

From Play to Pathways: Building Transportation Awareness in Early Learners

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INTRODUCTION

More than half a dozen four- and five-year-olds gather in one particular corner of two floors of engaging open play activities. Several of the children line up with paper tickets to board a large yellow school bus that has been built from wood and cardboard and meticulously painted. Another child sporting a fashionable cap sits in front of the toy steering wheel and invites his classmates onboard. Other than the evidence of exceptional crafting efforts of the family volunteers, this scene could be from any preschool on any day of learning through play. However, this moment, as part of a pilot program from the Mineta Transportation Institute (MTI), was much more intentional. For more than two decades MTI has been operating successful national workforce development¹ and educational programs² for thousands of K-12 students and adults—why not preschoolers?

Workforce development focuses on ensuring an industry has the diverse, qualified workers they need to succeed. In recent years, the transportation industry has struggled to recruit and retain its workforce, especially as the industry faces massive upheavals due to the pandemic, evolving technology, and climate change. Although preschool-aged children are obviously far from searching for a job anytime soon, they, their families, their communities, and the industry can benefit from implementing developmentally appropriate curricula that lay the groundwork for future opportunities to help them pursue their educational, career, and life goals. A recent collaboration between MTI and a cooperative preschool explored what it would mean to integrate transportation-inspired curriculum and career exploration into Pre-K classrooms.

EARLY CHILDHOOD FOUNDATIONS

Decades of research clearly shows that children exposed to high-quality preschool education are more prepared for school, better meet learning objectives, and are more likely to graduate high school. Even with other variables such as income, children with better early education tend to be healthier and better able to contribute to their communities.

The groundbreaking Perry Preschool Project,³ which significantly influenced Head Start⁴ programs, was an early program that aimed to promote the social mobility of disadvantaged African-American preschoolers in Michigan in the 1960s. The high-quality preschool education provided to the children in this study had a massive impact⁵ on their lives. Participants were more likely to graduate high school and pursue higher education, earn more in their careers, were less likely to be arrested, and were healthier than those in the control group.

Because of early evidence like the Perry Preschool Project, more efforts and more funding were allocated to early childhood education programs, including Head Start—the U.S. Department of Health and Human Services program that provides comprehensive early childhood education and

other critical services to low-income children and their families. Since its inception in 1965, Head Start has served more than 38 million children and their families, and continues to have significant impact on the health and well-being of participants. Children enrolled in Head Start programs are more likely to graduate from high school and attend college and are shown to have improved social, emotional, and behavioral development.

But where is the intersection of early childhood programs and workforce development? Let's step back for a moment and look at why we (in transportation and beyond) need workforce development in the first place.

THE NEED FOR WORKFORCE DEVELOPMENT

There has been plenty⁶ written about the transit workforce shortage⁷ and the need for diversity and equity initiatives in the transportation industry. For example, a survey⁸ from the American Public Transportation Association (APTA)⁹ found that 96 percent of respondent agencies face a workforce shortage. There has been a push for workplace and hiring changes¹⁰ that meet the needs of the workforce, including more diverse workers; but at the same time, there are simply not enough talented, capable transportation workers to go around as the current workforce retires.

The transportation industry is not alone in its workforce challenges. Across many sectors in the U.S. and globally, there have been issues of an aging workforce and hiring and retention issues as the world of work shifts post pandemic. There has been a related recognition that the roots of workforce development and career exploration start much earlier than high school or college and that we don't need to hand children an engineering blueprint—representation¹¹ and exploration are a good place to start.

THE BENEFITS OF STEM-INSPIRED CURRICULUM

Programs that are STEM-inspired have been proven especially helpful. Integrating STEM concepts in early childhood education is crucial for sparking children's interest in STEM-focused fields and for paving the way forward for diverse career and life path options. Studies show that early exposure to STEM concepts improves problem-solving skills and increases awareness of and enthusiasm for STEM careers. Students who engaged with STEM camps in the UK were twice as likely¹² to believe they can achieve a STEM career. Programs like the Little Scientists¹³ in Australia and similar initiatives in other countries have demonstrated that play-based activities can effectively introduce young children to engineering, science, and technology, helping them develop the foundational skills needed for more advanced learning and career planning options.

Moreover, implementing STEM education in early childhood education aligns with the Next Generation Science Standards (NGSS), which emphasize the importance of interdisciplinary learning through hands-on exploration and inquiry. By engaging children in activities that involve questioning, experimenting, and designing, educators can help them build essential cognitive and social skills while fostering a positive attitude toward STEM fields. As children grow, this early exposure supports their ability to make informed decisions about their future education and career paths, ultimately preparing them for the challenges of the 21st century.

This is why recent years have experienced a massive push for increased STEM education for all ages as we have come to better understand the importance of foundations in science, technology, engineering, and mathematics. (Sometimes art will also be included and thus the acronym becomes “STEAM.”) This includes a Biden-Harris Administration initiative¹⁴ “YOU Belong in STEM” meant to “help implement and scale equitable, high-quality STEM education for all students from PreK to higher education—regardless of background—to ensure their 21st century career readiness and global competitiveness.”

Note that this initiative specifically includes PreK (Pre-Kindergarten, sometimes called “Transitional Kindergarten” or TK) children. Although often dismissed for their developmentally appropriate although inconvenient inability to fully regulate emotions, four- and five-year-old children are more capable than many people realize. Research shows that brain development in the first five years of life is especially critical as it lays the foundation for future development, behavior, and abilities. Although the brain continues to develop until adulthood, young children’s brains have more plasticity¹⁵ than adult brains and the preschool years are a time not only of significant cognitive and behavioral growth but, relatedly, of “a period¹⁶ of ‘blossoming’ within the brain, during which anatomical and physiological substrates show some of their most dynamic and elaborative developmental changes.”

LITTLE KIDS, BIG IDEAS

Evidence abounds as to the positive impacts of early childhood education programs on children—and, in turn, on their families and communities.

Thus, although we are specifically connecting the transportation industry with STEM education and thus drawing a parallel between this type of early childhood education program and workforce development, it is not just a capitalistic approach. Early education, including STEM-focused and developmentally relevant career-inspired education, benefits children not only in potentially teaching them skills that will benefit them in their future careers but in their lives in general, at all ages, and establishing an equality of opportunity.

Children become adults who live in, engage in, and contribute to local and global communities that deal with big, even unprecedented challenges like those related to climate change, not to mention pandemics and technological upheavals and more typical life challenges such as finding a career that sustains yourself and your family, maybe even one you enjoy. Providing children with opportunities to develop critical thinking, problem-solving, and social-emotional skills means they have a better chance of living the life they want and positively shaping the lives of those around them.

So what does age-appropriate career exploration look like for preschoolers? When every moment is a learning opportunity and a chance for curiosity and self-discovery, introducing STEM concepts and the world of careers does not ever need to disrupt children’s world of play—in fact, play and fantasy must be fundamental to it.

Even when children are not explicitly or didactically exposed to career exploration, it is something happening both consciously and unconsciously even in the early childhood years. A person’s profession is often a fundamental part of their identity, and children learn through observation

and by engaging with the people around them. Even children younger than Pre-K will likely exhibit some understanding of professions with enough context. For example, a picture book might show a person with an apron in a kitchen decorating cupcakes. Even if the child does not have the vocabulary to explain this situation or say the word “baker,” they can recognize many of the concepts and will draw parallels to their own experiences. Most young children will recognize frontline professions whom they may interact with such as a firefighter and doctor, and many would also be able to point out a veterinarian, teacher, and other basic, broad category occupations like “scientist” and “construction worker,” etc.

Curriculum that consciously aims to meet the needs of preschool children while exposing them to the industry will have more intentional thematic elements and have holistic implementation.

That is what the collaboration between one preschool and MTI looked like.

BOTHELL FAMILY COOPERATIVE PRESCHOOL & MINETA TRANSPORTATION INSTITUTE

The program was developed in a partnership with MTI and Bothell Family Cooperative Preschool Director Beth Edwards.¹⁷ Edwards has been teaching preschool for more than two decades in affiliation with Shoreline Community College.

This particular preschool operates under the cooperative model as a “member-driven preschool that brings together parents and caregivers with skilled educators to *collaboratively* provide a rich learning experience for children.” Co-op preschools enable parents and other caregivers to be a part of their child’s first educational experiences, allow children an easier transition to time away from their primary caregivers, and empower families to learn along with their children.

Like many other high-quality early childhood programs, the transportation-focused curriculum developed in partnership with Edwards and MTI included activities focusing on early literacy and STEM as well as imaginative play, open-ended hands-on activities, and engaging field trips. The collaboration also created a pilot deliverable designed around the curriculum that is published and free to use on MTI’s website. It will continue to be expanded and adapted with further feedback from BFCP students, caregivers, and educators.



Figure 1. Pre-K students engage in dramatic play themed around air transportation

The deliverables, published on MTI's [website](#) and available for free to use by other educators, include a thematic calendar template and a list of activities that together enable implementation of developmentally appropriate play-based curriculum inspired by transportation.

The thematic calendar is divided into classroom categories for ease of use: Creative Arts, Science and Math, Manipulative, Sensory, Blocks, Dramatic Play, Literacy, Circle Time, Documentation, Take Home.

The activities align with the California Preschool/Transitional Kindergarten Learning Foundations—a framework for educators to support the development of young children in various domains to ensure they are prepared for kindergarten and beyond. Much of the learning that preschool-aged children are engaging in is learning basic life skills such as gross motor skills like balance and hand preference, social emotional skills like learning how to engage in conversation and emotionally regulate, early language foundations and expanding vocabulary, and more. To provide some context, it's good to remember that the average age of children to be potty trained is about three—so PreK four- and five-year-olds are very recently grappling with basic bodily functions.

This curriculum is designed to be implemented holistically and therefore all activities empower children to develop skills across multiple areas. The activities in the deliverable are listed by type for the ease of the educator for curriculum planning and classroom management. The [thematic calendar](#) is divided into classroom sections that loosely align with the categories. No matter how they are organized, the activities help children absorb the foundational concepts and skills that will help them be successful in the classroom, in their community, and in life.

The full California Preschool/Transitional Kindergarten Learning Foundations documentation can be [read here](#),¹⁸ but let's look at just a few examples to demonstrate how the curriculum here can be implemented in the classroom and what helping young children learn these foundations actually looks like.

Let's return to that moment of play with which we began.

Dedicated parents and the school's educators have set up a dramatic play area for children to role play activities related to interacting with a bus. One of the kids takes paper tickets from his friends, who line up and then take their seats on the other side of the yellow-painted cardboard. They discuss where they are headed—to the grocery store, to school, to the park—and where they should be let off in this imaginary world. There are myriad other interactions as well with involved and ongoing conversations between the children and, as needed, an adult. Can the stuffed dog ride the bus? Is food allowed? Can the bus go to Hawaii? Why not? Are there enough seats? Did everyone pay for their ticket? Can you sit over there so I have more room?

In just this brief moment, these children are practicing skills of

- social-emotional development (e.g., empathy and emotional regulation),
- language development (e.g., understanding/using location words and constructing narratives),
- mathematics (e.g., one-to-one correspondence and solving addition and subtraction in everyday situations),
- science (e.g., making observations, asking questions, defining problems),
- physical development (e.g., spatial awareness, fine motor skills),
- health (e.g., recognizing and communicating about body boundaries),
- history and social science (e.g., gathering information, identifying and including peers),
- and arts (e.g., using props and costumes).

These categories are those defined by the California Preschool/Transitional Kindergarten Learning Foundations and demonstrate how children are learning through play to develop the skills they need. Throughout the day at circle time and the sensory table, children practice more skills that help them become happy, healthy little humans that can pursue their goals and someday contribute to their communities.

PRESCHOOL FOUNDATIONS & CAREER EXPLORATION

Again, the transportation workforce is grappling with a shortage of diverse, talented workers who are capable of rising to the challenges of the 21st century world. Workforce development is a major step¹⁹ toward solving this problem, although it has historically focused more on building skills in individuals closer to entering the workforce. The pipeline to career opportunities can start even sooner.

There has been significant documented success in workforce development for K-12 and in career education and exploration for young children. Introducing career education in early childhood can enable a deeper understanding of the world and lay the groundwork for a deeper understanding of the world of work and how it fits into local and global communities. One study²⁰ of 133 kindergarteners found that those who participated in a specialized career education program showed significantly greater gains in occupational knowledge compared to their peers, and both parents and teachers perceived the program favorably. Another study²¹ that interviewed preschool teachers in Malaysia found that incorporating more career exploration into early childhood education curriculum could help children expand their occupational choices and better prepare them for future career decisions.

Although the littlest humans among us are often taken for granted, young children are constantly absorbing vast amounts of information—often more efficiently²² than adults.

MTI has a long history of supporting a wide range of educational and workforce development programs for K-12 children and adults. Adults have the Mineta Leadership Academy,²³ high school students can earn transferable college credit at the Mineta Summer Transportation Institute (MSTI) at San Jose State University,²⁴ and K-12 students have several competitions to enter. MTI also developed the Elementary Lesson Plans²⁵ that introduce 1-6th graders to the basics of how people and goods are moved. These programs are useful and fun; the average satisfaction rate of MSTI from the last four years, for example, is 98.5 percent. Over the years, thousands of participants have engaged in these programs to learn new skills, build community, and achieve personal and professional growth.

There has been some research²⁶ regarding career education in early childhood with parents and educators viewing it as generally positive²⁷ if done deliberately without overwhelming children.

The preschool collaboration empowered children to safely explore their communities on walks around the neighborhood as they learned pedestrian safety. It let them reach further into their world by visiting a nearby seaplane base and by riding the bus to a local park. When they tried on the role of bus operator or air traffic controller in play, they were able to envision themselves in that real role in their futures.



Figure 2. (Left) Pre-K student shows off a bus ticket during a community excursion. Youth ages 18 years and younger can use transit for free in most of Washington state. (Right) Pre-K students wait excitedly to ride a Sound Transit bus to the park during an excursion.



Figure 3. Pre-K students and a parent ride a Sound Transit bus to the local park during an excursion.

Early childhood education and workforce development for all ages, if done right, can build foundations and skills that will benefit the individual and community as well as the economy. There remain gender and racial biases in many industries and barriers to economic equity that educational and workforce development programs can begin to break down to empower and connect all of us.



Figure 4. (Left) A Pre-K student makes art from mud and a toy vehicle. (Right) Pre-K students have fun learning physics as they build ramps for toy vehicles.

LOOKING FORWARD / CONCLUSION

Beyond the benefits of building those pre-K and STEM foundations, the children who engaged in this curriculum benefited from perhaps less tangible connections to their community and world. They practiced critical thinking, bravery, and kindness. They gained a deeper understanding of their community and environment. They learned through real-world experiences about their neighbors and how to welcome them aboard the bus, plane, or train and to advocate for what is right and safe and good for their school, their community, the environment, and for each other.

The sentiment that “play is the work of childhood” has been attributed to renowned psychologist and child development expert Jean Piaget, to pioneering physician and educator Maria Montessori, and others—demonstrating that our understanding of this concept has been around for some time to say the least. PBS-famous Mr. Fred Rogers said it too, “Play is often talked about as if it were a relief from serious learning. But for children, play is serious learning. At various times, play is a way to cope with life and to prepare for adulthood. Playing is a way to solve problems and to express feelings. In fact, play is the real work of childhood.”

In an ever-changing world with increasingly complex issues, it’s more important than ever for our children to have the foundations as they grow that will give them the knowledge and skills they need to understand their environment, engage with their communities, and make decisions that better their own lives and the lives of those around them. Through transportation-inspired activities, children grasp the critical role that transportation plays in connecting communities and sustaining the environment. They begin to understand that buses and trains aren’t just vehicles—they’re

lifelines that bring people together, support local economies, and help create a more equitable and sustainable world. Including play-based, developmentally appropriate career exploration—especially with STEM-based learning—can empower an equality of opportunity that will let children form their own identities and maybe help them answer however they want that all-important question: ***What do you want to be when you grow up?***

Endnotes

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As MTI's Editor and Writer since 2020, Lisa V. Rose ensures all of MTI's written communication is concise, effective, and accessible. She helped write the grant application for the Mineta Consortium for Equitable, Efficient, and Sustainable Transportation, led by MTI, which was awarded \$10 million in federal funding and \$5 million from regional and state partners. With an MA in English from SJSU, Lisa dedicates herself to using language to advance equity in transportation, education, and every space she can influence. She is also a parent to a preschooler who wants to grow up to be an "animal scientist."

This report can be accessed at
<http://transweb.sjsu.edu/research/2474>



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