



# “THINK LIKE AN ENGINEER!”

*This is the catchphrase that Linda McLemore, a Project Lead The Way (PLTW) Launch teacher in the Kansas City Public Schools (KCPS), uses as encouragement when her elementary students are stuck on a problem. The motto inspires students to not give up and to use key transportable skills, such as collaboration and critical thinking, to persevere and figure out a solution. By doing so, her students are building these skills early and will be better prepared for careers in science, technology, engineering, and math (STEM).*



Research suggests that early introduction to STEM **positively impacts** student outcomes. Benefits include improvements in children’s math and reading skills later on, (McClure, 2017) attitude toward science (McClure et al., 2017), and valuing of skills like collaboration and reflection (Krajcik et al., 2021). For students who are English language learners, participation in STEM activities **makes language meaningful** by allowing students to explore complex reasoning and communication skills with peers (Institute for Inquiry, 2015). Problem-based STEM activities are also believed to **benefit students with special needs** by more effectively keeping their attention and helping them remain on task (Aydeniz et al., 2012).

KCPS is an urban Missouri district of **approximately 14,000 students** that understands the value of early STEM experiences. The district began implementing PLTW Launch during the 2017-18 academic year and currently provides the program to all K-6 students. KCPS also offers PLTW Gateway and the three PLTW high school programs to its secondary students. PLTW programming aligns with KCPS’s proposed strategic plan, “Blueprint 2030,” which prioritizes providing students with **hands-on, project-based learning experiences**, increasing access to science, technology, engineering, arts, and math (STEAM) curriculum, and developing college and career readiness skills.

KCPS ensures that students who are English Learners and who have special needs get the most benefit from their PLTW classes by utilizing the accessibility features and accommodations provided by PLTW, further adapting the program as needed, and implementing additional supports to meet student needs. By utilizing PLTW Launch and ensuring access for all, KCPS is providing all students an **early opportunity to build transportable skills** that they can apply in middle school, high school, and beyond.

## Kansas City Public Schools Overview

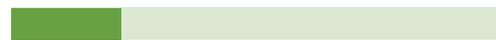
**89%** are students of color



**100%** qualify for free meals



**22%** of students are ELL



PLTW Enrollment Since 2017-2018 School Year



# Transportable Skills Development

A 2019 report by Burning Glass Technologies, a job market analytics company, found that the **four skills employers request** most from prospective employees are **communication, problem solving, collaboration, and critical thinking**. As early as kindergarten, KCPS PLTW Launch students are developing these key transportable skills. However, developing and employing these skills requires learning, practice, and time.

McLemore describes the road to transportable skills development as a learning process. “At first, [students] do struggle. Because, as we know, **this is totally different from being in a group where you’re in the traditional classroom** where you have to write a paragraph... This involves a lot of getting up, moving around, talking to each other, **collaborating with each other**, and being engaged.”



Problem Solving



Critical and Creative Thinking



Collaboration



Communication



Ethical Reasoning and Mindset



***This program is totally hands on. The kids work in groups—they have to collaborate and make designs; they have to test and go back and solve things that are not working with their designs...In a traditional classroom, they don’t do those kinds of things.”***

- KCPS PLTW Launch Teacher

Percentage of KCPS students who can solve real-world, interdisciplinary problems



***“It’s fun and you get to build a lot of stuff...You get to learn how to do stuff with your hands and at the same time you’re learning.”***

- 3rd Grade KCPS PLTW Launch Student



***I would say from the problem-based approach – the APB – I think it’s good in that it allows the kids to drive more of the learning themselves.”***

- KCPS PLTW Launch Teacher

Offering PLTW Launch throughout elementary school gives KCPS students the chance to develop these skills. As they progress through 5th grade, students become **increasingly able to engage in activities that use design thinking** and require them to **collaborate with peers** to solve **real-world problems**. These experiences prepare students not only for success in middle and high school, but also give them a **competitive edge** in the future job market.





## Problem Solving

PLTW Launch builds transportable skills by requiring young learners to do activities that are **not typical in a traditional classroom**. They must find solutions to real-world problems by working together on projects and they must test and revise their ideas. Students **do not always get it right the first time**, but they learn a lot in the process and grow from the challenge. During an infectious disease lesson, for example, Charlotte Chauvin's students did not get the same solution as the scientists. "But they backed up their reasons. I said, 'You provided evidence. That, to me, is what you do.' I try to explain that **scientists don't get it right the first time**. And that **engineers do not get it right the first time**. So, they all know, hopefully, that if it didn't work, it's okay."

Chauvin, a K-6 PLTW teacher in KCPS, appreciates the PLTW Launch curriculum because it teaches students that there is **more than one way to solve a problem**. "I always tell the kids: I have a question, but it has a thousand answers. There is no one correct answer. There are a thousand answers, so tell me what you think." KCPS students rise to the challenge, often coming up with solutions that Chauvin considers **"above and beyond."**



*I think they're definitely starting to warm up to the fact that Rome wasn't built overnight. I mean, failure's not always going to be a bad thing. I think that it allows for jumping off points, opportunities to ask good questions when you're having to go back and redesign."*

- KCPS PLTW Launch Teacher

In addition, KCPS' use of PLTW Launch with students who are English language learners and students who have special needs **provides opportunities for all** students to work through problems in their own way. McLemore shared her excitement about watching her students with special needs complete PLTW projects. She praised the level of focus that her students display while working and noted that they often come up with designs and models that their peers do not. Another PLTW Launch teacher expressed appreciation for the **Spanish PLTW Launch** curriculum and shared that it has been critical for some English learners who have questions or **need to experience** the curriculum **in their native language**.

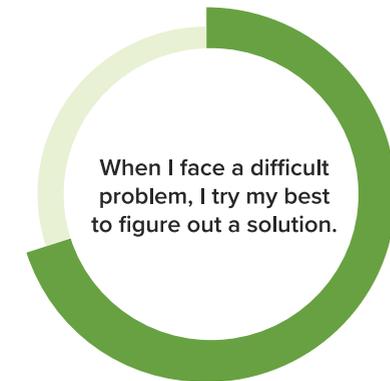


*Usually there is a lot more [focus] on our decisions and ideas on the topic instead of a correct answer."*

- 5th grade KCPS PLTW Launch student



**70%**  
agree



**70%**  
agree

Source: 2021 KCPS 2nd-5th Grade Launch Survey Results



## Critical and Creative Thinking

Critical thinking is another skill that KCPS prioritizes for its elementary students. “Part of our vision statement is that we want to **help students become critical thinkers**. That’s a huge piece of the [PLTW] Launch class,” stated Julie Lynch, principal of Hale Cook Elementary. She notes that the PLTW Launch program addresses the need for students to move into **higher order thinking skills** and apply those skills. “If we are looking down the road to when students are leaving the K-12 system—whether that’s going into the workforce immediately, whether that’s going to a trade school, whether that’s going to college—all those things **encompass needing the skills of being able to analyze, build something, or create**...When our first graders can design a shoe that will be best suited for a certain part of the world, they are putting those skills into action as a first grader.”

McLemore also witnesses students develop critical thinking skills as they progress in their PLTW lessons. “To me, **this is long-term**. It’s preparing them for life skills where they have to, like I said, think like an engineer. Where they have to solve problems and solve issues...Where they really have to think and use critical thinking.”



PLTW Launch not only encourages students to **think creatively**, but also reaches a variety of learning styles. Takeisha Brown, principal of Wendell Phillips Elementary School, suggests that PLTW provides an alternative to traditional written assignments by providing **opportunities for visual, tactile, and auditory learners** to thrive. Furthermore, Stephanie Kimbrough, a PLTW Gateway teacher, reports that middle school **students request PLTW Gateway** because of its non-traditional approach to learning. Students with different learning styles **want to enroll** because of the kinesthetic opportunities and tactile nature of PLTW courses. By engaging a variety of learning styles, PLTW Launch meets young learners’ academic needs. And as students move up to middle and high school, they can use their critical and creative thinking skills to **generate solutions to more complex real-world problems**.



***We were making hats [to] survive certain environments. I got the rainforest... I decided to cover it like camouflage... I was thinking about the animals that would be above me... I put Saran wrap on it, so that rain couldn’t get in... I worked so hard and I felt like it paid off!”***

*- 3rd grade KCPS PLTW Launch student*



***[PLTW] allows innovation and allows students to show their strengths. Everyone isn’t a paper and pencil type of person...PLTW provides opportunities for those students who are more hands-on and project-based learners.”***

*- Takeisha Brown, KCPS PLTW Launch Principal*



## Collaboration

KCPS students rely on each other to get questions answered and work in teams to tackle activities like attempting to get a tiger over a wall using simple and compound machines. Chauvin often encourages her students to collaborate. And while some students are initially reluctant to work in groups, they make the best of it. “Some of the kids would prefer to do it themselves. But I try to explain to them that, **in this world of ours, you really won’t work alone.** Sometimes you may like the people you are working with. Sometimes you may not like the people you work with. You just have to figure out a way to get along.”

A parent of two PLTW Launch students agrees. She noted that her children are not always in groups with their closest friends; and when a teacher intentionally mixes up groups, students learn how to work with others. “They’re learning **‘how do I work with somebody that I don’t like.’**”

The parent added that PLTW Launch builds students’ social skills **through teamwork and collaboration.** And, as highlighted by Kimbrough, students of all abilities benefit from interacting with students who are different from themselves. Because of teamwork and peer interactions in their PLTW classes, she has observed students who are not English learners and without special needs **develop more sensitivity toward their peers.**



*We have almost never done something independently... We’ve done everything in a group... I just really enjoy doing things independently, but I will work with groups if I have to.”*

*- 3rd grade KCPS PLTW Launch student*



*I think one grade that really stands out to me in terms of [collaboration] is my 3rd grade [class] where they were designing and using simple machines with the VEX builds and they were able to design a machine that would actually rescue an animal...And they even were able to work as groups for presentations. So, to see that at [a] 3rd grade level, in my opinion, is quite impressive. And a lot of that again was self-driven—providing them necessary tools from PLTW and the materials, but just allowing them to be self-regulating, driving [their] own learning and their own success.”*

*- KCPS PLTW Launch teacher*

## Communication

In addition to learning how to effectively communicate while working in teams, students practice their communication skills **through interactions with professionals**. KCPS teachers leverage their community connections and other resources to create opportunities for students to develop in this area. For example, one PLTW Launch teacher indicated that students present their infectious disease projects to the school nurse, while another mentioned bringing in a local physician to talk to 5th grade students about infections.

Furthermore, when asked to identify a time that her PLTW classmates did something well, a 5th grade student stated, “When we all presented our ideas on poster.” **She noted being proud of how confidently everyone spoke**. McLemore similarly shared the sense of excitement she experiences when she hears from parents that her **more withdrawn and less confident students enjoy PLTW** and correctly use PLTW Launch vocabulary while outside of school. Through their PLTW Launch experiences, young learners at **KCPS develop important presentation and dialogue skills**, while simultaneously gaining a better understanding of how their work applies to the real world.



*As these students explore the materials/equipment in the VEX construction kits, I observe how laser-focused and determined they are when they are allowed to have free-creative design opportunities. Then, they will beautifully articulate their design and it just amazes me how well their verbal expressions align with the design they have constructed!”*

*- KCPS PLTW Launch teacher*

# TRANSPORTABLE SKILLS OVER TIME

As outlined in **Blueprint 2030**, KCPS has proposed “**career exploration**” and “**competency-based education**” as its educational models for middle and high school, respectively. As part of this approach, KCPS secondary students will have the opportunity to continue to participate in PLTW courses, complete a career exploration course, and experience career pathways. Students will also **interact with industry professionals**, work on industry-related projects, and participate in internships—all of which will require them to communicate effectively, collaborate with others, utilize critical and creative thinking, and problem solve. The transportable skills that KCPS students gain through their experiences in **PLTW Launch will prepare them to successfully navigate** this rigorous career and college programming.



“The way we learn [in high school PLTW courses] is different...It’s more interactive. We’re actually using the stuff as we learn... If we’re learning how to make motors move, we’re actually building something that will make motors move. Whereas in other classes, we might learn how to do something, but we might not use it.”

- 10th grade PLTW student

It is **never too early** to begin developing critical transportable skills. By offering PLTW Launch to all of its elementary students, KCPS is **making an impact by ensuring access for all and providing young learners** with a competitive advantage in school, college, and career. As McLemore states, “I’ve had 6th graders tell me, ‘At first, I wanted to be a football player, now I’m rethinking what I want to do with my life.’... [PLTW Launch] helps with careers and getting [students] **prepared for life.**”

“Launch reaches students before they develop notions about what they can or can’t do. The curriculum lets them create, innovate and problem solve in fun ways as they work side by side with their classmates. And the cast of multicultural characters helps students relate and make connections about what is possible. It’s been rewarding to see KCPS make this commitment to reaching the early grades with accessible and inclusive STEM programming for all students.”

- Martha McCabe, Executive Director, KC STEM Alliance

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