EDITOR’S NOTE
Project-based learning offers students the opportunity to develop the skills needed to address real-world challenges. This Spotlight will help you evaluate student group projects on both content mastery and collaboration skills; discover how experiential projects can help students become better problem solvers; gain insights for integrating real-world problem solving into classrooms; examine the positive effects of ‘capstone projects’ for high school seniors; and more.

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How to Assess Group Projects: It’s About Content And Teamwork

By Sarah D. Sparks

Group work is a time-tested strategy in many classrooms, but educators are starting to rethink how to evaluate these projects not just on the content students learn, but the skills they hone to work in teams as adults.

Collaborative problem-solving—the ability to work with others on new and complex problems—is one of the most highly sought-after skills by employers. It’s required under both the common-core math and reading standards and the Next Generation Science Standards. But it’s also notoriously tricky to pull off a project that builds both students’ cognitive and social skills as they meet content standards.

“As teachers, we assume students know how to collaborate,” said Diana Lowe, a curriculum director for math and science in the Texarkana, Ark., school district, which adopted project-based learning as part of its own shift to the Common Core State Standards.

In practice, though, Texarkana educators found group projects often foundered—not because students didn’t understand the content, but because they couldn’t work together successfully. The district has been working with the Buck Institute for Education, a nonprofit which provides teacher training on implementing project-based learning, to integrate both content and teamwork skills into assessing their group projects.

“Part of what makes it risky to launch collaborative problem-solving projects for a teacher is there’s a lack of research on how to set up contexts for problems,” said Art Graesser, a psychology professor at the University of Memphis in Tennessee who studies collaborative learning and problem-solving. “Emotions can be involved; the kids might fight over who gets to do what and ... have conflict because part of the construct is to try to get different people’s perspectives.”

Breaking Down Skills

In 2017, the Program for International Student Assessment released the first worldwide test of students’ collaborative problem-solving skills. U.S. 15-year-olds scored in the top 15 of the 52 participating countries, but fewer than 10 percent had strong collaboration skills. On average, U.S. students knew how to volunteer information or ask for clarification in a group, but they were less likely to be able to handle complex problems, mediate group conflicts, or evaluate the quality of their teammates’ work.

“Employers are asking us for specific things that kids can do ... to be able to solve problems on the road, to communicate well with each other,” said William Brazier, the professional-learning supervisor for the Loudoun County, Va., district, which launched a districtwide project-based and group-learning initiative in 2014. “Previously, the question was, ‘What information do I need to know for a test?’ Now that question is, ‘What work do I have to produce that will actually have an application in the world that makes collaboration much more important?’

More-typical group projects, such as science labs, don’t necessarily boost students’ collaboration skills. In fact, students who spent the most time doing practical experiments in science class performed 31 points lower on average on PISA’s collaborative problem-solving test than students who rarely did so.

That may be because group projects in which the answer is already known can make it easier for individual students to slack off, according to Graesser.

He recommended teachers instead set up problems in which students with different skill sets must come together to solve a new problem and produce something. “It’s very visible when you create something. Each person has to do their part or else it doesn’t work,” Graesser said.

The Loudoun district now requires its teachers to explicitly teach students collaboration skills as part of introducing project-based learning and has students develop ”contracts” laying out roles and agreeing to rules to guide discussions, such as active listening.

“What we think is needed is not simply assessing the teamwork, but it is training, practice, and feedback,” said Stephen Fiore, director of the Cognitive Sciences Laboratory and team cognition researcher at the University of Central Florida. Research has shown that people in teams taught how to distribute expertise and evaluate what they are discussing, such as the pros and cons of the solutions they develop have been found to produce the best work, Fiore said.

For teachers, that means the process of assessing group projects should include “explicitly quizzing [students] on whether they know what their team members are doing,” Fiore said. “When we look at the kinds of teamwork processes, we would break it down into: How well are they sharing information? How well do they recognize the roles the team members are taking on? Are they trying to meet the goals that the team has identified? How well are they addressing any conflict?”

Building Trust

Teachers in the Texarkana district mapped out both individual benchmarks for content in each project and a “soft-skills rubric,” which
they use to monitor students’ communication, creativity, and teamwork over the course of group projects.

“Even though you’re still measuring students’ individual progress toward the content standards, those soft-skill rubrics do give you a way to look at a team assessment that is not based on the student’s content knowledge,” said Rachel Scott, the director of the magnet program for the Texarkana district.

Teachers build up students’ skills in areas like listening, assigning roles, and monitoring each others’ work in short, low-stakes group activities before moving to major group projects, Texarkana’s Lowe said.

“It’s important as a teacher to establish a [collaborative] culture ... so that students develop some trust and appreciation for each other’s abilities and skill sets,” Lowe said. “It sets the tone for them being able to do more with their projects and teams.”

Renee Dooly, a 1st grade teacher at Chico Country Day School, a project-based charter school in Chico, Calif., said she builds in time for class reflections after group projects.

“Kids will be very honest,” Dooly said. “This year’s class ... they do have a hard time working together, but they are very good about saying, ‘Oh, this went well because we all had a turn to talk,’ or ‘This didn’t go well because so-and-so wouldn’t participate.’”

Emerging technology may also make it easier for teachers to assess students’ collaboration skills, by allowing teachers to track students’ participation in online planning discussions or edits to group projects.

Dooly said group projects allow students who struggle on traditional tests to show their academic strengths while also getting more support from their partners. For example, in an internal study of eight charter schools in Minnesota and Wisconsin, the EdVisions school network found students’ stronger scores on an assessment of collaboration skills were associated with better math and reading performance.

“You’re also going to have some kids who may not be able to perform at the 1st grade [level] work, but they really are putting the most effort into some part of the group project,” Dooly said. “Group work [becomes] a strength area for them.”
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Want Students to Become Better Problem Solvers? Then Teach Them to Fly Planes and Drones

By Kevin Bushweller

Rockville, Md. -

Pairs of Magruder High School freshmen are gathered at the controls of eight Redbird flight simulators, high-tech machinery with foot pedals and control panels that are used to train private and professional pilots how to take off, land, and maneuver aircraft safely under normal and dangerous circumstances.

The students in the second-floor classroom—some wearing COVID masks and others choosing not to—are all getting a taste of the thrill and potential dangers of piloting an airplane.

The surge in interest is fueled largely by the need in the industry because when you mix all those groups together, you get a higher IQ. You get better innovation,” said Tammie Jo Shults, a former Navy and Southwest Airlines pilot and author of Nerves of Steel, which recounts the problem-solving skills she put into action to safely land a Boeing 737 when it blew an engine at 32,000 feet. “We are not needed in the industry to make it fair. We’re needed in the industry because when you mix all those groups together, you get a higher IQ. You get better innovation.”

The free and relatively new curriculum—designed by the nonprofit Aircraft Owners and Pilots Association (AOPA) Foundation and used mostly in high school career and technical education programs—is spreading quickly across the country, growing from use in 29 schools in 17 states in 2017-18 to 322 schools in 44 states for the 2021-22 school year. Forty percent of the kids in the program are students of color and 21 percent are females.

The industry is also struggling to build a roster of pilots that features more women and people of color. Currently, only about 5 percent of aircraft pilots and flight engineers are women, 4 percent are Black, 2 percent are Asian, and 6 percent are Hispanic, according to U.S. Bureau of Labor Statistics.

“Women and people of different ethnicities, they bring a different perspective, a different energy,” said Tammie Jo Shults, a former Navy and Southwest Airlines pilot and author of Nerves of Steel, which recounts the problem-solving skills she put into action to safely land a Boeing 737 when it blew an engine at 32,000 feet. “We are not needed in the industry to make it fair. We’re needed in the industry because when you mix all those groups together, you get a higher IQ. You get better innovation.”

Brad Morrison, manager of pilot recruiting and development for American Airlines, said roughly half of his airline’s pilots are scheduled to retire within the next seven years and American needs to hire 2,400 pilots this year alone. There is also a big demand for airplane mechanics and other jobs due to retirements and the domestic and international expansion strategies of many airlines.

One 9th grader, Eleanor Kim, is not sure what career she eventually will choose as an adult, but she is seriously considering something related to the aviation industry. “I want to try this out,” she said. “It gives us a great plan for the future and future job options.”

The computer keyboards for the FAA-approved simulators feature red, green, blue, orange, and brown function keys for activating experiences such as flying in zero visibility, with a failed engine, or on autopilot. One student is approaching an airport for a landing, but veers sideways across the runway. Another applies too much power when taking off, flying up at an awkward, problematic angle.

In the years ahead, these 9th graders will learn the principles of flying airplanes and drones; tackle mathematical and engineering analyses around concepts such as torque, force, weight, distance, and altitude; learn how dead or malfunctioning batteries can unleash “runaway” drones; and investigate the possible causes of an airplane crash and how it could have been prevented.

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“What I tell kids now,” Morrison said, “is this is how I wish the industry would have been 20 years ago” when he was thinking of pursuing a career as a pilot. There are way more opportunities now to enter the airline industry in a variety of careers and get promoted quickly, he said.

Solving real-world problems: Investigating the cause of a plane crash

Ayman Bustillos, a Magruder senior who plans to study aerospace engineering at Embry-Riddle Aeronautical University in Daytona Beach, Fla., next year, has been in the AOPA program for four years. He said one of the most powerful and memorable problem-solving lessons he learned in high school happened when he was asked to investigate the cause of a catastrophic jet airplane crash. “That helped me in my decision to become an aerospace engineer,” he said.

The plane crash lesson—which is part of the curriculum—had Ayman and four other students work as a team to investigate why the plane crashed as it approached the runway. Ayman’s responsibility was to investigate the specifications of the airplane, its engines and its age; a second team member had to evaluate the quality of communications between the pilots and the air traffic control operators; a third, the weather conditions during takeoff, in flight, and on the landing approach; a fourth was tasked with pulling together all the data from the aftermath.
of the crash; and the last team member had to review previous airplane crashes to determine if there were lessons learned from those accidents that could be applied to this one.

“The whole point of the exercise was to work on a team and combine each other’s strengths,” said Ayman, who noted that the team’s final conclusion was that pilot error caused the crash.

Victoria Wentt, a recent Magruder graduate who is now attending a local community college, is working toward earning her private pilot’s certificate and hopes to one day fly for one of the major commercial airlines. She too found the opportunity to tackle a real-world problem like a plane crash much more meaningful than what she learned in most of her other classes in high school.

“We were the problem solvers,” said Wentt, who would be among a tiny percentage of Black female commercial airline pilots if she achieves her professional goal. “We had to figure out what happened and why it happened. We all learn off of other people’s mistakes. But in a plane crash scenario, you do not want to be the one making the mistake yourself.”

Despite the largely positive experience Ayman and Wentt had in the program, he suggested there is room for improvement. “The biggest flaw of the program was the lack of direct instruction,” he said. “Most of the time, you can do your own thing.”

That works well for highly motivated students like him, he said. But without enough direct supervision, others don’t take the work “as seriously as they’re supposed to.”

Luke Moitoza and Byron Barksdale are very serious about flying.

On this April morning, in their second period AOPA class, the two sophomores use plastic parts, wood pieces, tape, and rubber bands to build a miniature helicopter—an exercise to teach them about torque (a twisting force that prompts rotation) and how the rotor system of a helicopter affects its motion.

But after putting the tiny flying machine together, they twist the rubber band too tightly. When they let it go to see if it will fly properly, it shoots up like a rocket and smashes into the high ceiling in the Magruder classroom, the helicopter crashing to the floor after leaving one of its key propeller components embedded in the ceiling.

Byron, a high school baseball player wearing his blue and gray Magruder team jersey that day, eyes a tennis ball on his table, holds it in his hand for a moment, then throws it underhand at the ceiling, hitting a spot perfectly to make the purple helicopter part pop out of the ceiling and drop down. Cheers and laughter follow.

Then the two are right back at it, trying to put the helicopter back together, focused and serious with Moitoza wearing a black COVID mask and Barksdale maskless.

Moitoza, a 16-year-old with a military short haircut, received a $10,000 scholarship from AOPA to take flight lessons and is in the Civil Air Patrol. He plans to join the U.S. Air Force after college and hopes one day to fly B-21 bombers. Byron is thinking about entering the military to fly cargo planes.

In pursuit of his private pilot’s certificate, Moitoza did a solo flight in Winchester, Va., last fall, and a three-hour flight and night flight with an instructor. He is on track to get his pilot’s certificate when he turns 17.

‘The new frontier of flying’: Learning about drones

The AOPA curriculum has two tracks that students decide to take when they are juniors—the regular pilot pathway or the drone track. Because he has already learned a lot of the regular pilot skills on his own, Moitoza plans to enter the drone track because he wants to be licensed to fly both planes and drones. “That’s the new frontier of flying,” he said.

In a little more than a year, the number of FAA-licensed drone pilots in the United States increased from about 206,000 to more than 273,000, according to Glenn Ponas, the AOPA Foundation’s director of high school outreach and a former aviation teacher and district administrator for the Pittsburgh public schools.

But one of the hurdles for the Magruder program is getting approval from the county government to fly drones—either in a protected area inside the school building or outside on school property. School officials are working on making that happen. What complicates matters is the school is located close to Washington, D.C., which has some of the most-restricted air space in the country to fly regular planes or drones.

Natalie Webb, a junior in the program’s drone pathway, says it has taught her important problem-solving skills such as collaboration that are often absent in her other academic classes. She said having the opportunity to fly drones under the supervision of teachers would make the program even better. She hopes the school gets that approval before she graduates next year.

A 16-year-old competitive swimmer, Webb does not want to be a professional pilot of planes or drones. But she is now seriously considering a business management career in aviation because of the industry’s expanding opportunities.

That is music to the ears of Erik Yates, the AOPA Foundation’s director of curriculum development and a former public and international school teacher and STEM supervisor for 25 years, given that some career and technical education programs are often criticized for funneling students into narrow career pathways with few options to move in other directions. “If you can imagine a job, it’s in the airline industry,” he said, rattling off a bunch of non-pilot careers such as human resource management.

‘Flying does involve certain risks’

On a cold, drizzly afternoon in April, Yates is in an airplane hangar at the Montgomery County Airpark in Maryland, giving a presentation about the aviation industry and the myths surrounding it to a group of sophomores, including Luke and Byron. He occasionally pauses his presentation to accommodate the roar of charter jets or prop airplanes taxiing for a takeoff or coming in after a landing, and some kids turn to watch the planes.

Earlier that morning, the students had the opportunity to climb inside a charter jet and examine the cockpit, talk to current and retired airline pilots, and see how airplane mechanics work. The two mechanics working on this day are women.

When the din of the airplanes is far from the hangar, Yates talks to the students about US Airways Flight 1549, which hit a flock of birds after taking off on Jan. 15, 2009, from New York City’s La Guardia Airport and then lost all engine power. Yates told the students that the jet airplane’s captain, Chesley “Sully” Sullenberger, used problem-solving skills he had learned flying glider planes when he was younger to carefully guide the plane safely onto the Hudson River.

That story eventually led to a slide Yates showed on a large screen to the students about one of the myths about the airline industry: It is too dangerous. He pointed out that it is much safer to fly than to drive a car. (A few years ago, the National Safety Council compiled an odds-of-dying table, showing that the chances of dying in a motor vehicle accident to be 1 in 101 for a lifetime—for commercial airline flying and private flights, it concluded there were too few deaths to calculate lifetime odds.)

“We don’t hide from the fact that flying does involve certain risks,” he said in a follow-up interview. “But riding a horse involves certain risks, too.”

Luke weighed those risks before he took his first solo flight. But once the plane left the runway and took off toward the sky, he looked out the window and saw a passenger jet flying high above him, and he remembers thinking: “I’ve got this. This is why I’m flying.”

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*Education Week*, 2021

By Alyson Klein

The designers for Monte Vista Elementary School’s proposed outdoor classroom had some key questions to answer: What materials could they use while staying under the district’s $10,000 budget? How much square footage would work? How would they produce the scalable models the client wanted?

Those critical questions—which could have been considered at a local architecture firm—were part of just another math assignment in Robbi Berry’s 5th grade class at the Las Cruces, N.M., school. The prototypes the students created in class ultimately helped inform the work of the professional architects hired for the job.

And the project helped Berry’s students master some important 5th grade math concepts—such as adding and subtracting multidigit numbers with decimals. And the students did it without having to plod through boring math worksheets.

This problem-solving approach to teaching math to elementary school kids makes the subject much more intriguing and relevant, Berry and other educators say. It allows students to experience math the way it is used in real life, rather than as a pile of equations with no meaningful context.

It’s never too early to begin having kids learn math this way, experts say. Today’s elementary school students need to learn how to analyze, reason, and make complex decisions to improve their chances of success later in life, said Jo Boaler, a professor of education at Stanford University.

In the world of work, “it is not very useful to be somebody who has memorized methods to [answer] textbook questions, because the work that is in our world is very different from that,” she said. “In whatever job you go into, you need to problem solve, think critically, make connections between different areas. And we’re not just helping our students develop those kinds of capabilities” in most schools.

The benefits of a real-world problem-solving approach can stick with students for years, Boaler said. For a study published in 2017 in the Journal for Research in Mathematics Education, she followed a group of high school students who were learning math through real-world problem solving and another group—with similar socioeconomic characteristics—who were taught math in a more traditional way. (Boaler has not conducted similar research with elementary students.)

Eight years later, the students who had been exposed to the problem-solving methods were in higher-skill jobs and more likely to be looking at upward mobility in their careers than those who were taught more traditionally. The ones who had learned the traditional way said they saw math all around them in their professional lives but felt that their K-12 education had left them unprepared to use it for professional success.

What’s more, the problem-solving approach gives teachers the opportunity to introduce students to all kinds of possible careers.

Berry’s students, for instance, wear all sorts of professional hats to tackle math problems that she makes up based on real problems people face in the working world.

They’ve been event planners tasked with coordinating transportation to a wedding with 76 guests and four cars that can hold differing numbers of passengers. They’ve designed a house for a very picky client—played by Berry, doing her best posh lady voice. The house had to be built to certain specifications: a particular range of square footage, number of rooms, and sizes for those rooms.

The strategy gives students insight into how professional mathematicians think, Berry said. “Real mathematicians [see] a problem in the world, and they use math to solve it.”

More than one right answer, more than one right method

While those tasks make sense for 5th graders, kindergartners—and even preschoolers—can learn math through problem solving, Boaler said. She pointed to a lesson she created, called “foot parade,” in which children see pictures of the feet of different types of animals and are told to select as many creatures as they need to reach a particular number of feet. A cat and a bird, for instance, would be a total of six feet.

In the Howard County public schools in Maryland, elementary school math classes typically kick off with a problem-solving exercise, such as a discussion of a level-appropriate “target” number. For instance, students have a few minutes to brainstorm as many equations as possible to reach the number 147. Correct answers could be 100 plus 47, 823 minus 676, or other combinations of numbers. Students then share their answers in groups.

They must collaborate and recognize
Project-Based Learning

there are usually multiple ways to solve a problem, skills people in the working world exercise every day.

The goal is to expose “kids to different ways of thinking, without telling kids, ‘here’s the different ways you have to think,’” said John SanGiovanni, the district’s elementary math coordinator.

These math problems often have multiple correct answers, and multiple pathways for getting to a solution. That’s exciting for kids, Boaler said. “One of the things that has [turned] off so many kids [to math] is that [they] think it’s a subject with one answer and one method,” she said.

Whether the math problems are as intricate as Berry’s outdoor classroom challenge—or simpler, like Howard County’s “target number” exercise—the underlying goal is to “create interest and wonder,” and help students unlock the concepts behind operations like addition, subtraction, multiplication, and division, SanGiovanni said.

When students veer off in the wrong direction, it’s a chance to learn, Berry said.

“Mistakes grow our brain, we celebrate them,” she said. Going over a misstep is “when we have the best conversations.”

If a kid gets tripped up, Berry will ask the student privately if they are OK sharing their process with the class as a “favorite mistake.” If they aren’t, Berry will still share their work, but pretend the blunder was her own.

**Should teachers throw out their worksheets?**

Teachers using the real-world problem-solving approach can present the problem without initially giving instruction in the operations they might use to solve it, such as multiplication, Boaler said. That’s the reverse of how it’s done in a typical classroom where teachers say, “here are your methods, now do some questions that practice them.”

Flipping that traditional process on its head means giving students a rich problem first. Then, once they’ve given it some thought, a teacher can introduce methods that might help students find a solution.

“At that point, kids are interested. They’re like, ‘Oh, yeah, I need that method.’ Whereas, when you show them the methods first kids are like, ‘Why? Why am I doing this?’” Boaler said.

SanGiovanni agrees with that perspective, to a point. But in his mind, the occasional worksheet still has its place. “Ten [math] problems on a paper from time to time, it’s probably good for maintenance of a skill,” he said.

Plus, he emphasized that most kids won’t be able to learn all they need to know just by solving a big problem, he said. “There has to be some explicit instruction about some of the math,” he said. “You can’t just discover it all.”

**The problem-solving approach can be problematic for some**

Teaching math this way can be a lot to ask of teachers, students, and even parents.

Many teachers learned the subject through more traditional methods back in their student days, such as practicing math problems on worksheets before applying that knowledge to real world situations. They’re skeptical that young kids can learn this way, SanGiovanni said.

“Some of our teachers [believe] that you can’t solve this huge problem or this really cool problem, because you don’t know how to add three plus four yet, or better yet, you don’t know how to do it quickly,” he said. They say they “don’t feel like I can take the time” for the real world problem-solving approaches.

It’s also tough for some teachers to give up control, said Latrenda Knighten, a mathematics instructional coach in Baton Rouge, La.

“It is scary because you don’t know what answers you’re going to get,” she said. Children may get frustrated with the open-ended process, or a class discussion may veer off topic if every kid is encouraged to talk about the problem in their own way.

Another big hurdle: “There isn’t always access to good materials that frame lessons in [real world] problems,” SanGiovanni said.

While Boaler and others have created excellent resources, he said, “you teach kids for an hour and a half of math every day,” he said.

“That means you need 180 lessons, or 180 [real world] problems. And I know that some of those problems could be two or three days. But just the sheer volume isn’t there.”

Teacher preparation programs often don’t help prospective educators teach math through rich problem solving, particularly at the elementary level, he added.

District and school administrators may also push back against the approach. They worry students taught this way aren’t going to perform well on standardized tests, though those assessments increasingly measure students’ problem-solving abilities, Knighten said. “If we allow children to really internalize the concept, so that it sticks, you’re going to see [good test scores] because they’re going to make sense of it.”

Teachers get grief from parents, too, SanGiovanni said. “A lot of parents say they want their kids to be able to think and reason. They just don’t want it to look different from the way they learned,” he said.

Berry is quick to point out the real-world problem-solving approach was not the way the subject was taught when she was a student. That, she said, is largely why she grew up hating math and now makes it her mission for students to love it by the time they leave her classroom.

“Sitting in a seat, just doing problems out of a textbook, or me walking the kids through step by step on how to do a procedural. That, to me, is not authentic learning,” she said. “I don’t want them just to be test takers. I want them to be productive citizens when they leave me.”
Can ‘Capstone Projects’ Deepen Learning for High School Seniors?

By Stephen Sawchuk

Fremont High School teacher Maya Brodkey is laying out the next building block in her students’ high school graduation project—a yearlong assessment oriented around a research question students have developed on a social issue like homelessness, war, or vaping. They’ve already conducted hours of online research and written essay drafts outlining their problems; the next step is to deepen their understanding and gain additional perspectives through field research, including an interview.

Students can choose to use focus groups, which Brodkey points out can elicit great information about why people hold the beliefs they do, but can be hard to schedule. They can conduct a one-on-one interview with an expert, with the knowledge that any single anecdote or position is necessarily limited. Or they can draft a survey to get superficial feedback from a wide range of people, which sounds like a lot of fun to these seniors—until Brodkey explains that it also means collecting and analyzing the resulting data, and all those data are limited by how the students frame their questions.

She references student Joanna Gonzalez’s topic, which is on immigration policy and racism, clearly a front-burner issue in this diverse school system of 50,000.

“You can’t just do a survey for immigrants. What does that mean? Are you asking people if they immigrated in a particular category? Are they a particular age? Did they immigrate and now have citizenship? Are they the children of immigrants?” she points out.

The students gather in groups to start thinking about what kind of field research they will choose. Only a handful have ever conducted a formal interview before, and most are a little nervous.

“It’s no wonder: For most students, researching and writing about their topics represents the most sustained piece of writing they’ve had to do in high school, and field research isn’t even the last step. To graduate, they’ll have to craft a presentation about their topic for their entire school and respond to questions posed by a panel of teachers, almost as if they’re defending a thesis.

In High Demand

Oakland’s Graduate Capstone Project, as it’s called, provides a comprehensive look at how policymakers might think of structuring a yearlong performance test. Around 16 states have policies encouraging similar projects for high school graduation, but most of them don’t require it, and implementation of the projects tends to be uneven.

There’s nothing unique about the Oakland assessment’s individual pieces. What’s unusual is how they’re knit together comprehensively, with an eye toward making sure students’ mastery of research, writing, and oral skills matches the needs of what comes next for them.

“We really tried to learn from the mistakes of the past and think of this as not just a compliance policy,” said Young Whan Choi, the district’s manager of performance assessments. “It gives us an opportunity to improve the quality of the learning experience for students and develop some shared understanding of what we mean by a high-quality research paper, and a high-quality presentation, and what it means to be an Oakland graduate.”

All those skills are in high demand not only by colleges but also by employers, who say that few young people have the requisite oral-presentation or writing skills they expect of new hires.

“I have had students who have come back years later and said, ‘Having all these deadlines for different parts of the project helped me meet them for college,’” said James Barbuto, who teaches in nearby Skyline High School and oversees the capstone projects there. “I’ve never had a student who’s not been successful in some way, or gotten something out of it.”

Oakland teachers like Brodkey have encouraged students to select topics they’ve personally been touched by or feel passionate about. Partly, that’s because students need something complex enough to sustain a whole year. More importantly, it’s simply more authentic to a post-high-school world than topics like dress codes or cafeteria food.

“It sets them up to have a strong argument,” she said. “And with regard to civic education and engagement, when you pick a real issue, it’s easier to have a sense of agency.”

Joanna’s classmate Veex is examining problems faced by the Cambodian community here, many of whom are still suffering the aftereffects of the 1979 Khmer Rouge genocide. Another student, who fled from violence in Yemen a few years ago, has chosen to research the effect of the civil war there on youths.

Tuta Fili is among those students who’ve picked homelessness. “I had a best friend in elementary school who lived in his car for half a
A Renaissance

Oakland’s efforts constitute a renaissance of sorts for the program. District policy has required seniors to engage in a “serious research project or exhibition” since 2005. But until recently there was little consistency in student projects, according to Choi. Teachers treated oversight of the graduation project like a hot potato, a duty they passed off to one another in an “it’s your turn” rite of passage.

In effect, Choi said, the requirement contributed to stratification in the district: Some students got an opportunity to write in-depth research papers, but others didn’t—sometimes within the same high school.

In 2012, the district latched onto the requirement as a lever to focus the senior year and improve student civic engagement. During the first few years Oakland first worked with students in career and technical education, but over the last few years grant support has expanded the capstone projects to the general curriculum.

These evolutions have been implemented from the bottom up, rather than as a mandate. The Oakland district still gives high schools flexibility to decide whether to make the capstone a separate course or to work it into an existing one. And the district didn’t initially use common scoring guidelines to judge students’ writing, field research, or oral-presentation skills.

But as groups of teachers started adopting them on their own, they saw how it gave them a shared language for discussing student work, and improved equity by making sure each project was being judged by the same set of standards. Now, the district disseminates three sets of guidelines to all—one for the written paper, one on conducting field research, and one on the presentation—and offers teachers training on them.

For now, actual scoring procedures differ from school to school. At Fremont High, drafts of student papers are shared among faculty, and final versions are blind-scored by at least two educators. Students know that their work will have to satisfy even their most finicky teachers.

Not all schools have adopted the full Graduate Capstone Project—some still do a less-formal project or use a simpler scoring system. But the culture around the capstones is growing. For the class of 2018, two-thirds of graduating seniors participated in the full project.

Shaping Instruction

For teachers like Brodkey and Barbuto, the capstone truly comes down to instruction, not testing. It’s required them to rethink their own teaching approaches.

Both teachers say one of the most challenging lessons they teach has to do with sourcing, especially in identifying skewed news articles and making sure students weigh multiple, conflicting perspectives on their topics.

Barbuto has students read each source they turn up at least three times: once to weigh its credibility, including by looking at the publisher’s credentials and purpose; next, reading for background and context; and finally, synthesizing and seeing how it complements or alters their overall conclusions about their topic.

There’s also the big task of simply keeping tabs on students’ progress and providing the right supports, like helping them identify and link up to experts for their interviews.

Students feel the pressure, too. Senior Janeli Romero-Garcia describes the project as difficult, but doable.

“We’re not doing it all in a rush,” she said. “There are pieces here and pieces there, and they’re all coming together.”

Teachers are also thinking about how they want to see the capstone project evolve next.

Barbuto would like to see colleagues in earlier grades beginning to familiarize themselves with the scoring frameworks, so that it’s easier to help students build the foundational skills over time.

“When we first started doing this years ago, the immediate feedback from the students was that it was too much to expect them to master these skills in senior year. They needed to be practicing it every year,” he said.

Brodkey wants to double down on the social justice, community focus of her capstone teaching, inching the projects closer to action civics, in which students not only identify and research a problem but also try to use civic channels to help solve it.

“We continue to ask questions about: Should we keep capstone as a separate class? Should we fold it into English?” she said. “But there is not a question about whether we should do the project.”
Future-focused: Preparing for 2025 and beyond with iBlocks

As we look to the future, there are many unknowns when it comes to the world of work. Jobs that exist today may not exist in five years due to changes in technology and automation. The top future job skills cited by the World Economic Forum include critical thinking skills such as collaboration, problem-solving, and ideation. Also high on the list are social-emotional learning skills like resilience, stress tolerance, and flexibility. How can we make sure our instruction is building these skills and relevant for helping our students to deal with the challenges of a changing world of work?

Why focus on SEL in PBL?

To meet the demand for these skills, we need to provide students with project-based learning (PBL) opportunities which foster the development of both critical thinking and social-emotional learning (SEL) skills. Research shows that addressing the five competencies of SEL (self-awareness, social awareness, self-management, relationship building, and decision-making) positively impacts student academic performance. Of these skills, self-awareness and self-management are extremely important.

Project-based learning is focused on student choice and is student-driven, and therefore ideal for building these core competencies. It helps students take ownership of their learning, master self-assessment, and evolve as learners. Because PBL is an iterative process, students will see learning as a process they can guide, rather than a final product. These self-management skills will help students to become resilient, tolerate the stress they experience, and above all, develop flexibility.

When it comes to engaging in PBL, or other student-directed learning, it can be a difficult shift at first for some students. It can lead them to experience some frustration because it is open-ended and requires ongoing adjustments. As students try to solve a problem, they need to be able to process emotions, set goals, and push through the challenges faced. When this happens, being able to deal with these stressors and work through them will be essential for students now and in their future. This is why SEL matters and starting with a focus on self-awareness and self-management is key.

Promoting SEL through iBlocks

I recently met the folks at Teq and have been researching their iBlocks solution for PBL. I think it provides a good structure for students to work through projects and supports the development of SEL skills in some specific ways.

With iBlocks, students are working on authentic projects and will develop skills of self-awareness and self-management. Students have a Student Workbook and a Student Self-Assessment Rubric that are used as they work through each piece of the iBlock PBL experience. These are spaces where they can think through what they are learning, collect data, plan and document iterations, and reflect on the experience. It is so beneficial for students to have

www.iBlocks.com
this structured pacing and support available as it helps keep them on task while being open enough to remain student driven. Through iteration and reflection develop self-awareness as well as confidence in the process. By using the iBlock materials, it takes away some of that pressure for students of having to figure it out on their own.

The student materials also help teachers to facilitate rather than lead the learning. Essentially, iBlocks modules provide students with a structure that enables them to work with complex topics in a way that builds their skills over time and at a good pace so that they can build self-awareness and self-management skills. As a result, they will build resilience and be better prepared for the next PBL experience, and beyond.

As educators, we should continue to ask ourselves these questions:

- How can we create opportunities for students to drive their own learning?
- What options will provide a more interactive and collaborative experience, regardless of where learning is taking place?
- How do we weave SEL into our classroom and boost student engagement in learning?
- Which methods will provide students with the right skill development?

With the different iBlocks available, students engage in purposeful learning and figure out how to solve some real-world challenges. With each iBlock, teachers receive a Framework, Teacher’s Guide, Student Workbooks, and more. Our students can explore any area of interest and become innovators and problem solvers. They will learn about working as part of a team, pushing through failures, and engaging in hands-on STEM learning.

During an iBlocks experience, students will have gained essential knowledge and develop skills that will enable them to adapt to a changing world of education and work. To get started, download a sample iBlock: Rube Goldberg, Design a Comic Book, or Prosthetics.

The level of effort put into the materials by the curriculum team at Teq was evident. The Framework document outlined and explained each module of the iBlock and had helpful resources for the teacher to support students. The Student Workbook and Teacher Guide documents were also thought out and very helpful. Each student had a place to record their new understandings and document their iBlock journey.

The iBlock gave students the opportunity to explore the Engineering Design Process and build their understanding of Rube Goldberg and chain reaction contraptions. The students had a great time assembling their own RG machines and putting it to the test. They even had fun when things did not work as planned!

- Felicia Smith-Stephen - PS. 031 William T. Davis
With the knowledge that students will gain through their experiences, they will develop skills that will enable them to adapt to a changing world of education and work.

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Rachelle Dené Poth

This article was adapted from Rachelle Dené Poth's September 20th blog article. Rachelle is a Spanish and STEAM Emerging Technology Teacher at Riverview Junior Senior High School in Oakmont, PA. Rachelle is an ISTE Certified Educator and serves as the past president of the ISTE Teacher Education Network. Follow Rachelle on Twitter @Rdene915 and on Instagram @Rdene915.
Teach Like a Runner: 3 Ways to Get Started With Project-Based Learning

By Zachary Herrmann, Pam Grossman & Sarah Schneider Kavanagh

How can I get started incorporating project-based learning into my teaching?

Teaching is a lot like running.

Research has found that running as little as five to 10 minutes a day can have a massive impact on your health. In other words, you don’t have to go from a no-exercise lifestyle to an Olympic training regimen to see improvements. Taking small steps now can make a big difference later.

Similarly, project-based learning—an approach to teaching in which students create real solutions to real problems—can start with taking the equivalent of a five-minute run every day.

Consider authenticity, a core aspect of project-based learning. In our book, Core Practices for Project-Based Learning, we encourage teachers and leaders to think of authenticity along three dimensions: the students, the discipline, and the world. For each of these dimensions, here are simple changes you can make to build more authentic learning experiences for your students:

1. **Find connections to students’ lives.** So much of the work students do in school is disconnected from their daily lives. To help students make personal connections to their work, find ways for them to draw on their perspectives, beliefs, ideas, and values as they explore the big ideas of the lesson or project. In an English/language arts class, students might explore how the themes in a novel resonate (or don’t) with their own lived experiences. In a math class, students might identify patterns or phenomena that they find curious, then work to represent them mathematically to explore further.

2. **Engage in the work of the subject-matter discipline.** Rather than having students “learn about” math, science, or history, position students as mathematicians, scientists, and historians. For example, students can develop and refine mathematical models rather than do problem sets. They can design and run investigations to test hypotheses instead of listening to lectures. And they can work with primary-source documents to construct arguments about what happened in the past in lieu of memorizing names and dates.

3. **Link the work to the world outside the classroom.** Students deserve to engage in work that has meaning outside of the classroom. To do this, ask yourself three questions: What are students being asked to produce? Who is the audience for students’ work? And what is the potential impact that work has?

In many classrooms, the answer to these questions is that students are producing a paper or test for the teacher to review for a grade. But what if students produced something of value (an argument, solution, prototype, or proposal) for a real audience (the school, a community, a field, or an organization) that had the potential for a real impact (to educate, to raise awareness, to solve a problem, or provide a service)?

Each new school year begins with a sense of possibility. Project-based learning can be more exciting than intimidating if you start by incorporating just a few of its principles in your lessons. Even small changes can have a big impact on student learning.

Zachary Herrmann is the executive director of the Center for Professional Learning at the University of Pennsylvania Graduate School of Education. Pam Grossman is the dean and the George and Diane Weiss Professor of Education at the University of Pennsylvania Graduate School of Education. Sarah Schneider Kavanagh is an assistant professor at the University of Pennsylvania Graduate School of Education.
School is supposed to be a venue where students have numerous opportunities to engage in deep learning that will prepare them for their future. That learning is supposed to foster the ability for students to engage in their own learning around topics that they care about and perhaps even want to pursue after they leave high school and enter career and technical education, higher education, or the workforce in an internship capacity.

As teachers, we need to be allowed to explore issues with students like mathematical concepts, scientific problems that need our greatest thinking, or societal problems that need to be resolved. After all, we are supposed to empower students to feel they can change the world and not enable them to feel they can’t do anything to change it at all.

But everything becomes a political argument ...

Unfortunately, some issues are being barred from school. What are the adults so fearful of that they need to bar issues from being taught in schools when it’s those very students who can help us solve them? For example, the media and politicians seem to be consumed by critical race theory and cancel culture. The adults seem to be doing a lot of talking and making decisions about what students need to hear and learn and what is not acceptable to talk about in classrooms at all.

Those adults come from the left, the right, and in the middle.

Just for clarity, Merriam-Webster dictionary describes cancel culture as, “The practice or tendency of engaging in mass canceling as a way of expressing disapproval and exerting social pressure.” Vox further explains that “Conservative politicians and pundits have increasingly embraced the argument that cancel culture, rather than being a way of speaking truth to power, has spun out of control and become a senseless form of social media mob rule.”

As for critical race theory, Education Week writer Stephen Sawchuk offers an excellent explanation here. He writes,

“Critical race theory is an academic concept that is more than 40 years old. The core idea is that racism is a social construct, and that it is not merely the product of individual bias or prejudice but also something embedded in legal systems and policies.”

It seems that critical race theory is experiencing cancel culture.

Many have accused those who are trying to bar critical race theory being taught in the classroom as racist. In an Education Week blog post titled “Resisting ‘Anti-Racist’ Education Is Neither Racist Nor Unreasonable,” opinion blogger Rick Hess writes, “The issue, I’d argue, is that the backlash is not to this broadly-supported version of anti-racist education. Rather, the opponents are reacting to the ideas and educational practices promoted by some of anti-racism’s most visible and ardent adherents—ideas at odds with the values and beliefs of most Americans.”

Why Not Let Students Explore These Issues?

What the adults seem to be missing here is that critical race theory and cancel culture need not be taught by teachers as much as those concepts need to be explored by students. Instead of educators standing at the front of the classroom teaching students about CRT and cancel culture using direct instruction, perhaps those same teachers could support students as they explore these issues, and many, many more, through project-based learning.

In fact, in that same Hess article questioning the unreasonableness of resisting anti-racist education, he writes,

“As a onetime social studies and civics teacher (who long ago taught selections from Frantz Fanon, Lao Tse, and Marx to my high schoolers, alongside the Founders and Adam Smith), I’ve long supported efforts to look unflinchingly at American history and society, be inclusive of new perspectives, take differences more seriously, reexamine troubling practices, and do a much better job meeting the needs of all learners.”

I agree with Hess that we should encourage teachers and students to reexamine troubling practices like he was allowed to do when he was a teacher. Issues like red lining (watch Segregated By Design by Richard Rothstein),
Countless schools prioritize what’s comfortable for adults, not what’s best for students.”

PROJECT BASED LEARNING
Ross Cooper & Erin Murphy

“Global Cultures is a class that changes dramatically from year to year as we try our best to study some of the most pressing and interesting issues that are in the news. In most years, we will explore 6-8 issues that deal with conflict and/or development. Recently, we have studied the conflict in Yemen, the economic collapse of Venezuela, arguments about a universal basic income, populist movements, pandemics (before COVID-19), and the treatment of refugees.”

If you have time, please consider watching the episode of A Seat at the Table because it was a powerful conversation, and we explored what PBL is and how it can be used to teach anything from career technical concepts to critical race theory and cancel culture.

In the End

I had a more conservative family member contact me lately and ask why critical race theory needs to be taught and suggested we focus on how we are the same rather than focus on issues that divide us. The issue is that there are so many disparities in our country for Black and brown people and they do need to be explored so they can be resolved. In that exploration, we can begin to come together to understand what we have in common and can even look at how we can come together in more authentic ways.

One of the ways teachers and students can explore these issues is through PBL. Unfortunately, more and more states are passing legislation that bars that from happening. However, what we know is that those states don’t need legislation to bar those issues from being taught. Teachers will self-select not to teach it anyway, because they lack the confidence or the support to teach those issues. Both are examples of how cancel culture and critical race theory intersect.

In their recent book, Project Based Learning, Ross Cooper and Erin Murphy say it best when they write,”Based on what we’ve experienced, countless schools prioritize what’s comfortable for adults, not what’s best for students. And then we take issue with students when they don’t buy into what we’re doing.”

Thank goodness for teachers like Cone and students like Taylor and Tudryn who don’t shy away or bar these conversations but instead try to gain an understanding of all sides of the issue.

Peter DeWitt is a former K-5 public school principal turned author, presenter, and leadership coach.
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