

## Director's Corner: Math & Building

This year, we are intentionally emphasizing **all five concept areas of math** within our preschool and kindergarten curriculum, and we chose our whole school theme of **BUILDING** because it affords many opportunities to foster broad explorations of important mathematical concepts, both in terms of the children's building with a variety of materials and in terms of learning about the buildings in our environment and how they are constructed.



During our Family Math discussion last week, we offered suggestions for emphasizing the mathematics involved in everyday activities like cooking, laundry, recycling, taking a drive or playing games. You can also help engage your children in noticing interesting mathematical features of their own constructions and the buildings surrounding them. In these ways, you will strengthen the foundations for their understanding of both mathematics and building.

Let me suggest that you start with your own home and neighborhood. Our architecture consultant for the unit, Kelly Lyons, suggests having a sketchbook or clipboard available so that children can record their observations. You could also use a digital camera and then discuss the photographs you take.

### 1) Number & Operations (Arithmetic)

- Includes counting, comparing & ordering, recognizing number & subitizing (visually perceiving the quantity), composing and decomposing numbers, adding & subtracting, and multiplying & dividing
- *Count doors, windows, rooms, floors, etc. and then consider how many more there would be if you included your neighbor's apartment or added another floor to your house.*

### 2) Patterns, Functions & Algebra

- Includes identifying patterns and describing change
- *Notice the pattern on a railing (post, space, spindle, space, post, etc.) or the pattern of alternating brick orientation, as well as whether any patterns change as the building gets taller.*

### 3) Geometry & Spatial Sense

- Includes recognizing & forming shapes (individually and in combination), describing locations, directions, and coordinates, transforming & creating symmetry, visualizing & reasoning spatially
- *Observe the overall shape of the building in which you live, as well as the component shapes of windows, roof, etc.; then consider the symmetries and the surroundings beside, in front of, behind ...*

### 4) Measurement

- Includes both comparing attributes using units and specific techniques & tools
- *Consider relative sizes (taller, wider, etc.), weights, textures and strength of materials, etc.*

### 5) Data Analysis & Probability (Statistics)

- Includes classifying & organizing data using varied representations, then using the information to make predictions & decisions
- *Classify buildings in the neighborhood by type, size, surface material, function and notice patterns like more living spaces than restaurants, more materials appropriate for cold winter, etc.*

Future newsletters will include more ideas for exploring building & buildings as a family. Enjoy!!

## Director's Corner: Building Self-Esteem & Independence

The Children's School's educational philosophy is based on theories and research in Developmental Psychology. We use "**developmental goals**" as a systematic framework for focusing our program design. Beginning with this newsletter, I will highlight one set of goals each month to make the rationale underlying our design decisions clearer, as well as to support families in fostering their children's development with similar intentionality.



**Self-Esteem & Independence:** encouraging each child's pride in individual characteristics, families, experiences, and accomplishments and each child's responsibility for personal care, actions, and words.

Psychologist Erik Erikson emphasized young children's need to develop a sense of autonomy, the confidence to take initiative, and the motivation to industriously master culturally valued tasks. Jean Piaget highlighted children's innate disposition to explore the world as curious scientists. In both theories, the role of adults is simply to provide a safe and encouraging environment for exploration. At the Children's School, we view this developing self-esteem and independence as foundational for all of their other achievements. We let children know that they are special and that they belong by using their names and photographs throughout the classrooms, by displaying the products of their efforts, and by inviting them to contribute meaningfully to the group. By learning to value and manage themselves, including their bodies, their actions, and their emotions, children acquire a positive and proactive stance toward learning to interact, to communicate, etc.

Within each theme, educators highlight each child's uniqueness in a variety of ways. In September, we encourage children to share their families and experiences with each other, while also teaching them to follow the rules and routines that keep everyone safe and comfortable. Units like the recent kindergarten emphasis on the Medieval Times afford opportunities to develop individual crests, use personal initials to note ownership, and learn from the ways people in another time and place resourcefully met their daily needs, had fun, and expressed themselves through the arts. The preschoolers' current recycling unit strengthens children's ability to impact their community by taking responsibility for managing resources and using existing materials in creative ways.

Carefully building mathematics skills, or skills in any academic domain, provides children with tools for solving problems that they encounter in their daily lives. They can use measurement to share equitably or tally votes to determine which game to play or snack to make. Practice noticing patterns encourages children to predict what will happen next, and basic counting and arithmetic procedures help children organize both time and materials. In all of these ways, children begin to view themselves as capable individuals with a "can do" approach to new situations.

Families can promote self-esteem and independence by allowing time and providing encouragement for children to master a wide variety of self-help skills, such as feeding, dressing, and bathing themselves, as well as taking care of their belongings. Finding age-appropriate ways for each child to contribute to the household work helps children to understand their value to the family and to feel confident offering help elsewhere. You'd be amazed at what children can do when given clear training and plenty of practice. Their satisfaction in accomplishment is a joy to witness!

## Director's Corner: Fostering Interaction & Cooperation



The Children's School's "**developmental goals**" for interaction and cooperation provide a systematic framework for design details in all aspects of our early childhood programs. To clarify the intentionality of our design decisions, as well as to support families in fostering their children's development, I will share the theories underlying our philosophy and their implications for our approaches.

**Interaction & Cooperation** - promoting children's social skills for diverse adult and peer relations, including listening, turn-taking, following directions, rules and routines, group participation, care for shared materials, and conflict resolution.

In many respects, young children can learn social skills as they develop self-esteem and independence – by exploration within a safe and encouraging environment. But, social learning theories also emphasize the importance of adults modeling appropriate interactions and acknowledging or reinforcing the behaviors that children need to practice in order to become effectively integrated into a family, a class, a team, etc. Sociocultural theories highlight the need for a supportive context where adults offer scaffolding to help ensure children's successful participation. Cognitive information-processing theories, such as those guiding much of the research in Carnegie Mellon's Psychology Department, stress the detailed specification of the knowledge and skills children need for each task and the explicit instruction and feedback relative to those specifications. For these reasons, Children's School educators 1) purposefully model respectful interactions with children, families, colleagues, undergraduates, researchers, and university personnel, 2) intentionally teach children the steps to take and words to use for both routine and challenging interactions, and 3) coach children through the process repeatedly until they can effectively interact on their own. We also embed directions, rules, and location cues within the environment with signs, visual schedules, photographs, etc.

Within each theme, educators emphasize the necessary interactions and implications of cooperation. For example, preschoolers recently learned about the Community Helpers that work together to help everyone live safely at Carnegie Mellon and in Pittsburgh. They also learned how our efforts to reduce, reuse, and recycle benefit our environment so that everyone can live well. At the same time, our kindergartners were learning about the many ways that Native Americans collaborated with each other and their environment to meet the human needs without negatively impacting the environment.

Even fostering mathematics skills can involve social interaction. Children practice counting and timing skills when they follow the rules for the number of children in each center or use a timer to take turns on the computer. They also collect and record data about their classmates, such as when the kindergarten "clipboard helper" conducts the weekly survey and reports the results to the group.

Families can promote interaction and cooperation by using a similar mix of careful modeling, direct discussion of social expectations and strategies, and coaching in the context of natural interactions. Basic manners, social conventions for meeting and greeting people, and appropriate ways to make requests or handle disagreements are all important to practice at home and in the community. You can help children by reviewing in advance and adding just one new skill at a time. The successful interaction will provide its own reinforcement, particularly when others respond positively!

## Director's Corner: Cultivating Communication



The Children's School's "**developmental goals**" for communication direct us to focus broadly on oral communication via listening & speaking as well as written communication via reading & writing – all in age appropriate ways, from the time children enter the school until they leave. By explaining our approaches to meeting these goals, I hope to show the purposes behind our practices so that families can be similarly intentional in supporting children's increasingly effective communication.

**Communication** - facilitating comprehension and expression skills beginning with oral and progressing to written language.

Children's ability to learn oral language without direct instruction is amazing. Simple encouragement to participate in the naturally occurring conversations that are part of family and school life typically promotes appropriate developmental progressions, even with multiple languages being learned simultaneously, especially if children have exposure to effective models. I'm sure you've noticed, however, that children are just as capable of imitating the negative tone of voice and socially inappropriate words that they overhear, and that they usually do so at just the wrong time. That's where consistently purposeful use of appropriate vocabulary, polite phrasing, and positive tones of voice, together with specific reinforcement, help children to use language for effective participation in varied social contexts. As with social skills, Children's School educators use the triad of modeling, explicit instruction, and coaching to help individual children progress. Developing skills for reading and writing surely benefits from the same approaches, but there are two key differences, both of which stem from the need to process many MORE bits of information, with lots of potentially confusing similarities (e.g., *b* vs. *p* vs. *d* vs. *q* or *to* vs. *too* vs. *two*) and exceptions (e.g., why do enough and stuff rhyme when cough and cuff do not?). Because of this heavy "cognitive load", the learning process for most children takes an extended period of time and involves frequent, repeated errors. We cannot, therefore, expect the same rapid progress that is evident for oral language development. In order to support children's motivation for tackling the written language challenges, we must be extremely careful to encourage children's efforts without emphasizing their mistakes. For these reasons, we focus on children's communication of meaning rather than on conventional spelling, consistent letter sizing and orientation, etc. Research has shown that the key initial steps involve abilities to hear the separate sounds that together make words and then identifying the letter-sound correspondence. That's why you hear us doing lots of activities with alliteration and rhyme.

Within each theme, educators introduce new vocabulary and offer opportunities for children to utilize new terms when they converse about theme-related activities. We also utilize many visual representations of words, often together with relevant pictures, so that children begin to build site word vocabulary and can easily find conventional spellings if they are interested. Interestingly, practicing mathematics skills for patterns also helps children notice common features across words, such as bat, brat, hat, that, sat, splat, etc., or distinguish features for commonly confused words, such as where, wear, were, and whir. Families can promote both oral and written communication by encouraging children's involvement in conversation, story reading, and writing for real purposes. Enclosed with this newsletter, you'll find an article with more detailed developmental sequences and suggestions. Offer multiple options and follow your child's interests along the way.

## Director's Corner: Deepening Discovery & Exploration



The Children's School's "**developmental goals**" for discovery & exploration express our commitment to substantive, inquiry-based study of developmentally appropriate themes. By highlighting our educators' intentional preparation for these learning experiences and responsiveness to the children's questions and interests, I seek to demonstrate ways that families can further enhance the children's developing skills and knowledge foundations for future learning.

**Discovery & Exploration** - fostering a positive attitude toward learning through questioning, observing, and experimenting with varied materials related to diverse themes.

Children's "approaches to learning" are the most important focus of our intentional teaching during the early years. We foster curiosity, initiative, attention, concentration, planning, persistence, acceptance of mistakes as part of learning, and the value of multiple strategies and solutions to problems. As with the other developmental domains, we combine modeling, explicit instruction, and coaching throughout the individualized process for each child.

The specific skills we teach generally follow the scientific method, beginning with questioning and predicting, then collecting and observing, and finally explaining and reporting. When seeking answers to our questions, we teach classifying, ordering, comparing and contrasting as basic skills that we practice with varied objects and events to highlight foundational science and math concepts (including all five domains of mathematics that I introduced in the October newsletter). We also introduce a wide range of tools for observing and representations for recording so that children have multiple options at their disposal.

When choosing themes, we aim for broad coverage of the life, earth, and physical sciences, literature and the arts, and social studies topics. For example, the preschoolers have studied recycling & community helpers, fairy tales & folk tales, and the healthy body so far this year, while the kindergartners have studied the healthy body, Native Americans, light & color, and the marketplace. We're all about to study building, which will include focus on the physics involved, the aesthetics, as well as the community context. What amazes me most about our educators' approach to the themes is their ability to identify the key concepts and frame them in a way that the children can understand. We also rely heavily on non-fiction books, internet sites with appropriate images and explanations, and expert guests to support our explanations of key theme content.

Naturally, mathematics is a prominent part of our inquiry process because our data collection often involves counting, measuring, describing shapes, spatial relations and patterns, and then representing the data via graphs, tables, etc. Our upcoming building unit will have many opportunities for extended projects that involve mathematics. Recently a preschool 3's group helped Mr. Salinetto measure various spaces to determine where we can use a large Pittsburgh floor map for building our city, and the kindergarten is planning to design and build a chicken coop for use in a later project of hatching chickens.

Family support for discovery and exploration is essential because you have more time to help each child pursue individual interests for even deeper inquiry, especially via extended projects, field trips, and broader reading / internet research. We look forward to hearing about your explorations!

## Director's Corner: Facilitating Physical Capabilities



The Children's School's "**developmental goals**" for physical capabilities, including health and safety, focus our program design on offering diverse opportunities for children to strengthen their bodies while actively learning indoors and out. By emphasizing the ways we purposefully invite productive and creative movement in safe contexts, I aim to encourage families to collaborate with us to promote healthy and active lifestyles at home, at school, and in the community.

**Physical Capabilities / Health & Safety** - giving children opportunities to use their growing bodies in safe ways to develop small and large motor skills, coordination, and healthy living habits.

Our intentional planning for young children's motor development includes both small (fine) and large (gross) motor skills. Small motor skill building includes offering a wide range of activities that require eye-hand coordination (e.g., puzzles, blocks, beads, pegs), use of tools for real tasks (e.g., drawing, writing, cutting, woodworking, cooking, sewing, and using computers), and coordinated hand motions involving clapping, tracing, folding, etc. Large motor skill development includes strengthening leg & foot skills (e.g., balancing, walking, marching, running, hopping, etc.), arm & hand skills with varied balls (e.g., throwing, catching, rolling, bouncing, etc.), and coordinated movements of both arms & legs (e.g., riding a tricycle, pulling a wagon, climbing, jumping rope, doing exercises, etc.). For all movements, we aim for sufficient practice to increase coordination, strength, and body control. The specific concepts and skills that we teach about health and safety include nutritious food choices, effective hygiene habits, appropriate waste disposal and recycling, and consistent use of safety procedures and equipment (e.g., crossing the street, emergency drills, wearing safety goggles, etc.).

As with the other developmental domains, we combine modeling, explicit instruction, and coaching throughout the individualized process for each child, and we encourage initiative, attention, concentration, planning, persistence, acceptance of mistakes as part of learning, and the value of multiple strategies and solutions to movement problems.

For every theme, we develop related activities in each of the learning centers so that children have novel materials, projects, games, and dramatic play opportunities to practice their developing skills while learning about the topic of study. Our recent whole school theme of Building involved a wonderful variety of small and large building materials and incentive for learning appropriate body control so that the children could build safely without their structures falling.

You might be surprised to learn how much mathematics is involved in movement. We count movements and arrange movements in patterns, particularly when rhythm and dance are involved. We can move our bodies to create shapes and explore ways to move in, out, under, over, and around our friends or objects in our environment. We can measure our movement frequency, speed, distance, etc. and graph these measurements to monitor our progress over time. There is also math involved in many of our health and safety practices, such as using the food pyramid, washing our hands for a certain length of time, and sorting learning materials at clean up time.

Families can enhance everyone's physical development by making active, healthy, and safe choices on a daily basis, as well as by discussing options with the children. Many household tasks involve exercising small and large muscles, so have fun cooking, cleaning, and doing yardwork together!

## Director's Corner: Enhancing Artistic Expression & Appreciation



The Children's School's "**developmental goals**" for artistic expression and appreciation broaden our program design to invite children's self-expression in ways that go beyond traditional verbal communication, as well as their respect for others' self-expression. By highlighting our intentional integration of visual arts, music, creative movement, and drama into our program, I seek to promote family exploration of similar options as you interact with each other at home and in the community.

**Artistic Expression & Appreciation** - cultivating each child's ability to express ideas and emotions through art, music, movement, and drama.

Planning intentionally for any type of arts experience involves materials, tools & techniques, and opportunities. Young children need time to explore materials before they can productively utilize them to express their ideas, so we offer many chances for children to experiment with the same materials and to compare and contrast them. Learning how chalk works on paper vs. cement, with and without water, helps prepare a child for independent choices of artistic medium. Similarly, exploring sounds made with the whale drum, chime wall, and amadinda in our outdoor classroom may eventually lead to their choice of instruments for future lessons. Teachers support children's exploration by explicitly introducing new tools and specific production techniques. For example, Ms. McMichael teaches 21 different movements for Sound Play so that, when given opportunities to invent new combinations, children have more resources for creativity. We also share "tricks of the trade", like making props from light materials but using your actions to make them appear heavy. The rest of our design involves offering diverse opportunities to entice all of the children to engage in the arts. We aim for open-ended activities and responsiveness to children's ideas for extending them.

Some of our themes emphasize the arts directly, such as prior whole school units on Art & Artists, Music, and Theatre Arts. Others naturally promote dramatic play and theatrical production, such as recent units on Fairy Tales & Folk Tales or Medieval Times. Even units that might seem more science oriented, like Building or Light & Color, afford many opportunities for exploring and appreciating aesthetics and design. Regardless of the specific focus of study, our educators develop creative experiences to help the children understand the topic more fully and to share their ideas more broadly. We also recruit diverse artists to share their work with the children to foster appreciation and help children learn how to be a respectful audience and thoughtful critic.

In all of the arts, mathematics is key. As the preschoolers learn about making tints by adding white and shades by adding black to primary and secondary colors, they explore the visual effects of more and less. Kindergartners learning about reflection and refraction start to notice the impact of angles. Of course, counting is key to rhythm in both music and dance, as are repeated patterns.

Pittsburgh offers families many venues for arts exploration, starting with public art and free community performances, to open-ended arts spaces at the Children's Museum, to formal arts classes for young children. Parents can also glean ideas for home experiences from the teachers' daily emails and children's ideas. With imagination, a few basic supplies, and a space that can be easily cleaned, families can collaboratively create and entertain, both indoors and out. Taking photos of your experiences can help preserve the memories and encourage reflective discussion as well.

## Director's Corner: Learning Pathways



Over the course of my articles this year, I have introduced our major professional development emphases, Math & Building, and highlighted the ways that our educators intentionally design programs to foster every child's progress toward meeting the Children's School's "**developmental goals**". For each set of goals, I also explained the ways that our thematic studies incorporate rich opportunities for strengthening skills, the diverse methods we use for reinforcing central mathematics concepts, and the approaches families can adopt to support the children's learning.

Earlier this week, I attended a fascinating talk by Dr. Roy Pea, a professor at Stanford University, whose research on children's learning in science, technology, engineering, and math (STEM) has impacted our national education policy and practice. He advocated taking a long-term view of children's "*learning careers*" with an emphasis on the ways that our culture can shape their "*trajectories of participation*" in a positive and productive way to help them develop their interests and talents into fulfilling personal and professional endeavors. Through a variety of case studies, Dr. Pea emphasized the importance of parents and other adult mentors in providing opportunities and resources that both spark and support children's **identity** as learners in certain disciplines (i.e., viewing themselves as scientists, naturalists, musicians, etc.), their gradual acquisition of **accountable disciplinary knowledge**, and their **navigation** of the formal and informal systems that manage access to each field. Not surprisingly, children whose families and communities have less to offer in terms of opportunities and resources are less likely to develop and successfully pursue passions to the level that their innate potential would allow. In order to bridge that gap, institutions like CMU and the Children's School are actively involved in community outreach for children and educators, partnerships with programs like the Pittsburgh Public Schools' "Start on Success", national events like "Take Our Daughters and Sons to Work Day", etc.

Perhaps you are involved in similar outreach through your job or your community, but the point of my raising these issues now is to encourage you to consider the coming summer as a time to invest yourself in the early learning careers of your children. No need to buy workbooks or flash cards. Instead, pursue your own hobbies and involve your children. There are age appropriate ways to invite even young children to help with gardening, film-making, woodworking, sewing, etc. If your children seem fascinated by a particular topic that doesn't fit your skill or interest (e.g., insects, dinosaurs, painting), visit the library to get non-fiction books, check for local exhibits or interest groups that might offer tours or lessons, or check the web for related information and project ideas. Remember that grandparents, neighbors, and other community members might also enjoy sharing their passions with your children, and they might have more time and resources than you have available. Lastly, when you have opportunities to explore your neighborhood or travel even farther from home, consider starting a collection, a photo album, a scrapbook, or in some other way recording your adventures.

We look forward to hearing about your family's explorations in the fall, when we will again be partnering with you in supporting your children's learning careers. For those of you with children progressing to elementary schools, we wish you well and hope that you will allow them to visit when possible to share their excitement about more advanced learning with the preschool and kindergarten classes. You'll always be part of the Children's School family!