

### INTRODUCTION TO YEAR TWO

Through the NYS Learning Technology Grant, teacher professional development focused on effective methods of integrating STEM into daily instruction as well as to provide an after-school enrichment opportunity for students. Professional development included in-person learning by facilitators from BrainPOP, Lego, and a planned continuation with Microsoft that was begun during Year One. Students from the Yonkers Public Schools and its partner schools within the city engaged in preparation for the district's second Lego Robotics competition scheduled for April. The 2019–2020 school year program, however, was abruptly interrupted by Covid–19 and the immediate shift to full remote learning. During these months of full remote instruction, Microsoft Teams training accelerated within the district. Professional development on using Teams, and other instructional technology programs, occurred multiple times each week from April through June in order to plan for full implementation of a primary digital platform that could offer a consistent approach across 39 schools and that would be robust enough to be used by all learners, children and adults. A fully-remote STEM program was piloted during the summer using some of the technology purchased through the LTG.

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# GOALS

### OUR PURPOSE (OUR STUDENTS)



### OUR PURPOSE (TEACHER LEARNING)



# THE PROJECT-BASED LEARNING METHOD



## THE PBL PROCESS

#### THE INQUIRY BEGINS WITH A DRIVING QUESTION OR COMPELLING PROBLEM TO SOLVE, ROOTED IN THE REAL-WORLD.

STUDENTS COLLABORATE IN SMALL GROUPS TO PROBLEM-SOLVE, RESEARCH, QUESTION, EXPERIMENT, AND INVESTIGATE.

#### STUDENTS GATHER, INTERPRET, AND USE EVIDENCE.

STUDENTS CONSTRUCT AND TEST POTENTIAL SOLUTIONS. STUDENTS CREATE A PROJECT THAT THEY WILL PRESENT TO THE COMMUNITY AND RECEIVE FEEDBACK.

STUDENTS ENGAGE IN REFLECTION ACTIVITIES ABOUT THE PRODUCT AND PROCESS.

### PROJECT-BASED LEARNING ENGAGES STUDENTS AND PROMOTES HIGHER LEVELS OF ACADEMIC SUCCESS



THROUGH PROJECT-BASED LEARNING (PBL), STUDENTS BECOME EXPERTS THROUGH DEEP STUDY OF CONTENT, PRACTICING HIGHER-ORDER THINKING SKILLS (PROBLEM-SOLVING, CRITICAL THINKING, CREATING) AND SEEING THE CONNECTION BETWEEN THE ACADEMIC AND THE OUTSIDE WORLD.

●→◆ ↓ ■←● THE PROGRAM'S GOALS EXTENDED WELL BEYOND LEARNING DISCRETE STEM LESSONS. THROUGH IMPLEMENTING PBL, STUDENTS ENGAGED IN "TRIAL AND ERROR" IN ORDER TO DEVELOP BETTER SOLUTIONS. THEY USED TECHNOLOGY TO FACILITATE LEARNING AND CREATING; THEY COLLABORATED IN TEAMS, AND THEY HAD FUN.

PBL IS STUDENT-CENTERED AND MORE ENGAGING FOR YOUNG LEARNERS. "HIGH MOTIVATION TOWARDS SCHOOL LEADS STUDENTS TO WANT TO KNOW MORE, TO ENGAGE WITH THEIR LEARNING, AND TO MAKE THE CONNECTION BETWEEN SCHOOL AND THE OUTSIDE WORLD" (SCHEER ET AL, 2012).



## AUTHENTIC LEARNING

The connection to real-world questions and problems is key to projectbased learning. To assist students in connecting new learning with knowledge they already hold, the projects must be well-organized, carefully scaffolded, and designed in a way that includes tasks that provide students with choices (Ausubel; Blumenfeld et al, 1991; Novak, 2002; Krajcik & Blumenfeld, 2006).





### THE VALUE OF SOLVING AUTHENTIC PROBLEMS



High motivation levels towards school leads students to want to know more, to engage with their learning, and to make the connection between school and the outside world (Scheer et al, 2012).



### DRIVING QUESTION

An important characteristic of inquiry-based learning methods, such as project-based learning, is that students become the "drivers of their education," collaborating to answer driving questions or solve compelling problems and creating a project that showcases their solutions (Blumenfeld et al, 1991; Lawson & Lawson, 2011, Scheer et al, 2012). Classrooms that have high levels of student autonomy and where students are encouraged to express themselves tend to have "higher levels of student mastery of content, higher engagement levels, and better learning outcomes" (Lawson & Lawson, 2011)

# WHY IS A DRIVING QUESTION IMPORTANT?

The driving question or compelling problem sets the inquiry in motion. It must be broad enough to allow for more than one "right" answer and it must be reflective of real-world issues. Well-crafted driving questions or compelling problems help students to see the connection between school and the outside world. Students have more of a personal investment in the work because "it engages them in real, meaningful tasks and problems that emulate what experts do in real world situations," (Dewey, 1959).







### PBL LEADS TO INCREASED MOTIVATION



Solving authentic, complex problems motivates students to want to learn more. It increases academic engagement and increases learning outcomes (Dewey, 1930; Kilpatrick, 1921; Blumenthal et al, 1991; Hernandez-Ramos & De La Paz, 2009).

### STUDENT-CENTERED LEARNING INCREASES ACHIEVEMENT

When we shift from traditional teacher-driven instruction to a more open-ended process that uses "inquiry, reflection, negotiating meaning, case and problem-based learning, discussion and collaboration, and self-directed learning" students achieve at much greater rates (Roessign & Chambers, 2011).



#### STUDENT-CENTERED LEARNING APPROACHES LEAD TO INCREASED PROFICIENCIES AND COMPETENCIES

Students become the experts







## CULTURAL RELEVANCE

Students need to see themselves in innovative and important roles. When children are provided with opportunities to be innovative, to create, to engage in meaningful learning, they excel (Moll & Gonzalez, 1994)



### CULTURALLY RESPONSIVE TEACHING IS POWERFUL

Research shows that the collaborative nature of inquiry-based approaches leads all students, regardless of race or socioeconomic status, to higher levels of motivation towards their academic work. By bringing the community into the classroom through the project-based learning construct we "deepen and enhance" children's "funds of knowledge." (Moll & Gonzalez, 1994).

### THE VALUE OF INQUIRY-BASED LEARNING

Through solving authentic, complex problems students become more motivated because they can see the connection between the classroom and the outside world, often leading to increased learning outcomes (Dewey, 1933; Kilpatrick, 1921; Blumenfeld et al, 1991). "...students need opportunities to construct knowledge by solving real problems through asking and refining questions, designing and conducting investigations, gathering, analyzing, and interpreting information and data, drawing conclusions and reporting findings" (Blumenfeld, et al 2000).



# FINAL NOTE

Covid-19 changed in-class interactions between teachers and students throughout the country, as well as the world. The LTG has helped us to meet these new demands by providing additional technology and professional development and encouraging innovation. While the LTG did not fund the pilot Summer Virtual Engineering Academy, it fostered an exploration of diverse methods of teaching and learning that were more engaging and effective in a fully remote and hybrid environment.





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