like a good job and do a great job to the teacher or anything we get to watch a movie, or if it’s a holiday or anything we get to watch a movie about the holiday.” TB4 and a few other participants identified the SMART Board® as a piece of technology of choice. One of her pictures was the SMART Board® and materials for activities (see Figure 82).

In talking about that picture she said, “We can use those blocks to build something. We usually do that at play time, or we could use those to make a little house or anything with those blocks.” Her other picture (see Figure 85) was also of materials for activities. TB4 also took a photograph of computers (see Figure 83), book area (see Figure 84) and an area close to the teacher’s space where the students read with the teacher (see Figure 81).

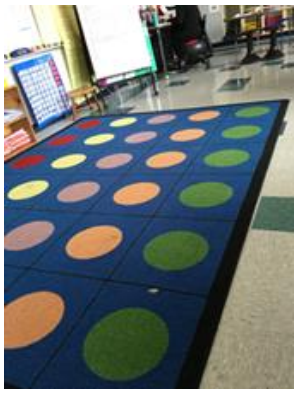

Figure 81. Where we read with the teacher

Figure 82. SMART Board®

Figure 83. Computers

Figure 84. Book area

Figure 85. Stuff for activities

Table 5 shows a summary of the spaces and materials identified by participants in the photographs they took and related comments.

Table 5

Spaces/Materials Identified by Participants in TB Classroom

Space/Materials identified in pictures	Number of participants	Comments
Computers	3	"This one because I like doing computers" (TB1) "I like that area really good because you can go on to Epic!©" (TB2)

Space/Materials identified in pictures	Number of participants	Comments
Library books	3	"Reading is my favorite station because I like reading…I am at a 24 and am trying to get to a 30 by the end of the year" (TB3)
Table with several seats	2	"That's where we read. And like we lay down all the stuff and then the teacher sits right there and then we sit down, and we read our tiny little book to the teacher" (TB4)
Art materials	2	"We grab those stuff, and we get to do activities over here" (TB4)
Math station	2	"And that over there is the math box" (TB2)
Book boxes	1	"I took a picture of the book because I like reading it" (TB1)
Displays	1	"This is the hundreds chart over there, and it helps, if we are doing a math problem" (TB2)
Personal items	1	"I have a little pig over there" (TB3)
Rug area	1	"This is where we normally do our phonics, and I like studying new words, but we do math there sometimes too" (TB3)
SMART Board®	1	She puts things on the board, and we dance to it (TB4)
ELA station	1	"This is for stuff we use for phonics" (TB1)

Where in the classroom do students prefer to spend their time? Findings shared in this section were collected from interviews with participants, participant-generated photographs,

and observations by the researcher of the participants working in their classroom. As mentioned earlier, this classroom did not have a free choice time where students could choose activities, materials, or where they wanted to work. During the time the researcher observed, groups of students rotated in four different reading stations. One station was reading books at their level on the rug, another was reading or listening to books on the computers, reading with the assistant teacher at a table, and reading with the classroom teacher at another table.

Student TB1. All sources of data on TB1 showed he liked phonics, and he showed this even in response to the interview questions related to where he preferred to spend his time. He pointed at the rug and said he liked doing phonics there. As he continued talking about the rug as a space he preferred to spend his time, he went on to mention, "Because it is soft" and "I like working with my friends." For TB1, his preference for spaces where he could work with friends came up from the interview as shown above and from observation data. When the researcher observed TB1 during reading station time, he started off reading in an individual corner on the rug, and after a few minutes he moved to sit closer to TB2, even after the teacher told them to move back to their spots a couple of times.

Student TB2. TB2 preferred working from a low table in the classroom. The low table in the classroom had flexible seating that included seating on small rugs or very low chairs. TB2 in the interview said, "It's a good table when I sit down. I could stretch my legs." This also showed that he liked to stretch or move as he learned. When the researcher asked him regarding places in the classroom where he did not like to work he chuckled and said, "That's actually kind of a hard question because the things that I dislike there is [*sic*] not a lot of things that I dislike in this room." Although the researcher tried probing for more information on spaces where he did not want to work, he did not give any information except that he liked almost everything.

Although TB2 did not mention this in the interviews, the researcher observed TB1 and TB2 moving from their spots to sit beside each other at the rug. Interestingly though, when TB2 talked about spaces he liked in the classroom one of the things he mentioned was that he liked the rule in the classroom that they had to sit at four corners of the rug.

Student TB3. Like some of her classmates, TB3 identified the computer area as a place she preferred to spend her time. In talking about computers and the space where she normally worked, she however showed her individual preference for seating and quiet spaces. For example she said, "Because there is Epic!©, and I like reading there because I get to listen to some of my favorite books on there…because it's quiet, and I can get headphones, and I can just rock back and forth in my wobble stool…"

Students could only use the computers at a specific area in the classroom, and this was an area TB3 discussed. The students were sitting at a large table with flexible seating, and they could choose seating. TB3 chose to sit on a rocking stool. From the observation notes it seemed TB3 liked to work at spaces that offered seating that allowed her to move as she worked.

Student TB4. During the interview and pictures, when sharing her preferences on where she preferred to work, TB4 identified the computer area and the rug as places she liked to work. She identified the rug area as a place where she liked to read. She also preferred to work at the rug. During the researcher's observation of TB4 working in the classroom, she was reading at the rug with her group. Each student was expected to sit at the four corners of the rug so they would not talk to each other. A few minutes into the observation, TB4 moved to a corner of the rug where a friend was sitting, and she continued reading her book while seated beside her friend.

TB4 shared that she did not like to work close to some of the displays in her classroom. For instance, she said, "I don't really like where like on that board it shows like all the time,

where it shows us questions where there is things that we could use, but I don't really like it." She also said, "I don't like it because where it shows our names and everything...it used to be over there, and it should have stayed over there, and that's when in the beginning it showed our names, but everybody knows our names…" She seemed to prefer displays to be in certain spaces. For instance, she seemed to imply that the display with the students' names was no longer relevant because they all knew each other's name.

At the beginning of the researcher's observation the teacher played a song, and students had to dance along. TB4 seemed to enjoy this time of movement because she was dancing happily and chatting with friends.

When studying various content areas (reading, math, science), which aspects of the classrooms' physical environment do students think help them to learn? Findings shared in this section were collected from interviews with participants, participant-generated photographs, and observations by the researcher of the participants working in their classroom.

Student TB1. In regard to aspects of the classroom physical learning environment that TB1 thought helped him to learn, he shared different aspects for different content areas. In response to the question on where he would like to do math, he identified a low table in the classroom and said, "Because when you sit down like you are sitting on a chair, and the chair is on the ground...and it looks small." He used the word small twice when responding to the question.

In his discussion on aspects that helped him to write he stated that the low table was a good place for writing, "Because the wobble stool is right there, I can wobble." Additionally, for science aspects of the environment related to learning, meaningfulness and focus on learning were important for TB1. TB1 described one of the tables in the room as ideal, "Because there is

more room." He also said that the table was wider, and would be easy to clean if the learning got messy.

For math learning as discussed earlier under the subquestion on what he liked about his classroom, he mentioned cubes in the classroom and said, "When we count up to like 20 you will have 10 and then you will have another 10." In the same discussion he alluded to the fact that books in the book area helped him to learn.

Student TB2. As far as TB2 was concerned aspects of the environment that helped him to learn were aspects that mainly involved displays and materials in the classroom. For instance, in talking about his photograph of the hundreds chart he said, "This is the hundreds chart over there, and it helps if we are doing a math problem…We can actually know what we are doing or something." Additionally, one of his photographs (see Figure 71) had a box of clocks, and in talking about the picture he said, "You can get clocks if we are working on time." He also mentioned cubes in the same conversation.

He said he liked writing at one of the tables in the classroom because, "Not a lot of people can sit there. So, not a lot of people can actually copy my work." He gave a similar response in talking about math learning. He pointed out one of the middle tables in the room was good for science learning, "Because there is more room to touch and move around your arms, and not a lot of people sit there during projects." Like most of the study participants, TB2 felt that physical comfort helped him in reading. He identified the rug as an ideal space for reading because it was soft.

Student TB3. TB3 revealed that there were several aspects of the physical learning environment that she felt helped her to learn in different content areas. In reading she identified the reading station as a space that helped her to learn and shared her personal interest in reading.

This was illustrated by her comment, “I like it because umm, reading is my favorite station because I like reading English because I can. So, I am at a 24, and I am trying to get to a 30 by the end of the year, so I am trying really hard.” Her motivation was connected to the area she identified.

In addition, she shared that reading at the small desk with flexible seating helped her to be more engaged when reading. She explained that they sometimes have choice for where to work when they have completed tasks assigned by the teacher.

Working in spaces without distractions or that helped her focus on learning was something prevalent in TB3’s data related to learning in math, reading, and writing but not for science learning. For instance, she shared that she would read a book at the carpet but would move to a different spot if people started talking at the carpet. She said the same thing regarding math. She mentioned that she would prefer to work at one of the big tables and not at the rug because, “Sometimes it’s really full, so I don’t wanna get really disturbed by anybody, so I can focus on it.” In addition, when talking about writing she said, “Most of my friends sit here, so I am always away from my friends when I do my writing so I can concentrate better.” TB3 felt that spaces without distractions helped her to focus on learning.

For science learning, she shared that the rug provided more room for science activities and materials she would need, “We have more room, and I would get a big like poster board.” In addition, she felt that comfort was also an important factor, especially when reading. An example of the space was the rug because, “It’s nice and comfy.”

Student TB4. During the discussion on her photographs, TB4 pointed out highlighters that were in the picture and said, “And that’s for highlighting the right words. That if you, …once you read it you know of special parts of the book.” Like the other participants in her

classroom, she identified spaces that provided a lot of room as important for learning science. Her argument for large space was similar to the other students in that she alluded to the idea that science learning needed a lot of space. Her perspective however differed slightly from those of her classmates in that she added that more room was important not only for the activity but to accommodate more seating, "Like there is more seats that you could work with them …"

In relation to what helped her in reading she identified computers. In talking about one of her pictures she said, "And that's where I was talking about computers. We can read any book. We don't like, we don't like, we can read our level, but it has a lot more books than over there. Okay, that we could pick, like different ones." She also shared that a small space beside the book center was good for writing and reading.

Which aspects of the physical learning environment contribute to students' sense of belonging? Findings shared in this section were collected from interviews with participants, participant-generated photographs, and observations by the researcher of the participants working in their classroom.

Student TB1. The main aspect that contributed to TB1's sense of belonging was related to his interest in reading. He shared that he felt good when reading a book. During observations, the researcher noticed that TB1 loved to read and would pick a book from the collection in the classroom when he was done with assigned work and read at one of the tables in the classroom. His first photograph of favorite spaces was the classroom book station (see Figure 70). He used the word good to describe how he felt when reading.

Student TB2. For TB2 there was one aspect of the physical learning environment that he felt contributed to his sense of belonging. He commented that he felt good working at a table where the assistant teacher usually sat because, "I know actually if somebody needs work

checked over here …I have it straightened up." He used the word confident to describe how he felt when working in that space. He shared, "I also feel confident because I probably won't get it wrong, but if I do the teacher can actually check and tell me I am wrong or not." An interesting thing he mentioned was that he also felt confident working at a table away from other students knowing that no one would copy his work.

Student TB3. TB3 shared that she felt safe working at the rug because it was close to the teacher. She also shared that there were spaces that were in the classroom that she had never used that made her feel she belonged to the classroom. She described a space in the classroom they referred to as the calming zone as a place that made her feel good. When responding to the interview question, she said, "One of my favorites is the calming zone because if someone gets mad they go there, so then they really don't get mad, and they will get involved in more things." She described items in the space that contributed to this sense of belonging including pillows and cushions.

Student TB4. TB4 described feelings associated to sense of belonging as feeling happy and excited. One of her photographs was the SMART Board®, and when she talked about the place as one of her favorites, she explained that she loved watching movies on the SMART Board® and dancing to music when the teacher played music on the SMART Board®. When the researcher observed TB4, the teacher was playing some music videos on the SMART Board®, and TB4 looked very happy singing along and dancing. In addition to that, she identified an area in her classroom created for calming down as important for her sense of belonging. In response to the interview question of what made her feel good she said, "Over there where it says like if you are not in a very good mood you go over there, and it tells you how to calm down."

TB4 explained that spaces that are not well organized made her not feel good in her classroom. In other ways, such spaces negatively impacted her sense of belonging in the classroom. Pointing at some of the displays she said, “There is math over there, and there is math over there, but then on top it’s not.” She also commented about another space in the classroom during the interview, “I don’t like it, like where all those things are mixed in because we really can’t put a lot of our things in it.” Additionally, the lack of organization made the classroom not a place where she felt she belonged because it affected her access to spaces for personal belongings. Discussing further about the space that was mixed up she shared that it made it impossible for students to put their lunchboxes in the space that was initially created for that purpose because they were afraid it could fall over.

Which aspects of the physical learning environment do students prefer to be changed? Findings shared in this section were collected from interviews with participants and conversations with participants about their photographs.

Student TB1. TB1’s data seemed to show he felt as a student he could not determine his classroom’s physical environment. In response to the related question, he commented that he would not add anything to the classroom because he could make a mess.

Student TB2. According to TB2 there was need to add items that promoted classroom positive behavior. He shared that the students used to get rewards for positive behavior and wanted the teacher to return the jar to the classroom that was used to keep track of positive behavior and performance on classwork.

Student TB3. TB3 felt there was need to adapt the classroom environment so that it would help the teacher more with classroom management. She recommended that the teacher should move “the calming zone” back away from where it was at that time because “over there

it's really small, and they might start acting up and leave, and Ms. T would have to do a lot with them like trying to keep them in the calming zone." She seemed to believe when students have more room it helped them to calm down faster.

She communicated that there was need to reorganize parts of the classroom so that there would be more room for the teacher's materials. She said it was important to create some storage space for the teacher because "she has to keep them under her table and stuff."

Student TB4. TB4 expressed her preference for change in the physical environment in a way that was different from other participants. During the interview she spoke at length about the need to add more cameras in the classroom so that they would record "if somebody was doing something wrong." Responding to the question asking what she would remove in the classroom she shared that she would remove flip charts and replace them with smaller size paper because it could still serve the same purpose.

Earlier on in the interview TB4 pointed out a part of the classroom that she said was disorganized and would prefer to be rearranged. She preferred that math-related materials would all go into the same space and desired to have adequate storage for personal items.

TB Case Summary. The data collected on participants in this case, like in the other classrooms, showed that the students varied with their preferences and needs in the classroom environment. For instance, TB4 shared that she liked organized spaces and she preferred to have parts of the classroom reorganized. She also preferred working with other students, while TB3 preferred working in spaces without distractions to help her focus.

Students liked spaces and materials that gave them opportunity to work with others and engage with materials and spaces that were connected to their own personal interests and preferences and that supported their learning and gave them choices. Generally, participants in

this classroom did not verbalize a lot of aspects that they wanted to be changed. Most of them said they felt there was nothing that needed to be removed in the classroom.

Cross-case Analysis

Multiple case study research helps to gain a deeper understanding of the unit of analysis or the case (Stake, 2005). The focus of the cross-case analysis is to provide a "unified description across cases" and to provide an overview of how the research questions were answered by the four cases (Merriam & Tisdell, 2016). In the following section, similarities and differences in the perceptions of the classroom physical learning environment by the participants in the four different classrooms are explored. The focus for comparison of the cases is on gaining deeper understanding of the students' perceptions of their classroom's physical learning environment. Important findings are shared question by question. Examples from the two groups of cases are used to clearly show the commonalities and variations in the participants' notions about their classroom's physical learning environment. To conclude the chapter, a general overview of findings is discussed showing how each of the five themes emerged from the data.

Quick View of Data Analysis Process

Data were analyzed through several steps that included coding data and developing categories and themes. Because the study aim was to seek understanding of participants' perspectives or their realities, first cycle coding labels were mainly in vivo codes, and a few emotion codes and codes naming certain spaces in the classroom were also developed (Saldaña, 2013). Emotions codes were developed by analyzing participants' feelings reflected in the data collected and from the researcher's standpoint, especially in observation data (Saldaña, 2013). Labels were also assigned based on the research questions ensuring that all codes were tied back

to the research questions. This was followed by sorting of the codes into categories based on relationships of the codes and underlying meaning found among the codes (Saldaña, 2013).

Description of Categories and Themes

The data analysis process shared above resulted in identification of 10 general categories from the codes developed (see Appendix C for a list of codes and categories). From the categories five themes emerged that can be described as related to access and meaningfulness, comfort, active learning, management, and learning community. When looking through the data, the theme of access and meaningfulness was related to easy access of materials and other elements of the environment, elements that fostered independence and afforded the students choice. It also included instances in the data that conveyed the message that students considered the elements of the environment as being meaningful to them. The theme of comfort included both features in the data associated with individual participant's physical and emotional comfort. The theme of active learning was connected to play and use of materials in learning. Management and guidance was associated with the teacher's use of the physical environment as a tool for classroom management or guiding students. Learning community was related to aspects that promote social interaction. Table 6 shows categories and themes generated from the data.

Table 6

Themes, Categories, and Codes Developed from the Data

Theme	Category
Access and meaningfulness	Choice
	Accessibility and meaningfulness
Comfort	Sense of ownership (territory)

Theme	Category
	Privacy and individuality Adaptability (this is a subcategory under privacy)
	Focus on learning
	Emotional mental well-being (sense of belonging)
Active learning	Content area learning Literacy centers/ literacy-related learning
	Active engagement
Management	Classroom management
Learning community	Learning community

What Do Students Like About Their Classrooms' Physical Learning Environment?

There was variance and similarities in what students liked about their classroom physical learning environment between the teacher-centered classrooms and the learner-centered classrooms. Student pictures across cases showed common aspects like the reading area and computers and significant differences especially from the participants' discussions about their pictures and responses to the interview questions. Although students identified similar aspects, their reasons for selecting those aspects were different at times. There were also some differences in the pictures selected by students in the two groups of classrooms.

In the photographs where participants took pictures of their favorite places, almost all the participants (6) in teacher-centered classrooms took pictures of the computer area, while only three participants in learner-centered classrooms took pictures of the computer area. All

participants in LA, LB, and TA classrooms took a picture of the reading area in their classrooms and none in the TB classroom.

All the participants in the TA and TB classrooms identified computers or the computer area as one of the aspects of their classroom environment that they liked. A common perspective among participants was that they liked computers because they could play games and read a variety of books. These games were content area related. See Table 7 for examples of quotations.

Table 7

Participants' Perceptions on Computers as Part of What They Liked About Their Environment

Teacher-centered classrooms (TA and TB)	Learner-centered classrooms (LA and LB)
• "That you can do learning games on them. You can do Freckle© and Xtra Math™." (TA1) • "Because it has some of my favorite games on ABCya!" (TA2) • "I like the computers. Because I just like playing on ABCya! is fun." (TA3) • "Reading books on Epic!©. On the computer." (TB1) • "But this one over here is the computer area and …I like it really good because you can go on to Epic!©." (TB2) • "And then computers because it's because that's where my favorite book is, and it's Cinderella Rex." (TB3) • "And that's where I was talking about computers. We can read any book. We don't like.. we don't like.. we can read our level but it has a lot more books than over there." (TB4)	• "I like electronics, and that's mainly where all of them are; umm I like playing Prodigy©, and we sometimes play Prodigy© on that iPad®, and we charge our iPads® over there to play Prodigy© and other stuff like Raz-Kids™, Checkers Net." (LA2) • "Because I like the iPads® because there is a lot of learning games on them. Like you can read on Epic!©." (LA3) • "Because it's fun to play on, and I get to go on reading every day." (LB3)

Teacher-centered classrooms (TA and TB)	Learner-centered classrooms (LA and LB)
• "This picture is of the computers. I really like it because I can look up stuff that I don't know." (TA4)	

Only three participants in learner-centered classrooms identified computers as something they liked about their classroom environment. The reasons the participants provided were, however, still like those given by participants in the teacher-centered classrooms. What stood out in participants' comments from both groups was the common idea that computers provided access to games and books. Interestingly, one participant shared a different perspective from the rest of the participants, that she liked computers because they were a resource for research. "This picture umm is of the computers. I really like it because I can look up stuff that I don't know." (TA4).

All the students in LA and TA, and three of the participants in LB liked the library or reading area. None of the participants in TB talked about the reading area specifically except for one participant who said he liked reading at one of the tables in the classroom and took a picture of a book and shared that was because he liked reading. Most informants in both groups of classrooms, especially TA and LA, felt that the reading area was a comfortable place, and that was why they liked it. Students in both groups also shared that they liked the books, but participants in the LB classroom seemed to focus more on the variety of books and how the books helped them to learn. The comments in Table 8 illustrate that.

Table 8

TA, LA, and LB Participants' Perceptions on the Library and Reading Area

TA and LA classrooms The library or reading area is comfortable	LB classroom The library and reading areas have books
• "And then I like to read over there… because there is [*sic*] comfortable chairs." (TA1) • "It just makes me feel comfortable." (TA2) • "Then right here because it's comfy." (TA3) • "That's the loft I really like it …Well, I love to read, and you read up there. Umm it's just really comfy." (LA1) • "I would say I like the reading loft the most. …I would say it's the most comfortable and.. it's fun to read in." (LA2) • "Umm, I would like… the loft because it's for reading, and I really love reading." (LA3) • "I like the reading loft because I just told you that up there umm it's really quiet, and you can peacefully read." (LA4)	• "Sooo library. This..so you can tell there are a lot of good books like informational books about the Titanic…fiction books." (LB1) • "I like library the most. Cause anytime you read one book and then you can move on to like a..harder level just like a little harder." (LB2) • "My favorite thing in this classroom my favorite part in this classroom it is library. It is my… it is so important to me because if kids want to learn about animals they just want to want to read a book they can go there." (LB4)

Some participants' views on the reading center were a bit different from the other students. TA4 liked the reading area because she could take one of the stuffed animals and read with it. In addition, she shared that she liked reading by the bookshelf because, "It's very quiet,

and you can choose any books that you may want to read, and you read them. It's fun." Similar sentiments were shared by a participant in the LB classroom. Describing his picture of the classroom reading area, LB1 said, "There are pillows right here, and then down here there are reading buddies…are little stuffed animals and you can get out and read with."

Two students in the TA classroom identified a desk connected to the teacher or the teacher's table as one of the places they liked in the classroom. They, however, had different reasons for why they liked the space. TA1 liked the desk connected to the teacher's table because it allowed him to work without distractions while TA4 liked the items on the teacher's desk and the comfortable seating in the areas, "Her chair is comfy. So, when she is not sitting in, there I sit, just sit in it." Some participants in LB classrooms shared sentiments similar to those shared by participants in TA that they liked sitting close to the teacher at the rug away from friends so that they would not be distracted.

A small number of participants in the two groups of classrooms said they liked some places because they gave them opportunities to work with other students. This was mainly evident in teacher-centered classrooms. Several participants like TA1 and TA3 talked about their teacher and friends in their discussion as what they liked about their classroom environment or their pictures. Only two participants from the learner-centered classrooms shared similar views in relation to the question. The comments below illustrate participants' views:

TA2 – "Then this one is where like my friends and stuff would meet up to read with each, to each other."

TA4 - "This is the math game area...it… helps me spend more time with my friends and help them to learn more math and help me to learn more."

TB4 – “I like like, where like where we… in the morning when we sit down for morning meeting we pass around that stick over there and we, and we talk about what we did for the weekend.”

TB3 – “When we sit down on the carpet and learn phonics. When we get our dry erase boards and we get our markers, and she has to tell us a word, and we write it…on our dry erase boards.”

LB1 – “I am going to say that although there are a lot of like groups…where people are like involved they still learn, and they correct their mistakes. Like everybody does that.”

Another common thing some students in both groups liked was flexible seating or opportunities to move. For instance, TB2 liked the, “lower table because you don’t really, you can actually stretch your legs.” TB4 in talking about one of her pictures said, “That’s where we did that thing, and we usually like once we are done doing boards we, we usually get…she puts things on the board, and we dance to it” and TA3 liked one of the chairs in the classroom because it could rock. In the learner-centered classrooms LA3 said she liked the SMART Board® because, “That’s where I get most of my wiggles out because we do GoNoodle®, and also we get to watch videos that are really fun.” LA4 said he liked recess because, “Did you know that umm you can’t live umm actually you can but umm you won’t be very smart if you have never played before?”

A number of students from the two groups identified materials in the classroom as something they liked and provided different reasons. TA4 said the math game area helped him to learn more; TB1 said some materials in the classroom helped him “to do stuff.” TB2 shared that, “You can get clocks if we are working on time.” TB4 shared that, “We can use these blocks to build something.” TA2 talked about “making stuff, making pictures.” LA4 said, “And also you

get smarter because if you are learning how to build and there is [*sic*] blocks out there, so you can learn how to build different stuff, different designs. And, umm it's sort of a challenge to get you smarter because you have the blueprint in your head, umm you don't have a blueprint actual blueprint."

Some of the elements participants liked were similar. For example, one participant liked a quiet place where he could play with a friend,

> Like right here sometimes me and my friend C may we would place a jacket at the hook and then make enough room for us to like get under. Because then it's like… because then it's like quiet, and we can have like some alone time with each other" (TA2).

Similar sentiments were shared in the learner-centered classrooms by LA4, "There is like this corner where there is books, and by table 4 too, and, umm I like to build there sometimes because no nobody hardly goes there, so I have a little private spot so nobody can just run through and knock down my castle or something, umm knock down whatever I am building." This idea of private or secret spaces showed up in different ways among the participants.

TB2 was the only one in the classroom who talked about displays as something he liked. His pictures included picture of the hundreds chart and one about coins. In discussing the coins chart he said it, "Shows how we know our cents and stuff." And in talking about the hundreds chart he said, "We can actually know what we are doing." A participant in TA however also shared a picture of the calendar as something he liked in his classroom, and one in LA talked about a display in one of her pictures. More participants in learner-centered classrooms however identified displays as something they liked in the classroom. Additionally, they also showed more awareness of the purpose of the displays and seemed to use them more when compared to students in teacher-centered classrooms. This was more pronounced in LB classroom. LB1 said,

“She has examples like writing goals, like how we do our plans...” One of LB2’s photographs was the morning station display, and as she talked about the picture she said, “So, one will be right here, two will be right here, and three will be right here, and four will be at the bottom, and five will be at the top. Oh I, so, it tells you where you are going that day.”

Easy access of materials was an important concept found mainly in learner-centered classrooms. According to LB4, one reason he took a picture of the area at the rug was because “When you need materials or if you are just wanting to play a game you can go there and grab.”

When TB4 talked about a picture at the rug she said, “That’s where we get to, we grab those stuff, and we get to do activities over here.” LA4 and LA3 played games during observations, and LA4’s photographs also showed active engagement. LB2 shared, “The geoblocks basically you can build stuff with it so, if you wanted to build a house you would take those square boxes …the square blocks you take it and put it in a shape, and then you may continue building make it tall.”

Similar ideas related to classroom management were found in both learner-centered and teacher-centered classrooms in the interview data of two participants.

LB1- “I am going to say the way that we have the tables situated where we have people… the people that and we are not going to get too crazy with [*sic*].”

TA1 - “And then that’s my like… I took it because no one can cheat.” TA1 was talking about a picture he took of his desk.

The focus of the participants about classroom management was however different. While the students in the learner-centered classroom seemed to be interested more on controlled classroom interaction, the students in the teacher-centered classroom seemed to be more interested in individual activities or learning.

In response to the interview question of what they liked and disliked about their classroom physical environment, some participants talked about factors that were not directly related to the classroom's physical environment. For instance, LA2 shared, "I would say the stuff that Ms. T. teaches I already know because my mom has taught me a lot, like I even know some multiplication facts."

Similar ways of responding were found in TA, TB, and LB classrooms where the participants chose to talk about their teacher or their friends because that was the thing they liked the most about their classroom. For instance, in response to the interview question of what he liked or disliked about his classroom, LB1 said, "A lot of kindness. That's what I like. That not like any of the learning parts. Kindness is one of the best." The fact that these participants mentioned their teachers and friends in the context of the environment demonstrates the interrelatedness of the social and physical learning environment. Spaces like the classroom environment are both physical and social (Shao-Chang Wee & Anthamatten, 2014; Soja, 1980).

Table 9 provides an overview of places and materials that participants in all four cases photographed.

Table 9

Places and Elements of the Environment that Participants Photographed by Case.

Place	LA classroom	LB classroom	L Total	TA classroom	TB classroom	T Total
Reading area	LA1(two pictures) LA2, LA3, LA4	LB1, LB2, LB3, LB4	9	TA1, TA2, TA3, TA4		4

Place	LA classroom	LB classroom	L Total	TA classroom	TB classroom	T Total
Computer	LA2	LB2, LB3	3	TA2, TA3, TA4	TB1, TB3, TB4	6
Displays	LA1, LA2	LB1, LB2, LB3	5	TA1	TB2	2
Math center/ station	LA3, LA4	LB1	3	TA4	TB1, TB2	3
Library/ books	LA4	LB4	2		TB2, TB3 TB4	3
Table			0	TA2, TA3, TA4	TB3, TB4	5
Art and writing	LA3		1	TA2	TB1, TB4	3
Assigned table or seat	LA3, LA4		2	TA1, TA2		2
Rug area		LB1, LB2, LB3	3		TB3	1
Cubbies	LA2		1	TA1, TA2		2
Teacher's table		LB4	1	TA1, TA3		2
Book boxes		LB4, LB2	2		TB1	1
Writing center		LB1, LB3, LB4	3			0
Enclosed space/ small space	LA1 (not directly in picture), LA2		2			0

Place	LA classroom	LB classroom	L Total	TA classroom	TB classroom	T Total
SMART Board®	LA3		1		TB4	1
ELA station			0	TA4	TB1	2
Spaces for science	LA2		1			0
Pet		LB3	1			0
Toys and paper	LA4		1			0
Social studies center	LA4		1			0
Calming zone		LB2	1			0
Book box		LB2	1			0
Small group materials		LB3	1			0
Personal items			0		TB3	1

Where in the Classroom Do Students Prefer to Spend Their Time?

Generally, students preferred to spend their time in parts of the classroom that were comfortable, had flexible seating, and that provided opportunity to work in small groups or alone. This was supported by participants' data in both groups of classrooms. Students' preferences for comfortable spaces were depicted in their pictures, main interviews, and

discussions about their photographs. In the teacher-centered classrooms students, like TB1, shared that he preferred to work from the rug and added that, “It is soft.” Participants in both classrooms also preferred spaces because they were comfortable. The set-up of the place like the size or environmental elements also seemed to matter to them. Participants would usually refer to these a little, small, private, or secret spaces. For instance, participant LB1 in his interview shared that he had three areas he preferred to work from, and he called these, “good good little spots to work at.” He added that the places were relaxing. LA1 also echoed the same idea when she talked about a place she liked to work at in the main interview and the picture interview. She said it was a, “little like place, little space, just this little part here, little place by the table.” However, although participants in the teacher-centered classrooms talked about little places as being comfortable or good for work, they were not as articulate in their expression of their preferences as the participants in the learner-centered classrooms. Some participants in LA and LB classrooms even shared their previous experiences regarding how the spaces they talked about were comfortable or ideal for work.

Flexible seating was also one thing that made participants prefer to work in certain places. In the TB classroom for instance, most of the participants shared they liked working at two tables in the classroom that had comfortable flexible seating. TB2 shared that he would prefer working at this table because, “It’s a good table when I sit down; I could stretch my legs.” TB3 also shared that he liked working from a table in the classroom because, “It’s quiet, and I can get headphones, and I can just rock back and forth in my wobble stool.”

As depicted in TB3’s words above, quiet places without distractions were also a favorite place to work from for participants from both groups. For instance, LA1 stated in the interview that there was no place in her classroom where she did not like to work, and she shared that she

did not like working at her seat when it was close to the place where the class usually had whole-group instruction and a lot of students would be around her seat. She was happy that the teacher had moved her table away from the space. LA1's preferences to work in spaces without a lot of students was something the researcher observed. She observed several participants working in places they did not talk about in the interview or pictures. LA2 shared that he did not want to work at crowded places with a lot of distractions. LA3 shared that she would prefer working in the cubby room because, "It's a quiet place…I really like that." In the LB classroom, LB2 and LB3 were the participants that showed the most preference for areas where a lot of students did not work.

Interestingly, not all participants thought places that other students said were comfortable places were good for them as they work. Participant LA3 shared that a place she would not like to work was the loft because, "I will be kind of scared. It's tree high." She also added that she would be too distracted by the pillows in the loft although they were comfortable. LA3 however shared a picture of the loft as one of her favorite places and mentioned that she read in the loft.

Several participants in both groups seemed to have preference for places where they could work with friends or their teachers. This was mainly depicted in their observation data more than the interviews. Participants like LB1, TB1, LA2, LA3, and LB4 worked at places like the classroom rug with other students during the time they had free choice time or indoor recess. LB4 identified the teacher's table as a good place to work because "if you need help, one of the teachers are [*sic*] there to help you." TA4 also shared the same idea of preferring to work close to the teacher stating that she "just feel safer when I am close to the grown-ups." Additionally, TB1 stated that he preferred working at the rug because he liked working with his friends.

There were a few participants in both groups who shared preference for places where they could actively engage with materials. TA1 for instance identified the cubby room as a place he preferred to work from, but his focus was on the frisbee in the room that he said was “one of my favorite things to play with.” TA3 also worked in the same room during one of the observation sessions, and she was playing a math game with some of her peers. LB3 shared that she liked working at the rug and said “there is a lot of choice that we like...” She listed games, puzzles and other materials as she talked about the rug as a place where she would like to work. Although most of the participants did not talk about learning centers or other places where they could engage with materials as a place they would prefer to work, more than half of the participants in both groups mentioned something related to materials in response to other interview questions or in their photographs. A possible reason for this could be that participants did not consider such activities as work.

In sharing about places they preferred to work in the interview, two participants in teacher-centered classrooms mentioned unique aspects. These were related to lighting and displays. TB4 mentioned that she did not like some displays in the classroom that showed their names because everyone in the classroom at that time knew each other’s names. TA1 also expressed preference for places with more light when working and shared that he would not want to work from the same place when it will be sunny because “the sun gets in your eyes.”

When Studying Various Content Areas (Reading, Math, Science), Which Aspects of the Classrooms’ Physical Environment do Students Think Help Them to Learn?

The interview questions related to the question asked students where they would prefer to write, read, do math, and science. Some of the data were also derived from students’ discussions about their pictures. When asked what they thought, participants in both groups

shared mostly similar ideas for all content areas with a few differences. The same trend was found even in discussions of their pictures.

Writing. With respect to physical learning environment elements that helped them when writing, students in both groups had different thoughts and a few commonalities that were mainly across groups of classrooms than within either of the groups. For instance, many students shared that they felt working at places where they could focus helped them to write more productively. Examples they gave were places where a few people could work at a time. These included little spaces where "there is nothing else around you to distract you" (LA1), where "there is not much noise like screaming or something falling down" (LA4), and that is "really quiet" (TA2). In all, eight students shared this idea in different ways.

Participants also said places where they felt comfortable writing were important. Their descriptions of what made the places comfortable were different across cases. As an example, two participants felt flexible seating that moves was important to them. Both participants were from a teacher-centered classroom. None of the participants in learner-centered classrooms shared this view, probably because both learner-centered classrooms had no seating that moved. One of the participants said he would write in a comfortable chair, "I just want a comfy chair…It just makes me feel like it makes me work better. When I am in a comfy chair, to roll around and then go back and forth" (TB3). The same idea was shared by TB1 that he would write at a table in the classroom because "the wobble stool is right there right now. I can wobble." Another student in a teacher-centered classroom shared that she felt comfortable at her desk when writing, "maybe because that's like the really organized place that I really like because ...I don't like unorganized areas" (TB4).

There were unique thoughts shared especially in learner-centered classrooms. One student said she preferred dark lighting and could work "under the table, that's the most dark spot that I would do it…cause it's not too hot, not too cold…it's just right. It's dark, so I like dark spaces" (LA3). Another student in a learner-centered classroom shared that he would write better if he was sitting with friends saying, "that helps me because if I need help I know who to ask and I …aren't [*sic*] kind of scared that they won't help me" (LB4). Another participant (LB2), felt easy access to materials like paper, markers, colored pencils, and crayons was important when writing.

Reading. Participants in both groups felt comfortable places were important for reading. Thirteen participants talked about elements that were important to make a reading space comfortable in the main interview. They used words like nice and comfy, soft, comfy spot, little, and comfortable to describe the spaces. Several of the participants, especially in LA, LB, and TA classrooms, took pictures of the comfortable places they liked to read in, and these included comfortable chairs, pillows, and stuffed animals. In talking about these photographs, participants in the three classrooms expressed their thoughts on how the elements helped them to read. All the students in LA shared that they liked reading in the classroom's reading loft because it was comfortable, although participant LA3 shared the loft was distracting to her because of the comfort. Two participants in TB shared that the carpet was the most comfortable space in their classroom that helped them when reading. Participants in LB thought their reading space and their tables were comfortable places for reading.

There were participants from both classrooms who stated that quiet areas were important for reading. For instance, LA4 shared that the reading loft was both comfortable and "really quiet and like you can just relax, read, and no one can bother you." TA1 shared that the cubbies in the

classroom were a good place to read “when it’s quiet, and you can read by yourself there.” TA2 also picked two places in the classroom and talking about one of them he said he would read at a table in the room “because it’s not really a popular space.” These spaces were also small at times and some participants referred to them as secret spots. This was common in LB were the teacher gave students opportunity to choose a secret spot for reading for a few minutes in the morning. The participants talked about spaces under the table, between two pieces of furniture, and by some drawers.

Two participants in LA and TB thought flexible seating helped them when reading. LA1 said she liked reading in the reading loft because, “It’s just this comfy spot where you can lie down and just read your book” and TB4 said “there is [*sic*] chairs that you can sit, and then over there you could sit down on the floor and make space. They have carpets that you can lie down or sit on it.”

In talking about one of her pictures, a participant in the learner-centered classroom pointed out that classroom displays helped her in reading. She said, “The reason I selected this part as a taken picture is because you could see we have reading strategies like the long e, and then magic e, long a digraph, long o digraph, long i digraph or controlled words like …then the r words right here…” (see Figure 25). The idea of classroom displays as important for reading was not shared by participants in teacher-centered classrooms. Two participants however talked about books being close to where they are reading as important for reading. In the interview, participant TA3 shared that she liked reading in the classroom’s reading area because she could easily reach out and grab a book from her seat. TA4 also shared the same idea when she said, “My reading level is P, and if I were close to the bookshelf I can grab another book and read it.”

One participant, LB4, was the only one who shared about reading with friends. He shared that if he had a choice for where he wanted to read, he would read at one of the tables with his friend because they had been friends since kindergarten."

Math learning. There was not much difference between teacher-centered and learner-centered classrooms in regard to aspects participants thought helped them with math learning, especially during the interviews. The differences that were noticed were mainly among students across all the cases. One main difference between the two groups was that two students in teacher-centered classrooms thought spaces that allowed them to work alone were important because students did not want other students to copy their work. For instance, TA1 said, "Right where I am right now (desk) because I will have no one like cheating on my paper." TB2 chose a table because, "No one can copy my work."

Students from both groups of classrooms thought places without distractions were important, and these were places that were quiet and away from a lot of activity. Some of their comments are illustrated in Table 10.

Table 10

Places Without Distractions were Important for Participants in Both Groups

Participant	Statement from interview
LA1	"Probably in that little spot again because there is nothing to distract me. And I am just there, and the only thing that I can see is my paper."
LA2	"Because there is a lot of room, and I would say and there is not many distractions [*sic*]."
LA4	"If I am doing math, usually everyone is quiet in the whole room, and they work at their seats. So, it will be quiet no matter where I work."

TA2	"Somewhere where like had…quiet [*sic*]"
TA3	"Carpet – sometimes it's really full, so I don't wanna get really disturbed by anybody, so I can focus on it."

Three students from both groups preferred doing math at their assigned seats. Their reasons were somewhat similar because they all thought their desks were places where they felt comfortable. Two students felt it was a place where they were used to working, and one student felt it was a place where he could see the board well.

One student felt places that were calm helped him to learn math because he sometimes got frustrated. According to him, the classroom reading area was an example of such a place because, "It's really like one of the calmest places in the classroom" (LB1). Students from both groups shared that displays helped them to learn math. For instance, one said if she had a choice on where to do math she would work from one of the teacher's tables because, "If I needed a hundreds chart they are right over at the table, and you can see the number line really good" (LB2). Another student when talking about his photograph of the hundreds chart said, "This is the hundreds chart over there, and it helps, if we are doing a math problem…We can actually know what we are doing or something" (TB2). Displays in relation to math learning were something several students from both groups talked about especially when they discussed photographs that they took.

Science learning. More similarities than differences were identified between teacher-centered and learner-centered classrooms in relation to aspects that they thought helped them to learn science. The most common aspect of the environment identified by participants was the need for room to help them when doing science activities. Half of the participants across cases

identified spaces in their classroom that they thought were conducive for science learning, and in their discussions mentioned that was because the spaces had adequate room. Of the eight participants, five were in the teacher-centered classrooms, and three in the learner-centered classrooms. Some of the participants' comments are noted in Table 11.

Table 11

A Lot of Room was Important for Participants in Both Groups for Science Learning

Participant	Teacher-centered classrooms	Participant	Learner-centered classrooms
TA4	"Science projects are messy, and we need a big space for all that mess too."	LA1	"There is more room for me to use things."
TB1	"There is more room, easier to clean if it gets messy."	LB2	"Because there is more room at the rug than at the tables."
TB2	"There is more room to move around your arms, and not a lot of people sit there during projects."	LB4	"Most of the times I would do a science project on the carpet because that's the biggest spot space if you are making something big."
TB3	"We have more room, and I would get like a big poster board or something, and then I would write on that."		
TB4	"Because that's		

Participant	Teacher-centered classrooms	Participant	Learner-centered classrooms
	where you get more space where you can do things, like so everybody can put their things down, like there is more seats that you could work with them, and there is space that you could do…[*sic*]”		

There were two participants, one from each group of classrooms, who thought seating that allowed them to work alone or with a small group would help them to focus. One of the student’s comments was that he would prefer doing science at his table, “When there are not many people” and “where I am far apart from different people” (LA4). The other participant stated that he would prefer to do science at a desk where he could work alone, “so I can really concentrate and put it together” (TA1).

A small group of participants from both groups, as noted in Table 12, thought when they do science they should work with other students or their teacher. Their comments revealed that they wanted an environment that allowed for such learning experiences. Two of the students were in the LB learner-centered classroom, and one was in the TB teacher-centered classroom.

Table 12

Working with the Teacher and Other Students was Important for Participants in Both Groups for Science Learning

Participant	Teacher-centered classrooms	Participant	Learner-centered classrooms
TB4	"Because that's where you get more space where you can do things, like, so everybody can put their things down, like, there is more seats that you could work with them, and there is space that you could do…[*sic*]"	LB1	"We are all doing it as a group, and we can kind of talk about how we are doing it."
		LB4	"The teacher's table over there, because if I need help with a science project, she will help me"

According to three participants in both groups, comfortable seating was also important for science learning. One of the participants identified a part of her classroom that she said was ideal for science because it had, "a little chair right here. It's comfy" (LA3). Two of the participants who shared similar thoughts were in learner-centered classrooms, and they said, "Like right over here sitting on one of these chairs. Because probably that's gonna

be easier for me to sit down and be relaxed" (TA2). The other participant said she would do science at a table with a "comfy chair" (TA3). One participant from the learner-centered classrooms had a view that was completely different from the other participants. She felt that spaces that were dark were good for science learning. She said she would like to do science in a room that was connected to the classroom because, "It's dark; it's the perfect spot for me" (LA3).

Which Aspects of the Physical Learning Environment Contribute to Students' Sense of Belonging?

Participants from both groups of classrooms were aware of aspects in their physical learning environment that gave them a sense of belonging, and this was evident in their responses to the interview questions asking about aspects of their classroom that made them feel good or not good. Answers to this question also came from the data from participant discussions about their photographs and the photographs themselves when the participants implied something to do with their sense of belonging. Some similarities and differences were identified between participants in the two groups of classrooms.

Mostly participants in learner-centered classrooms identified aspects that made them feel comfortable as positively affecting their sense of belonging. Some of the words they used to describe how they felt in those places were really calm, relaxed, happy, comfy, and comfortable. Participant LA1 shared that she felt good in the loft because it was a comfortable place. She shared a picture of families in the loft and explained that it helped them know about each other. LA2 shared that the cubby room was a place that helped him feel good, and he goes there after a bad day to calm down and to feel inspired. LB4 shared that his reading spot was one of the places where he felt good. This was a place the teacher asked students to select as a secret spot to

read a few hours each morning. LB4 said his spot was under his table and, “No other table is a table I feel most comfortable, because that one is where all my buddies sit.”

A similar idea was shared by LB1 when he talked about the ‘cool down spot” in the classroom. He described items in the space and added, “If you wanna know this about me, I actually love soft things.” He explained that soft things helped to calm him down and made him feel comfortable in the place. One participant in TB shared that the calming zone in her classroom gave students a sense of belonging. She shared that she had never used the place but was glad that, “If someone gets mad, they go there, so then they really don’t get mad and will get involved in more things” (TB3). She described the items in the place as comfortable and calming.

Two participants in the teacher-centered classrooms and one in the learner-centered classrooms shared that they felt good when they were close to their teachers. Their reasons were similar. TB3 said she felt safe close to her teacher, and LB4 shared that his classroom made him feel good and it was, “The best I could ever be in, because the teachers in here are really good to us, and everything in here is made to look happy.”

Some participants in both groups of classrooms shared that places without distractions gave them a sense of belonging in the classroom. These were TA2 and LA4. TA2 shared that he didn’t feel good when he was around people who were loud and who could get him into trouble. LA2 shared that the reading loft made him feel good because it was a place without distractions and where he could not be, “annoyed by some people and all that stuff.”

In both groups of classrooms, students expressed preferences for calming spaces. Their pictures and interviews illustrated this. In LA classrooms LA2 talked about the cubby room, and in TB classrooms, almost all participants talked about the calming zone as a space they felt was

important for their sense of belonging. Participants in LA and TA classrooms probably did not talk about it because the place was not available in their classroom. For LA2 it seemed this was a space that he created for himself. The teacher probably did not design the space as a calming zone. It was like other spaces participants created in the classroom to meet their needs, like the space participant TA2 created in the cubbies and behind the chair in the reading area for privacy.

Which Aspects of the Physical Learning Environment Do Students Prefer to Be Changed?

Participants' views of what they wanted changed in their classroom's physical environment were very diverse. Some of the expectations were unrealistic. There were not many similarities or differences for students in the teacher-centered classrooms or those in the learner-centered classrooms. One unique aspect shared by participants in teacher-centered classrooms that was not in the learner-centered classrooms was the need to change and reorganize displays in the classroom. Also, the need to add displays that appealed to the students' interests like horses and dinosaurs was shared. Concerns regarding aspects related to student behavior and displays were only raised by participants in teacher-centered classrooms. Table 13 provides a summary of views of participants from the two groups of classrooms.

Table 13

What Participants in Learner-centered Classrooms (LA and LB) and Teacher-centered Classrooms (TA and TB) Preferred to be Changed

Participant	LA	LB	TA	TB
1	Adding an invention to help students with their work	Nothing	Nothing	Nothing
2	More room in the classroom and in the reading area so there will be more personal space	Adding bathrooms to the classroom	Removing some of the displays in the room and replacing them with dinosaur-themed displays and adding dinosaurs to the classroom	Items to reward students for positive behavior
3	A free candy machine and more recess time	Removing a draft book	Removing old Charlie Brown displays in the classroom and replacing it with horse-related displays	Reorganizing materials in the classroom to create space for storage of materials by the teacher Moving the calming zone to a different part of the classroom where there was more room and away from the teacher

Participant	LA	LB	TA	TB
4	Removing a table in the classroom because it was too close to the large group instruction area, and there was a lot of activities going on at the table which made it too distracting to work there. Adding a solar system model to the classroom to help students learn about the solar system	Nothing	Adding more seating to the reading area so that more students could work from the space at a time. Removing some displays that students did not use	Adding cameras in the room to record unacceptable student behavior Reorganizing some of the displays so that content related materials would go together

Emerging Themes

Five themes emerged from data collected to answer the research questions. According to Saldaña (2013), a theme is “an outcome of coding categorization, or analytic reflection not something that is, in itself, coded” (p. 14). These themes were developed from the ideas shared

by students, their photographs, and the observations. The five themes that emerged from the data are: access and meaningfulness, active learning, comfort, learning community, and management. These themes partly overlap. Each of the themes and related data are discussed in turn below.

Theme 1: Comfort. The theme of comfort emerged as a very significant theme in the study. This theme was evident in the responses of participants from all the four cases. It was a shared belief that the classroom physical learning environment comfort level was an important factor for students. It emerged mainly from interview and photograph data, and the researcher's observations confirmed some of the aspects participants talked about in the interviews. Comfort to the participants encompassed both physical and emotional factors that students believed contribute to a positive comfort level in the classroom. These included spaces that students felt were designed for them, spaces and materials that provided privacy, aspects that helped them focus on learning, and aspects that provided emotional well-being. Closely connected to comfort was participants' individuality.

Although some participants identified more than one aspect in their photographs, of the photographs that students took (n = 83), 32.5% were of places that illustrated the theme of comfort. The main photographs connected to this theme were of the reading center in LA, LB, and TA classrooms. Other photographs that illustrated the theme were of the calming zone, cubbies room, rug area, personal items, displays, and students' assigned seats. When participants talked about their pictures of the areas, they shared that what made the places their favorite was an aspect of comfort and more specifically physical comfort. The reading area in LA for instance was considered by all participants a comfortable place, and each of them took at least one photograph of the area. Most of the pictures focused on specific parts of the general area such as a comfortable seat, a stuffed animal, soft lighting, or other homelike elements. Many of the

participants used words like comfy, comfortable, calming, or nice when talking about these comfortable aspects.

Participants' individuality was very evident in their perception of comfort in their environment. No single definition of comfort could fit every participant's view. For instance, for some participants it included places that were calming or had a certain level of lighting. Some preferred more light while others wanted less light. The preferences for lighting also differed depending on the activity.

Comfortable spaces were also spaces that were small, hidden, and without distractions. Comfort also involved personal items and was a combination of physical comfort and emotional comfort in most cases. The physical aspects in a space made participants feel emotionally comfortable. At times the effect the physical environment aspects had was also influenced by students' experiences and background as illustrated by LB1's comments shared earlier about how the lighting in the reading area reminded him of being at the beach.

Some participants, like LB3, had a different perception of comfort. She was not comfortable in the reading area where most of the participants in her classroom felt comfortable. She shared that she felt shy in the reading area. LB3 was a new student, and she may have felt uncomfortable being in a space where her peers were close to her. LA2 shared similar feelings when he talked about the reading area in his classroom. He enjoyed it as a comfortable space because of the homelike elements but felt they needed more room in the area.

According to participants, comfortable spaces and other aspects of the environment were usually small. There was a strong connection between size and comfort. Most students used words like little, small, and tiny when talking about aspects of the environment that they liked, preferred, or that gave them a sense of belonging. For instance, participants in LB shared about

their secret spots where they read in the morning. These included spaces under the table, between two pieces of furniture, and by some drawers.

Theme 2: Access and meaning.

Importance of easy access to materials and meaningful displays. This theme, gleaned from the data, was that easy access of materials and other resources was a key factor in environments that students felt supported their learning. It included participants' thoughts related to instructional displays that were meaningful to them, materials that were easy to access and transport, and organized spaces in general. Many participants in the study demonstrated an understanding of these aspects of their environment.

Participants preferred displays that were meaningful to them and organized, and this part of the theme was mainly evident in teacher-centered classrooms (TA and TB) where participants expressed their dislike for some of the displays in their classroom. Participants did not like displays that were not relevant to them. One participant in the TB classroom, TB4, shared that she did not like a display because it was no longer relevant to the needs of the students or serving the purpose it was created to serve, and that some of the displays had different content areas mixed up.

Students also had ideas for displays that were more meaningful to them as displays that were aligned with their interests. For instance, TA2 shared that he would remove some displays in the classroom and replace it with dinosaurs and he would also add other dinosaur-themed peripherals to the classroom. TA3 wanted Old Charlie Brown stuff removed and replaced with horses.

Seven participants took pictures of displays as part of their favorite parts of the classroom environment. These included time cards, hundreds charts, writing strategies, graphs, and other

displays that helped students work on tasks. Some participants in both groups, but mainly in learner-centered classrooms, found the displays very helpful and they used them during tasks. This was shown in participants' pictures and confirmed in the discussions and in some observations. For instance, TB4 talked about displays that helped her know different coins. LB4 said writing goals and the math displays helped to remind him of things that he might forget as he worked. Displays also helped them during transitions and guided them.

Participants were also pleased to have different materials in their classroom that they could access and use when they needed them. During observations in LA and LB classrooms, participants carried materials from different parts of the room to the rug and different open spaces in the room. LA2 and LA3 mostly worked at the rug or a table. LB2 at one point in the interview shared that she liked working at the writing center, and she could have options of coloring materials and paper readily available at the center. She also talked about her preference for working at the teacher's table because it was a place she could easily see the displays as she worked. TB3 also shared she would get a poster or other materials and work from the rug.

Theme 3: Active learning. Participants in the study were well aware of the different materials in their classrooms and how they could foster their learning and development. Learning that might be most beneficial to individual students can be acquired through informal ways and not only through direct instruction (Schugurensky, 2006). Several scholars have also argued for the positive effects that actively engaging students can bring to young students' development (Milkie & Warner, 2011).

Most of the participants who talked about learning materials in depth, except for TB4, were in the learner-centered classrooms. Students in the teacher-centered classrooms probably did not talk about certain materials and aspects of their physical learning environment because

they were not aware of the aspects due to the design of the classroom and the pedagogy the environment promoted. According to Kangas (2010), “people don’t act in an objectively extant learning environment, but rather act, respond to and interpret the environment as they subjectively perceive it” (p. 207). Their interpretation of the environment was therefore limited to the experiences they had in the classroom or the quality of their classroom’s physical learning environment. LB1 and LB2 talked about using clocks when working on time, coins, and using blocks for building tenths, hundreds, and different math-related activities. Participants also talked about some of the materials in their classrooms as materials they could use for sociodramatic play and other forms of play.

Participants’ photographs also illustrated this theme. Many of the participants’ photographs were of related aspects of the environment that allowed for active engagement. Six of the photographs were math centers or stations, four were art and writing materials, one was the social studies center, five related to the writing center, and one was of another literacy station.

Theme 4: Learning community. This theme captured participants’ preferences and desires for spaces where they could engage with their peers and their teacher. Most of the participants showed need for a balance between spaces where they could work alone and spaces to work with other students. Others wanted more of the opportunities to work with friends, and it showed as their personality or learning preference. For instance, LB1 talked about his classroom groups in the interview as opportunities for learning and gaining feedback from peers in a safe environment.

Participants’ pictures also showed this theme. For instance, LB3 had a picture showing small-group rotations, and LB4’s picture was of the carpet used in the classroom as the whole

group gathering space. He said he liked the space because he felt happy to be around people he knew. TB4's picture was of the math game area, and she shared that it helped her spend more time with her friends and helped them to learn math and science. One of TA2's pictures was of a table in the classroom, and he talked about the table as a place he could work with his peers. Observations, especially in LA and LB where the researcher had more opportunity to observe participants during free choice time or indoor recess, also showed participants working with peers mostly at the rug in their classrooms. There were also incidents when participants worked at tables with materials with their peers.

Students in both groups of classrooms valued access to teachers or an adult to help them with work. For instance, when the researcher asked LA1 what she wanted to be changed in her classroom she shared she would make an invention that would help her with completing work faster than waiting on the teacher. This was an idea also found in TB and LB cases where students wanted to sit at the table with the assistant teacher or teacher so they could easily get help when they need it.

It seemed in the traditional classrooms, parts of the classroom, as well as the students, operated as units. The environment did not encourage collaboration and working together as the interview responses of some of the participants showed. Participants preferred to work at individual desks so that their peers would not copy their work. From the students' view, the focus in the classroom environment was on content and classroom management or order. In talking about their classrooms, participants in the learner-focused classrooms shared opportunities they had to work with other students, with their teacher and not in a competitive way. Generally, many of the participants enjoyed opportunities to work together on tasks.

Theme 5: Management. A theme that emerged mainly from teacher-centered classrooms was the use of the physical learning environment as a tool for classroom management. For these participants, their perspective was mainly from the view of how the teacher used the physical learning environment for guidance. The physical learning environment had to work for the teacher, and it was manipulated by the teacher to fit needs for classroom management or guidance.

TB2 shared that there was a rule in the classroom for only four or five students to read at the rug, and they were supposed to sit at the corners so they would not talk to each other. According to TB3 this rule did not always work out because students moved closer to each other to talk. During one observation in the TB classroom, the researcher noticed participants moving closer to their peers during times allocated for reading. Participants also talked about how seating was assigned and other ways the teacher used the environment to guide students. According to participant LB1 their teacher assigned seating at the tables in such a way that students would sit with peers who would not distract them. TB4 suggested adding cameras to the classroom to record disruptive behaviors in the classroom. Another participant in the same classroom also talked about bringing back a jar that the teacher used to encourage positive behavior. She identified the jar as something she wanted to be added to the classroom. The main themes are summarized in the Figure 86.

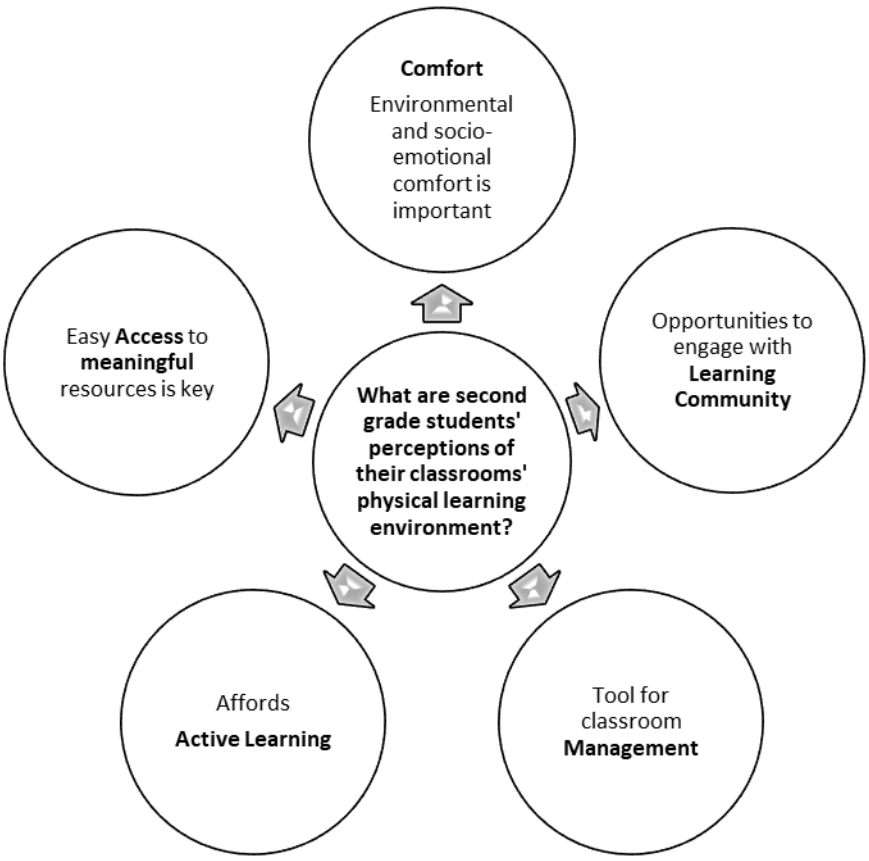

Figure 86. Main themes

Summary of Chapter 4

This chapter presented findings from the study beginning with a narrative of findings from each case in the first section. The last section of the chapter provided a cross-case analysis and ended with a discussion of the themes that emerged from the study. The following chapter discusses implications of the findings, study limitations, and potential areas for further study.

CHAPTER 5

SUMMARY, DISCUSSIONS, AND RECOMMENDATIONS

This chapter presents a summary of the study and the findings. It includes a discussion of how the findings contribute to the profession. A discussion on recommendations for educators and future research possibilities follows with a final discussion of study limitations and concluding statements.

Purpose of the Study

The purpose of this qualitative multiple case study was to explore and understand the experiences and perceptions of second-grade students of their classrooms' physical learning environment in four classrooms in three school districts in Northeast Tennessee. The classroom's physical environment is an important part of students' learning experiences and serves as a tool for teaching. It fosters both young students' development and learning (Ferguson et al., 2013; Olds, 2001; Ralph & Eddowes, 2002; Reutzel & Jones, 2013).

The physical learning environment influences social interaction (Evans 2006; Marx et al., 1999) and students' general well-being (Killeen et al., 2003; Mäkelä et al., 2014). Messages that can influence student behavior are sent through the classroom environment teachers create for their students (Bredekamp, 2017; Bullard, 2014; McGinty et al., 2013; Pointon & Kershner, 2000; Tanner, 2008). The classroom's physical learning environment has a significant influence on student learning in different content areas (Barrett et al., 2015, 2017; Tanner, 2008). The learning environment design is also reflective of the teacher's beliefs regarding how young children learn or best ways of teaching (Nislev, 2015) and is a part of the learning process that teachers can easily adapt to fit the needs of students in their classroom.

Summary of the Findings

The main research question that this study sought to answer is:

What are the perceptions of second-grade students about their classrooms' physical learning environment?

Subquestions are:

1. What do students like about their classrooms' physical learning environment?

2. Where in the classroom do students prefer to spend their time?

3. When studying various content areas (reading, math, science), which aspects of the classrooms' physical environment do students think help them to learn?

4. Which aspects of the physical learning environment contribute to students' sense of belonging?

5. Which aspects of the physical learning environment do students prefer to be changed?

The researcher adopted a constructivist perspective and used data collection methods that were appropriate for second-grade students and enabled participants to be actively engaged in the data collection process. The methods of data collection used in the multiple case study were inspired by the Mosaic approach (Clark & Moss, 2001). Data were collected through interviews, participant-generated photographs, and observations of participants working in their classrooms. The data were then analyzed starting at case level then across the two groups of cases. Details of the two stages of analysis were presented in Chapter 3. A brief summary of these findings is presented below question by question.

What Do Students Like About Their Classrooms' Physical Learning Environment?

Many students liked their reading areas and working at computers. More students in the teacher-centered classrooms than the learner-centered classrooms took pictures of computers as their favorite parts of their classrooms. Another area of difference between the two groups of classrooms was that mainly students in the learner-centered classrooms shared that they liked parts of their classrooms because the parts provided them easy access of materials.

Most of the participants in both groups liked the computer area because they could play content area-related games and read and listen to different types of books. They liked playing math games on the computers and using the computers for research. Aspects described in interviews that students shared regarding their preference of the reading spaces in their classrooms was mainly because reading areas were comfortable. They identified aspects like cushions, comfortable seating, stuffed animals, and the lighting in the area. Another common aspect about the reading area was that it was quiet, and many of the participants in both teacher-centered and learner-centered classrooms liked areas that were quiet and provided opportunities to work alone or with other students. Participants in both groups, and mainly in LB and TB classrooms, also identified displays in their classroom and materials that were related to their interests.

Where in the Classroom do Students Prefer to Spend Their Time?

Parts of the classroom that were comfortable, had flexible seating, and that afforded opportunities to work in groups or alone were identified by participants as places they preferred to spend their time. Students in the two groups shared very similar perceptions on this although students in the learner-centered classrooms were generally more articulate when talking about their preferences. Participants' photographs in both groups showed spaces such as rugs and

different types of seating. They also identified parts of the classroom where a few students could work at a time. These included reading areas, cubby rooms, and small spaces in the classroom. A couple of participants however expressed dislike for parts of the classroom that other participants in their classrooms had identified as comfortable. In all four cases participants' individuality was very evident in their preferences. Several preferred to spend their time in parts of the classroom with displays and materials that they liked. Generally, there was some variation among participants' descriptions of parts of their classroom where they preferred to work.

When Studying Various Content Areas (Reading, Math, Science), Which Aspects of the Classrooms' Physical Environment do Students Think Help Them to Learn?

Participants in both groups of classrooms thought places in the classroom that helped them to focus and that were comfortable helped them to read, to write successfully, and to successfully do math. These were parts of the classroom with little or no distractions, and such classrooms usually had comfortable seating or seating that was flexible and could move in place. Some participants shared that they preferred different work spaces where they could work with their friends or teachers. This was a finding in both groups. Participants also identified classroom displays with strategies for reading or math as aspects of their classrooms that helped them to learn. This was very pronounced in the LB classroom. They talked about this in the interviews and showed these aspects in their photographs. Additionally, easy access to materials or convenience was another aspect that participants in both groups identified as important to them. For science learning, participants highlighted that parts of the classroom with a lot of room and that were easy to clean were important to them.

Which Aspects of the Physical Learning Environment Contribute to Students' Sense of Belonging?

Participants in the two groups of classrooms talked about aspects of their classrooms that they associated with positive emotions or their personalities. They identified parts of the classroom where they felt comfortable because of the design and at times because the specific places gave them opportunity to have some privacy or time to themselves. This included places like the reading area, the cubbies room, and small spaces in the classroom. One of the most common areas participants in TB and LB talked about in this regard was an area in the classroom created by the teacher to help students to calm down. Working with friends and teachers or aspects of the social environment of the classroom was shared by participants in both groups.

Which Aspects of the Physical Learning Environment Do Students Prefer to Be Changed?

Participants in both groups had varied ideas on what they preferred to be changed in their classrooms' physical learning environment. Many shared that they liked their classroom as it was and did not want to have anything added or removed. Other participants in the teacher-centered classrooms however preferred some displays removed and replaced with items that were of interest to them such as dinosaur and horse pictures. Another thing the participants in the teacher-centered classrooms preferred to be changed were displays that were not meaningful to them. This was mainly found in the teacher-directed classrooms and not found in the learner-centered classrooms. Others wanted to change aspects that would make their access to resources or facilities easier.

Discussion of Findings

This study has identified five main themes in relation to second-grade students' perceptions of their classrooms' physical learning environment answering the main research

question. These are access and meaningfulness, comfort, active learning, management, and learning community. The study found that generally participants believed classroom environments that were best for them were meaningful to them and offered easy access to resources and materials. Both physical and emotional comfort were important to participants, and many were drawn to parts of the physical learning environment that facilitated active learning and social engagement as they learned. Participants also perceived the physical environment as a tool that their teachers used for classroom management and guidance. The themes in this study are interwoven even though they were discussed separately in Chapter 4.

Findings from the study showed a lot of similarities and little differences between perceptions of students in the two groups of classrooms, teacher-centered and learner-centered. The major difference was that students referenced aspects that were in their classrooms and seemed to be generally influenced by their experiences or contexts so would not talk about aspects of which they were not familiar.

Although there were common themes that emerged from the data, participants' perceptions were generally varied depicting their individuality. According to Shao-Chang Wee and Anthamatten (2014), children's experiences of their environment are different depending on their "social and physical context" (p. 88). In their study on children's culture of play, they concluded that the culture of play is "individual, social, and ultimately contextual" (p. 90). This is consistent with findings in this study where perceptions differed because of participants' backgrounds and experiences. These results were similar to those reported by Einarsdóttir (2005). In that study with participants 2–6 years old, they had perspectives that were similar and some that were different from their peers.

It is important for adults to be aware of this and try to observe and know what the students in their classrooms need so they can create such spaces for them or spaces that are flexible enough for students to transform into their own spaces in a way that enhances their learning and development. Giving children such opportunities can enhance their sense of ownership and autonomy. This observation is consistent with findings from Rasmussen (2004) and Moore (2015).

Moore's (2015) study found that children create secret, or their own, places in the outdoor space, and this is something this study found occurring in an indoor space. In Rasmussen's (2004) study, children talked about outdoor spaces that were meaningful to them. These were spaces such as corners that adults did not notice. In the present study on the theme of comfort, one of the constructs was privacy. Some of the participants valued private places that they created in the classroom. This was very much so in the LB classroom where the teacher had asked students to pick a secret place to read each morning. Participants brought this up in interviews, and they called these "secret spots." Some of these secret spots were under the table, between two pieces of furniture, and by some drawers in the classroom. Some of the participants in the other classrooms also talked about similar places.

In the LA classroom several participants talked about a place by the loft, an enclosed place, and mailboxes, referring to a small space by the mailbox where they liked to work and do different activities. While in Rasmussen's (2004), and Clark's (2007) studies such places were created by children for play and were outdoors, in this study such places were mainly considered by students as ideal work places where they could work without distraction or focus on a task like writing, math, or reading. This was common among participants in both groups of classrooms.

Similar to Rasmussen's (2014) study, participants also created these secret places for privacy or to have personal time with friends such as in one of the participant's description in a teacher-directed classroom who created a place in the cubbies with coats so that he and his friend could have personal time to play away from the rest of the class. In Clark's (2007) study with preschoolers, children also created places "to be quiet in noise" that is very similar to what some of the participants in one of the teacher-centered classrooms did.

According to Sunday (2018), "a flexible environment moves with children's interests and ideas and deepens experiences" (p. 5). Flexibility in a primary-school environment might be challenging because there are policies and state standards to be followed in the curriculum, but teachers still have room to incorporate flexibility in their classroom environment through learning centers and stations for instance or by being intentional about having materials and resources in the classroom that allow for flexibility and use. This was displayed in the study when participants in LB and TB classrooms shared that they had blocks that they could use for math and for play. One participant in the LB classroom went on to give an elaborate account of an experience she had using the flexible materials (blocks) in a flexible space (the carpet/rug) for play. The environment was so flexible that she could incorporate personal belongings to her play experience that she brought from home. This is in line with the constructivist theoretical framework guiding this research. If we believe that children construct their own knowledge, then they should have rich physical learning environments that will foster those experiences.

One of the main themes drawn from this study was comfort. Parallels can be drawn to the results of a study with Finnish students on their ideal school environment (Kangas, 2010). The concept of environmental comfort was very evident in the findings with 49% of participants identifying factors related to comfort, such as need for more space in the classrooms and around

the school, and comfortable furniture and lighting. Although the participants' perceptions were targeted at the whole school, parallels can be drawn in the findings.

In Kangas's study (2010), participants also expressed desire to use technology like computers and the Internet. In this study, many participants identified computers as something they liked about their classroom environment or as something that helped them to learn. Participants in Kangas's (2010) study also identified social and emotional factors as important for their ideal school. Although questions of the current study focused on the physical environment, several participants mentioned or discussed aspects related to the social and emotional environment in their perceptions of their physical learning environment. The findings of a few studies provide insights into how young students in the elementary grades are aware of the effect of their classroom's physical learning environments and can express views on issues affecting them (Barrett et al., 2011; Kershner & Pointon 2000).

Overall, this study supports the findings of other similar studies and strengthens the idea that the physical learning environment influences learning and sends different messages to students who work in those spaces. Although the study focused on second-grade students, the findings may well have a bearing on physical learning environments in older grades or younger grade levels. The findings of this study enhance our understanding of what young elementary students think about their classroom's physical learning environment and the aspects that are important to them.

The results add to the rapidly expanding field of research with children in education and other areas of study showing the need to conduct research with students on matters that have a direct influence on their lives (Gill et al., 2008; Harcourt & Mazzoni, 2012; Loizou, 2011; Mitra 2008). Findings from such studies and the current one make several contributions to the area of

elementary-level early childhood education classroom experiences and experiences of young children in general.

Recommendations for Future Research

The study findings support several implications for future research. Based on the findings of this study in relation to current literature examined for this study the following is recommended:

- Further studies should be conducted such as comparative studies with children of different cultures on elementary-age students' perceptions and preferences for their classroom learning environment. This in in line with Einarsdóttir's (2005) assertion that looking into "the social and cultural context in which" children live is important to get a complete picture of children's views and knowledge (p. 207).
- Further studies should be conducted analyzing how gender might be an influence on students' perceptions. More specifically, studies on the influence of gender on elementary-age students' perceptions and preferences for their classroom physical learning environment should be done because research shows differences in how high-quality early childhood experiences benefit boys and girls (Garcia, Heckman, & Ziff, 2018).
- The current study included classrooms that scored the highest and lowest on the APPEAL scale which is designed to measure classroom physical learning environments on a continuum of teacher-centered/traditional to learner-centered/constructivist practices. Further studies using the APPEAL rating scale (Evanshen & Faulk, 2019) are needed to see if classroom physical learning

environments that are more teacher-centered/traditional or learner-centered/constructivist are more effective for elementary-age students.

- Comparative studies can also be carried out with participants in classrooms where the creation of the physical environment is influenced by different curriculum approaches, initiatives and philosophies such as Montessori curriculum, initiatives such as charter schools with a specific focus like STEM, and schools that embrace philosophies such as constructivism.
- There is also need for similar studies working with classrooms that are more inclusive. As more and more students join regular classrooms (inclusion), there should be research focused on the needs of children with special needs who are in the classroom or an environment that will serve an inclusive population of students. Such studies could allow teachers to become more sensitive to differences in children's needs that could potentially affect their learning.
- In future studies data could be collected on the relationship between the aspects of the classroom physical learning environment that participants identified as important and how it influences their learning. Participants in all cases showed high preference for computers and the computer area and engaging materials. It is important to conduct future studies incorporating elements of information technology like computers in the early elementary-grade classroom and materials the engage students in active learning and find out how it influences their learning.

Recommendations for Teachers

The findings of this study have several practical implications for teachers. This study has shown that young students in the second grade are very aware of their classroom physical

learning environment. Findings offer a way for teachers to think about second-grade students as actively affected by their classroom physical learning environment and how the environment can be designed to support the diverse needs of each student in the learning space. Teachers can use findings from the study as a starting point in designing classroom environments that are engaging for young learners.

Additionally, study findings communicate how students are aware of, and affected by, their classroom environment. This can help teachers to be intentional about creating a classroom physical environment that better meets the needs of students. The study findings may help teachers focus more on the unique needs of their students and be more aware and considerate of the unique needs of the main users of the classroom: the students.

Teachers may need to consider assessing the classroom physical learning environment more from the perspective of their students rather than their own adult view. They may want to consider examining if there is something the students are experiencing that is influencing their learning. For instance, one participant in the study talked about installing a machine to help with homework because students get tired raising their hands to get the teacher's help. Teachers may need to listen to children's expressions and thoughts and ponder their ideas to determine if there is something they can do to further support student learning. For instance, the furniture set up may need adapting to afford easy access to get to students when they need help. Teachers should engage their students in conversations about their experiences and preferences in their classroom physical learning environment in an effort to support learning.

While the results and suggestions offered from this study are not a prescription of what a second-grade classroom should look like, students in this study do not have much power for decisions related to their environments as noted in other studies (McEvoy, 2014; Shao-Chang

Wee & Anthamatten, 2014). Teachers should consider making time to understand and appreciate students' perspectives on the spaces they use and incorporate the information they learn from students with what they know from research on best practices when designing their classroom's physical environment. The teacher is the facilitator and guide for the learning process; however, preferences from young children on their classroom physical learning environment should be considered and possibly adopted. Students should have some choice in the classroom as to where to work in the environment that fosters academic motivation and increases students' chances of success on tasks. The teacher, however, should remain the guide and not leave students to do anything they want (Dewey, 1990).

Teachers can use what they know about interests of students in their classroom to inform decisions about the design of the classroom physical learning environment. This could be in such areas as the peripherals in the classroom or resources in the learning centers and stations. Developmentally appropriate practice is informed by what teachers know about individual children in their classroom (Copple & Bredekamp, 2009). Findings from the study imply that when the classroom environment is reflective of the children in the classroom it helps students to feel comfortable in the learning space, and it fosters their sense of belonging and helps them to learn.

Recommendations for Administrators

Research shows that teachers' beliefs on how young children learn influences how they set up their classroom environment (Nislev, 2015). These established beliefs might make it difficult for some teachers to adapt their classrooms to fit the perceptions of the students they teach if they do not align with their beliefs. There would therefore seem to be a definite need for professional development for teachers on the best way to meet the diverse physical learning

environment needs of their students. In view of the findings from this research, students within the same classroom might have diverse needs, and this may be interpreted to mean there is no universally effective physical learning environment. Although teachers with beliefs that match their students' perspectives might easily agree to incorporate the students' ideas in their classrooms to meet their unique needs, they might also benefit from professional development focused on adapting classroom environments to suit the different needs of students.

Study Limitations

Generalization of Study Findings

The first limitation of the study is that findings cannot be generalized to the larger population. Qualitative research seeks to find "meaning in context" (Merriam & Tisdell, 2016, p. 2), and the special context for the current study was four second-grade classrooms identified as the highest and lowest scoring on the APPEAL rating scale (Evanshen & Faulk, 2019). Findings are therefore specific for the study contexts although similar settings might draw lessons from the students' perceptions. The study sample was limited to 16 students, which is not a representative sample for generalization of findings. Additionally, in line with qualitative research practice, participants were not randomly selected. Participants who were likely to be very informative for the study were selected by providing criteria and obtaining recommendations from the classroom teachers.

Limited Time and Curriculum Differences

Another limitation was time and the structure of the study site curriculum. Cases LB, TA, and TB did not have free choice time built in their daily schedules. This led to limited opportunities to observe participants engaging with their physical learning environment when they had choice. Such data might have illuminated the perceptions of participants on their

physical learning environment in the three cases. Observing students during “free choice” time for longer periods would have been more beneficial because it would yield data that would have added to that collected through interviews and photographs.

Summary

This chapter is the conclusion to the report on a multi-case qualitative study designed to explore second-grade students’ perceptions of their classrooms’ physical learning environment. Because research shows the significant impact the classroom’s physical learning environment has on children’s development and learning, the researcher identified a gap in the literature of gaining perspectives of young students because most of the research available on the area is from the point of view of adults. The study involved 16 participants in four classrooms across three school districts. Sources of data for the study were interviews, observations, and participant-generated photographs. In addition, participants also described their photographs to make sure they were interpreted correctly. These were thoughtfully selected as effective ways for gathering data on the topic from children who were 7 and 8 years old.

The researcher analyzed the data by trying to stay as close to the data as possible and looking at data from different sources as a unit to get a complete picture of each of the participant’s views. Findings from the study were shared starting at the participant level and ending with the general themes developed from the data. The themes that emerged from this data were access and meaningfulness, active learning, comfort, learning community, and management. This chapter also discussed potential further research needed to gain more understanding on the topic. Although the study findings may not be generalizable because of the size of the sample and other factors, insights on the implications of the findings for practitioners

were shared with the aim of shedding more light on an important aspect of teaching and learning that could be “a blind spot for practitioners” (Barrett et al., 2017, p. 447).

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APPENDICES

Appendix A

Interview Protocol

The protocol is for a researcher interviewing one second-grade student. Time allocated for each interview is 25 minutes.

Opening script/Before the interview

My name is Tsitsi Nyabando, I'm a student from the East Tennessee State University in ir City. My home country is Zimbabwe, which is a country in Africa. I came to this country to learn about young children's education. I'm here to learn about what you think about your classroom. Thank you for taking the time to talk with me today. I am going to be asking you a few questions and I want you to feel comfortable telling me what you think. There are no right or wrong answers.

Collecting informed consent

I will be recording our conversation with this recorder because it is hard for me to write down everything while talking with you and I do not want to miss any important information. Only I and my professors will have access to the information you are going to share with me today. I would be very grateful to talk with you today if you are okay with that. I want you to know that you should not participate/ answer my questions if you do not want to. Even if you agree to talk with me today, you can stop the interview at any time if you feel you do not want to continue. Do you have any questions for me?

Continue interview if student agree to participate. If not, thank them and explain that I would be glad to talk with them another day if they change their mind. Turn on recorder.

Interview Questions

Questions to build rapport

What is your favorite color? What is the best toy you have? How old are you? When is your birthday? Do you have any pets? What kind of pets?

Main interview questions

1. Tell me about what you like the most about your classroom learning environment? Tell me about what you dislike the most about your classroom learning environment?

2. What places in the classroom do you like or not like to do work at?
3. What parts of your classroom make you feel good or not good?
   - How so you feel when you are in that space?
   - Can you share a word or phrase that you would use to describe how you feel in/about the space?
4. If you are working on an assignment like writing a short story, where would you like to do that?

a. If you had the chance to choose where you want to say read a book, where would you like to do that?
   - Are there any reasons why you would choose that space?

b. Where in the classroom would you do a science project?
c. Where in the classroom would you do math exploration?

5. If you could design this classroom is there something that you would add? Is there something you would remove?

   - Why would you do that?
   - Can you tell me more about that?

6. Do you have any questions for me today?

Transition to participant-generated photographs

Examples questions: Did you do any traveling last summer? Can you tell me about your favorite places to visit? Do you have a cellphone you can use when you want to take pictures? What do you use when you want to take pictures?

Would you take five pictures of your favorite parts of your classroom for me? After they take the pictures ask - Tell me about your pictures?

Concluding interview

Thank you for talking with me today. I am going to listen to the recording of our conversation today and write all we said so I can look at it closely and learn. I am going to think about what you told me today in relation to what I want to know. After reading, writing, and thinking, I might come back to talk with you again and ask questions, so I can have complete understanding.

Appendix B

Observational Protocol

Date of Interview:

Time:

Length of Observation:

School:

Classroom:

Participant(s) observed:

Description of Setting:

	Notes and reflections			
	First 15 minutes	Second 15 minutes	Third 15 minutes	Fourth 15 minutes
Where students prefer to work Spaces they are working at				
Activities they are engaged in Reading Math Science				

Other				
Student learning Do they seem to be engaged or not?				
Social interactions Are students working alone or with others?				
Sense of belonging/well-being What emotions do I see/interpret?				

Conversations:

Appendix C

List of Codes Developed by Their Categories

Category	Codes
Choice	Flexible seating – seating choice, free choice, flexible spaces, classroom technology, table other than assigned, on the rug
Accessibility and meaningfulness	Instructional display (positive displays, negative displays), provides learning supports, materials that are easy to access and transport, organized space, easy to clean
Sense of ownership (territory	Own seat/table, (library, cubbies, displays)
Privacy and individuality Adaptability (this is a subcategory under privacy)	Secret hideout, private spot, closed space, under the table, learning preference, personal interest, dark spots, enough light, color, linked to outdoors, where they prefer to spend their time, personal items, under the table, get to stretch or movement
Focus on Learning	Crowded, difficult to focus, easy to focus, challenging spaces, really quiet, there is room,
Emotional mental well-being (sense of belonging)	Positive emotions, negative emotions, sense of belonging, it's comfy, mental health, cubbies, little, personal items, feels like home, safety
Content area learning	Book center/station library, reading center, writing, work study station word study station, math, science, reading
Active engagement	Art, games online, games, blocks, all centers/stations, SMART Board®/interactive displays
Classroom management	Guidance or behavior management, never used, not allowed
Learning community	Social interaction/interpersonal contact. Such elements of the environment stimulate social learning or collaborative learning, with friends, close to grown-ups, table other than theirs

VITA

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