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2018 SALARY & JOB SATISFACTION SURVEY

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Salaries are up among ed tech professionals this year. So is optimism for the future of the profession.

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Using project-based learning in support of clear curriculum goals leads to deeper learning and engagement for these school systems.



IT's Predictions & Concerns for 2018

FOR THE THIRD TIME running, we're kicking off the new year with our IT Salary & Job Satisfaction Survey, a look back at the state of the ed tech workplace and a look ahead at the hopes and aspirations of the professionals who help make technology work in and out of the classroom.

This time around though, we also wanted to ask our participants – mainly IT staff and leaders, but also technology-using teachers – about their gravest data security concerns and about the shifts or trends they foresee in education technology in the next five years.

We did this through two open-ended questions (our favorite type of survey response to tabulate), which generated some surprising, some notso-surprising, some amusing, some concerning and some thought-provoking answers.

What will be the biggest shift in IT in the education sector over the next five years?

The bulk of responses were not terribly unexpected. Anybody in ed tech could probably rattle off the top 3 answers off the top of their head:

- 1. Mobile/BYOD/1-to1 devices
- 2. Cloud computing
- 3. Online/virtual education

Privacy and security came in fourth, which makes sense given the pressures put on schools and vendors to protect student data. Somewhat surprisingly, virtual and/ or augmented reality came in fifth surprising in that it beat out STEM (sixth), personalized learning (seventh), digital textbooks (eighth), networking/wireless/ broadband (ninth).

Artificial intelligence rounded out the top 10. Some of the less popular but thoughtful responses couldn't be so simply categorized: Wrote one respondent: "Meeting the student perception that they are a consumer of education products not students. When they have this mindset, they want to be entertained first, educated second."

Wrote another not-too-terribly optimistic respondent: "Teachers will be removed and replaced with non-professional trainers."

On the more positive side, one said we'll see a shift that results in "a more nuanced understanding of how tech affects the brain and learning," and another said we'd see "a change in teaching pedagogy and training

- the infrastructure and devices are in place."

What will be the biggest data security threat to your institution over the next five years?

On the open-ended question of data security fears, most of the top 5 answers were related to one-another:

1. Hackers/data breaches (by far the top response)

2. End users (employees, students and users' personal devices)

- 3. Ransomware
- 4. Phishing
- 5. Cloud

Malware received honorable mention in sixth place.

The snarkiest responses were all related to end users, in particular contempt for their carelessness, incompetence or predilection for clicking on malware links in e-mails. But there was also a common theme of caring that ran throughout the responses: a concern for the wellbeing of students, teachers and staff, both for their personal safety and for the security of their information.

To continue the conversation, e-mail me at dnagel@1105media.com.



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With only three exceptions, salaries are up across the board for technology professionals in K-12 education in the last two years. The biggest gripe continues to be (not terribly surprisingly) budgets.

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or technology professionals, education has been a rewarding place to work over the last year.
 Salaries are up for the most part; job satisfaction is high; and the outlook for the future is positive
 these according to the results of our third-annual K–12
 IT Salary & Job Satisfaction Survey.

Salaries

Overall, the average salary for technology professionals in education (excluding classroom teachers) was \$66,640 in 2017 - up about \$3,000 from 2015 (fig. 1).

While C-level salaries were up on the whole (\$100,400 in 2017 versus \$99,045 in 2015), CIO salaries themselves declined from \$105,469 in 2015 to an even \$100,000 in 2017. That, however, is a slight recovery from 2016's average of \$99,583. (C-level includes CIO, CSO, CTO and CDO.)

Project managers and help desk/ support staff salaries took a hit in this year's survey as well. Project managers declined to \$70,636, down from \$74,940 in 2015. Help desk/support fell slightly over the same period, from \$41,425 to \$40,410.

The most substantial positive jumps over the two-year period were:

Systems administrators, who leapt more than \$18,000 – from \$60,035 to \$78,800;

■ Web developers, who climbed \$17,000 from \$58,000 to \$75,192; and

Database administrators, who jumped nearly \$11,000 from \$76,436 to \$87,000.

In the broader categories (fig. 2), several even more substantial jumps were seen over the last two years.

The average for those in systems analysis went from \$41,938 in 2015 to \$74,664 in 2017, a gain of more than \$32,000;

Applications and development staff saw an increase of \$22,000, from \$57,256 in 2015 to \$79,650 in 2017;

Web/digital media staff rose about \$19,000, from \$58,633 to \$77,667; and

Database/business intelligence staff rose almost \$15,000, from \$76,436 in 2015 to \$91,333 in 2017.

Respondents from the smallest schools or systems (0-499 students) had the lowest overall weighted average salary, at \$59,456 (\$58,874 at small private schools, \$59,731 at small public schools). Employees at the largest schools (3,000 or more students) had the highest weighted average salary: \$79,552 (\$77,742 private, \$80,300 public).

Elementary schools had the lowest salaries on average – \$60,161 for tech pros in public elementary schools (excluding teachers) and \$52,700 in private elementary schools. The average for public secondary schools was \$62,604 and, for private secondary schools, \$62,926. Those at public combined elementary came in at an average of \$73,225. Private combined schools came in at an average tech salary of \$70,206, excluding teachers.

Job Satisfaction

Technology professionals in education are, for the most part, quite satisfied with their jobs. About 84 percent plan to stay in their current position in the coming year (fig. 7), with just 16 percent expecting to leave their current employer. That's not terribly surprising, given that a majority of respondents have been with their present employer for 11 or more years, with a full 20 percent at 21-plus years (fig. 4).

Overall, more than three-quarters (77 percent) are satisfied or very satisfied in their jobs (fig. 9), with just 9 percent unsatisfied or very unsatisfied.

So what do tech pros like the most?

• Co-workers received the highest satisfaction rating, at 80 percent either satisfied or very satisfied;

Physical comfort came in second at about 79 percent;

Commute came in at a 71 percent

FIGURE 1

INDIVIDUAL SALARIES WHAT IS YOUR CURRENT SALARY?

	OVERALL (EXCLUDING TEACHERS)	cio	DIRECTOR OF INFORMATION TECHNOLOGY/IT DIRECTOR	DATABASE ADMINISTRATOR	PROJECT MANAGER	IT MANAGER	SYSTEMS ADMINISTRATOR	NETWORK ADMINISTRATOR	WEB DEVELOPER	TECHNOLOGY TEACHER
2018 AVERAGE	\$66,640	\$100,000	\$82,843	\$87,000	\$75,778	\$68,652	\$78,800	\$61,553	\$75,192	\$57,036
2017 AVERAGE	\$65,742	\$99,583	\$78,997	\$76,333	\$85,667	\$71,208	\$50,000	\$51,556	\$63,000	\$61,039
2016 AVERAGE	\$63,776	\$105,469	\$76,052	\$76,436	\$75,029	\$62,752	\$60,035	\$58,735	\$58,000	\$56,905

Overall average weighted by institution type; individual titles not weighted. All figures rounded.

satisfaction rating;

- Hours were fourth at 70 percent; and
- Rounding out the top 5, supervisors

received a satisfaction rating of 68 percent.

Only three aspects of the job received dissatisfaction ratings greater than 20 percent:

Departmental budgets, with 37 percent of respondents being either dissatisfied or very dissatisfied;

Salary (somewhat surprisingly), with 30 percent dissatisfaction; and

• "Top brass," with a 23 percent dissatisfaction rating.

Looking Ahead

The outlook in technology in the K-12 education sector is positive. More than two-thirds of respondents said they expect to see healthy or unbridled growth and opportunity in the future (fig. 8). Another 27 percent predicted continued stability. Just under 6 percent said the sector is in a slow decline. And, for the first time in this survey, zero respondents predicted doom in the near future.

A majority of our respondents said they expect to receive a pay raise (fig. 5) in the next year (51 percent), though the vast majority (91 percent) said they won't receive a new title to go along with it (fig. 6).

Methodology

THE Journal polled its readership in the summer and fall of 2017. We put out an open invitation to IT professionals in edu-

FIGURE 2

GROUPED S	SALAI	RIES	RIES WHAT IS YOUR CURRENT SALARY?										
	C-LEVEL (CIO/ CTO/CSO/CDO)	OTHER IT MANAGEMENT	PROJECT MANAGEMENT	DEVELOPMENT/ APPLICATIONS STAFF	DATABASE/ BUSINESS INTELLIGENCE STAFF	NETWORK/ DATA CENTER MANAGEMENT	INSTRUCTION DESIGN/ TECHNOLOGY	NETWORK/ DATA CENTER/ SECURITY STAFF	WEB/DIGITAL MEDIA STAFF	SYSTEMS ANALYSIS	TRAINER	HELP DESK/ COMPUTER SUPPORT	LIBRARIAN/ LIBRARY MEDIA SPECIALIST/ MEDIA SPECIALIST
2018 AVERAGE	\$100,400	\$78,140	\$70,636	\$79,650	\$91,333	\$68,810	\$66,774	\$68,810	\$77,667	\$74,664	\$65,576	\$40,410	\$57,305
2017 AVERAGE	\$102,075	\$76,806	\$75,167	\$65,333	\$75,449	\$66,383	\$70,157	\$51,154	\$61,193	\$56,000	\$61,195	\$45,107	\$59,034
2016 AVERAGE	\$99,045	\$72,994	\$74,940	\$57,256	\$76,436	\$61,048	\$64,329	\$60,774	\$58,633	\$41,938	\$55,185	\$41,425	\$57,049

Unweighted averages. Figures rounded.

FIGURE 3

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IT EXPERIENCE

Most respondents have been in IT for more than 10 years.

How Long Have You worked In IT?	0-2 YEARS	3-5 YEARS	6-10 YEARS	11-20 YEARS	21 OR MORE YEARS
PUBLIC	19%	13%	21%	25%	22%
PRIVATE	15%	17%	17%	34%	17%
WEIGHTED AVERAGE	18%	14%	20%	27%	21%

Responses were weighted by institution type. Figures rounded.

FIGURE 4

TIME WITH CURRENT EMPLOYER

Most respondents have been with their present employer for more than 10 years.

HOW LONG HAVE YOU BEEN WITH YOUR PRESENT EMPLOYER?	0-2 YEARS	3-5 YEARS	6-10 YEARS	11-20 YEARS	21 OR MORE YEARS
PUBLIC	9%	14%	19%	38%	20%
PRIVATE	12%	20%	27%	22%	19%
WEIGHTED AVERAGE	9%	16%	21%	34%	20%

Responses were weighted by institution type. Figures rounded.

Technology professionals in education are quite satisfied with their jobs. About 84 percent plan to stay in their plan to stay in their current position in the coming year (fig. 7), with just 16 percent expecting to leave their job.

Image Flow/Shutterstod

cation and incented them to participate with a \$250 Amazon gift card as a prize for one randomly selected winner and promised confidentiality for respondents. The survey was advertised on thejournal. com and in newsletters and e-mail promotions to our subscriber list, and recipients were asked to encourage colleagues to participate as well.

We received 490 completed surveys. Responses were manually culled that were clearly false or inappropriate for the survey. (For example, several higher ed IT staffers responded to the poll; their answers were excluded, as were responses from faculty members and non-IT staff and administrators except those who held dual positions in technology.)

The final tally for qualified respondents was 338, of which 326 were from public institutions, the rest from private institutions. Where noted in the figures accompanying this article, vetted responses from qualified public and private institutions were weighted by institution type to be representative of the nation as a whole based on data from the United States Department of Education.

We also asked for, but did not weigh against, geographic location and size of the institution's student body.

Geographically, our respondents tracked

FIGURE 5

PROSPECTS FOR SALARY GROWTH

A large minority of respondents expect to receive a pay increase next year

DO YOU ANTICIPATE RECEIVING A RAISE WITHIN THE NEXT 12 MONTHS?	YES	NO
PUBLIC	49%	51%
PRIVATE	59%	41%
WEIGHTED AVERAGE	51%	49%

Responses were weighted by institution type.

FIGURE 7

TURNOVER

Most IT workers in K–12 expect to stay put for the next 12 months.

DO YOU EXPECT TO LEAVE YOUR CURRENT EMPLOYER WITHIN THE NEXT 12 MONTHS?	YES	NO			
PUBLIC	18%	82%			
PRIVATE	12%	88%			
WEIGHTED AVERAGE	16%	84%			
Responses were weighted by institution type.					

FIGURE 6

PROMOTIONS

Few people's titles will be changing in 2018.

DO YOU ANTICIPATE RECEIVING A PROMOTION WITHIN THE NEXT 12 MONTHS?	YES	NO
PUBLIC	8%	92%
PRIVATE	12%	88%
WEIGHTED AVERAGE	9%	91%

Responses were weighted by institution type.

The outlook for K–12 ed tech is positive. More than two-thirds of respondents said they expect to see healthy or unbridled growth and opportunity in the future (fig. 8). somewhat closely with ED's regional data for K-12 institutions (using census regions), with the East South Central region the only significantly overrepresented area. New England: 6.8 percent; Mid Atlantic: 11.8 percent; East North Central: 14.2 percent; West North Central: 6.8 percent; South Atlantic: 30.2 percent; East South Central: 8 percent; West South Central: 8.8 percent; Mountain: 5.9 percent; and Pacific: 7.4 percent.

The breakdown in student body size among vetted respondents was: 0-499: 19.8 percent; 500-999: 26.7 percent; 1,000-1,499: 15.4 percent; 1,500-1,999: 5.3 percent; 2,000-2,999: 7.4 percent; and 3,000 or more: 25.4 percent.

The survey consisted of 14 questions,

13 of which were mandatory. A final open-ended question asking for additional comments was optional.

David Nagel is editor-in-chief of *THE Journal* and editorial director for 1105 Media's education publications.

FIGURE 8

INDUSTRY OUTLOOK

Most respondents foresee a healthy future for the sector.

WHAT IS YOUR OUTLOOK FOR THE FUTURE OF IT IN EDUCATION?	UNBRIDLED GROWTH AND OPPORTUNITY	HEALTHY GROWTH	CONTINUED STABILITY	SLOW DECLINE	DOOM IN THE NEAR FUTURE
PUBLIC	14%	53%	27%	6%	0%
PRIVATE	10%	58%	27%	5%	0%
WEIGHTED AVERAGE	13%	54%	27%	6%	0%

Responses weighted by institution type. All figures rounded.

FIGURE 9

JOB SATISFACTION

Salary, departmental budgets and "top brass" were the sorest points for our survey respondents.

PLEASE INDICATE YOUR LEVEL OF SATISFACTION WITH YOUR CURRENT JOB.	VERY SATISFIED	SATISFIED	NEUTRAL	UNSATISFIED	VERY UNSATISFIED
OVERALL	23.92%	52.82%	13.95%	4.65%	4.65%
SALARY	11.30%	33.55%	25.58%	19.93%	9.63%
BENEFITS	17.00%	48.00%	19.67%	10.67%	4.67%
HOURS	22.59%	47.84%	15.95%	8.31%	5.32%
SUPERVISOR	31.13%	36.75%	16.56%	8.94%	6.62%
TOP BRASS	15.61%	32.23%	29.24%	13.95%	8.97%
CO-WORKERS	33.22%	47.18%	12.96%	3.32%	3.32%
PHYSICAL COMFORT	26.25%	52.49%	14.62 %	3.65%	2.99%
EQUIPMENT	19.93%	42.52%	19.27%	14.29%	3.99%
YOUR DEPARTMENT'S BUDGET	11.30%	27.57%	23.92%	23.26%	13.95%
СОММИТЕ	42.72%	27.81%	14.90%	9.60%	4.97%

Responses not weighted. Responses from teachers excluded.



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INSPIRING INNOVATIVE LEARNERS



ED TECH TRENDS TO WATCH IN 2018

BY DIAN SCHAFFHAUSER

Delivering authentic experiences in the classroom and learning how to juggle district data are two wide themes that will monopolize education discussion in the new year. 0

NE DAY in late October the mayor of Johnsonville was setting up a 125-gallon aquarium, which would eventually host a pair of bala sharks, a catfish, three oscars and live coral for real-life science lessons on saltwater habitats. Anthony

Johnson's fourth and fifth graders at Isenberg Elementary School refer to the tank as "Lake Johnsonville."

Bringing the real world into the classroom is something a lot of teachers are trying to do. It's something Johnson specializes in. His students are issued funds when they become residents, then they're expected to pay bills, find work and learn by doing projects. And the mayor is a stickler for keeping schedules, so his students learn how to work with Google calendars to maintain their obligations and appointments. Earlier in the day, a student was waiting at home with his district-issued iPad, ready to connect Johnson to his mom for an online parent-teacher conference. "That kid set a reminder. He knew at 11:10 we needed to be on that [video] call," said Johnson. "When I turned it on, he was there waiting for me."

Project-, problem-, big-picture, or competency-based learning all describe movements afoot to immerse students in authentic experiences, which proponents of PBL have long heralded as the route to deeper learning. The challenge for teachers, of course, is coming up with those engaging lessons.

At Isenberg, located in Salisbury, NC, Johnson relies on a school subscription to

DefinedSTEM, a repository of resources that lays out the basics through videos, then provides experiments and projects – "performance tasks" in DefinedSTEM lingo – for students to follow as they learn new concepts. "Everything is there for the kids," Johnson said. "It's great because I'm not the teacher doing that problem-based learning. I become the facilitator."

Tapping into young people's interests in how the world works is just one ed tech practice we see on the rise. But it's not the only one. This article explores



Johnsonville students building solar ovens (left) and testing chemicals and physical properties in hands-on learning exercises

FEATURE | TECH TRENDS

how a handful of trends – adoption of virtual reality, growth of making, a bigger emphasis on computational thinking and continuing concerns about the protection of school data – are evolving in new ways that we believe will dominate education conversations in 2018.

Virtual Reality

Sure, there's plenty of talk in schools about how virtual reality (and its lesser-used partner, augmented reality) can deliver experiences to students that they might not otherwise have. What's beginning to bubble up more frequently, however, according to Chelsea Waite, program director for global learning at Digital Promise Global, isn't so much the consumption as how students are making use of new technologies "to be creators."

Waite is one of the leads behind the 360 Filmmakers Challenge, a program that works with Oculus to outfit schools with VR technology, including headsets and cameras (as well as basic training), and then encourages students to make videos on topics that matter to them. As a result of the filmmaking projects, the organization explained in a report issued earlier this year based on surveys and interviews with teachers and students, participating teens gained technical and creative production skills, got exposure to new career possibilities, increased their ability to take in the perspective of others and improved their ability to communicate and work on teams. Just as important, the survey found, the projects had "personal importance" for the students; and those who made the videos found the projects "more interesting" than other school work.

Waite insisted that high-end VR gear isn't needed to spark usage in the classroom. As the equipment – both headsets and cameras – come down in price and free and cheap smartphone apps are developed that allow for virtual world creation, "there are increasingly easy entry points from the production perspective."

Making

In 2016 Digital Promise teamed up with Maker Ed to issue a pledge called the "Maker Promise" to school leaders and teachers, urging them to dedicate space and resources and time to the concept of "making" – activities in which the student does design and creation of physical or digital objects.

That kind of hands-on education as a movement in schools has been around for as long as CTE and vocational classes have existed. But somehow, according to Josh Weisgrau, program director for maker learning at Digital Promise Global, we've set the maker movement apart as a distinct entity – something done alongside other programs of study.

As 2018 unfolds, we're going to start seeking a clearer distinction "between the maker movement and [making] in schools and in education." The shift, he explained, will be from "learning about making to learning through making." As a result, making will begin permeating all curriculum, as another great tool used by teachers for helping to personalize the learning.

"Not every teacher is going to be invested in creating the next generation of makers or engineers," Weisgrau added. But they're all invested in figuring out how best the students in front of them "learn as individuals" and the different ways they can help those students access the content or domain they're trying to teach.

Computational Thinking In the latest Hour of Code, tens of millions of students spent at least a little bit of a December school day learning about programming at classroom events around the world. Tutorials by Code.org were made available in 45 languages.

But that's just the start, asserted Waite and Weisgrau. What we can expect to see more of is a greater emphasis on computational thinking. "Coding is the ability to manipulate the tool that computers use," Waite said.

Learning how to approach problem-solving from a systemic point of view enables students to strengthen their ability to work through logical processes, analyze data and use systems thinking in all kinds of endeavors.



"Computational thinking is about how you as a person direct and manipulate the technology around you." Learning how to approach problem-solving from a systemic point of view enables students to strengthen their abilities to work through logical processes, analyze data and use systems thinking in all kinds of endeavors, not just programming.

One driver is the Next Generation Science Standards, which embeds the concept alongside math at all grade levels. For example, elementary students are expected to be able to demonstrate computational thinking by collecting and analyzing data tied to physical properties; middle schoolers use the same skills to explain how matter is conserved when substances change; and high schoolers apply it in energy-related calculations.

Sorting Out Rules for Student Data Use

In the last four years, according to the Data Quality Campaign, 94 additional laws have been passed on safeguarding the privacy, security and confidentiality of student data. Securing student data is the topic that seemingly won't die. And according to Sara Kloek, the Software & Information Industry Association's director of education policy, programs and student privacy, those discussions are "never going to go away. People want to make sure that students are protected in all aspects in the classroom."

What will be truly novel about the topic in 2018, however, is acknowledgement at the federal level about how confusing the various regulations are – especially FERPA, the Family Educational Rights and Privacy Act, which has been around since 1974, and COPPA, the Children's Online Privacy Protection Act, which was enacted in 1998.

Kloek, who formerly served as senior privacy and technology fellow at the U.S. Department of Education in the Office of the Chief Privacy Officer, said she was looking forward to attending a

WHAT ELSE TO WATCH FOR THIS YEAR

Google rules. The company's dominance in schools is hard to ignore, Doug Levin pointed out. Ed tech companies make sure to tout their Google integration; Google Chromebooks account for more than half of school-purchased mobile devices; and now Google Classroom has found a firm foothold in helping manage operations of the digital classroom. Google is "playing with lots of other ideas right now. But it has snuck up on us. And I think it's hard to understate how pervasive their influence has grown," he said.

E-rate modernization under attack. The FCC has opened up proceedings on E-rate, raising questions about provisions of the modernization orders put in place in 2014, Levin said. A main area of interest is self-provisioning of dark fiber — districts applying E-rate discounts to deploy their own fiber networks when they can't get the speeds they need or can't get them at "reasonable cost" from area internet service providers. As Levin explained, the FCC has "put a real cloud over whether or not that E-rate funding is going to continue being available. "They've held up people in building this out. There are questions about whether or not that money will remain available for folks — or might even get clawed back."

Videoconferencing will connect more students. Whether it's Zoom, Blue-Jeans or something else free and easy to set up, teachers are using video feeds to put students in touch with each other beyond classroom walls. At "Johnsonville," for example, every Wednesday, Anthony Johnson's kids sit in on sessions with educators, professionals and classes around the world. "Three weeks ago, we did a science experiment with a fifth-grade class in Ireland live," he recounted. "It was awesome."

Trust will continue taking a beating. It's been a hard year for experts. Trust in online content, news sources, platforms and institutions is at a low point. Training in media and digital literacy to assess the quality and veracity of information has never seemed more important. Those same literacies need to be applied in assessing the use of new technologies themselves, asserted Chelsea Waite. "Who is empowered and who is not?" she asked. "Technology is not neutral, and people made decisions to design it in a certain way." Therefore, added Josh Weisgrau, helping students develop critical mindsets can become a virtuous cycle. Computational thinking, making and the use of virtual means to learn about the real world is a continual reminder to students that "everything around them was created by somebody, and that therefore they can design it or redesign it in a better way."



Johnsonville students videoconferencing with BlueJeans

FEATURE | TECH TRENDS

Some have sought to attack schools "specifically because they are places where lots of kids are, and they're interested in making political points." - Doug Levin, Ed Tech Strategies

joint workshop, "Student Privacy and Ed Tech," planned for Dec. 1 and co-hosted by the U.S. Department of Education, which oversees FERPA, and the Federal Trade Commission, which is in charge of COPPA. The goal is to clarify and untangle the intersection between the two regulations and how they can protect students without interfering with the promise of education technology.

One potential outcome from the workshop, suggested Kloek, could be a greater motivation for schools and districts to get more active in communicating with parents and students about what they're doing on privacy. "It's hard. Public schools are required to send out the annual FERPA notice. I'm curious [about] who's doing it well and whether parents are happy about the way things happen," she said. "This is the first time where it's going to be discussed out in public. It's a conversation that's needed to happen for a while. Bringing all the stakeholders to the table is an important step."

Schools Will Continue Flubbing Cybersecurity

While technology provides a pipeline in education to the world and its riches of digital content, it can also be taken advantage of by "those with the most heinous views in ways that are fundamentally pretty threatening," warned Doug Levin, president of consultancy Ed Tech Strategies and former executive director of the State Educational Technology Directors Association. It doesn't help that cybercriminals have decided districts are low-hanging fruit for plucking personally sensitive data. "Schools have lots of things connected, but they don't have a lot of IT support. They're not always running the latest and greatest equipment. And so that makes them a target of opportunity," Levin explained. At the beginning of 2016, Levin began tracking cybersecurityrelated incidents reported about U.S. K-12 public schools and districts. As of the end of November 2017, he has added 234 security-related events to his "cyber incident map."

What's particularly "scary" about the break-ins these days is not simply the loss of personal data, he added, but how some criminals have sought to attack schools "specifically because they are places where lots of kids are, and they're interested in making political points." For example, a number of Los Angeles and Ventura area school websites were hijacked in 2017 to display pro-ISIS propaganda. More alarming, in October, a district in Iowa closed several schools after parents received text messages that threatened the safety and security of their children; some believe hackers stole personal information from the district network.

The fact that nobody else was doing this security tracking in such a focused and methodical way before Levin took on the challenge indicates just how immature the education field is when it comes to cybersecurity. "We know so little about the nature of threats that it's still in a place where we believe the world is flat," he mused. "We don't really understand the nature of threats — how they change over time, what steps districts can take to protect themselves. If you don't understand the nature of a threat, you can put in place all sorts of policies or buy all sorts of technology, and it turns out you're buying the wrong stuff."

That lack of maturity also surfaces in how data breaches are communicated to those affected as well. Levin cited a situation in Texas in which numerous districts had their employees' names, social security numbers and other data exposed on a website managed by the Texas Association of School Boards. Rather than coming clean as soon as possible about how many people were affected and from which districts, every time a news story appeared, the information was updated, as if one district didn't know about the break-in that occurred in the next district over. "It's the classic wrong way to get bad news out there," said Levin.

"There may be a need for guard rails, but it's not clear who gets to set them and how they get set," Levin acknowledged. "It may be that all this connectivity is not an unabashed good." THE

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FEATURE | STEAM EDUCATION

Coding programs don't have to break the bank. Here are some resources and tactics for funding computer science affordably and without skimping on quality. BN

FINDING FUNDS FOR CODING PROGRAMS



S THE IMPORTANCE of coding grows each year, school districts inevitably feel pressure to fund clubs and find money for specialized instruction within the curriculum. The pressure is not exclusive to upper grades. If anything, educators such as Katie M. Blagden increasingly see the benefits of early introduction to coding language.

As a science/technology/engineering/arts/mathematics (STEAM) coach and teacher at Ayers Ryal Side Elementary School, Beverly, MA, Blagden teaches rudimentary coding to kindergarten students using Kibo Robots. The robots feature coding blocks that come in sets of 10, 14, 18 and 21.

Blagden personally made the pitch for Kibo funds to the school's PTO, taking care to integrate the school's stated mission into the plea. "Our district's mission is to get students prepared for the outside world and their career, and one of the things that could be important in careers is coding," she said. "Kibo Robots are extremely affordable. Our PTO provided funds, and we purchased 10 of the Kibo 10s at \$229 each."

Many younger grades do not have a 1-to-1 or bring-your-owndevice (BYOD) policy, but the robots require no additional device. "That's the best part," said Blagden. "Our schools do not have a 1-to-1 policy for technology. Normally with coding, only one or two students can be doing it at a time. You can always get just a couple of Kibos and put them on stations. Kibo robots do not require any sort of computer connection, which is great for students and great for the school budget."

Finding a Grant

Whether it's Kibos or other coding equipment, additional attachments can be acquired as needs increase. Public and private grants are available for updates and original purchases. On the private side, J.D. Ferries-Rowe has seen grant opportunities expand over the years, primarily because businesses, including tech companies, are keen to nurture talent and ultimately bolster their potential workforce.

As chief information officer at Indianapolis-based Brebeuf Jesuit Preparatory School, Ferries-Rowe contends that the key to successfully getting private grants is making the case. "Develop a convincing case and you can approach businesses," he said. "We go to businesses that are affiliated with our school. Or we go to businesses that parents own. We make the case that our coding efforts are valuable, and then say, 'Here is what we need."

Numerous private grants are available from various tech companies. Teacher Geek lists STEM grants by state (teachergeek.com/pages/stem-grants). You can also find updated grant listings at thejournal.com/grants.

Using Free Tools and Negotiating Deals

"We teach coding and basic digital citizenship [to every freshman] as basic as Code.org and the Scratch programming environment [scratch.mit. edu]," said Ferries-Rowe. Both are free. "We use free programs to make sure we get 100 percent coverage for all the kids. We quickly enhanced the Scratch part of that curriculum by adding Makey Makey Boards. You can find these in bulk from China for \$25 per unit (retail \$50). Since we work in teams of three, we were able to cover an entire classroom worth of



are looking for. Can you help us with that funding?' If you go in with a pitch that has an actual goal and a real world number, along with the number of students that will be impacted, they are much more likely to give. You can pass the virtual hat."

STEM Fundraisers

Additional fund-raising options feature new takes on familiar selling programs. "The most formalized one that I have seen is Vex Robotics," said Ferries-Rowe. "Their recommended fundraiser is selling

"We use free programs to make sure we get 100% coverage for all the kids."

- J.D. Ferries-Rowe, CIO, Brebeuf Jesuit Prep

Makey Makey Boards for \$300."

Brebeuf recently started doing coding-related virtual reality (VR) design using "co-spaces," which sells blocks of student licenses in groups of 50 for \$75. Ferries-Rowe explains: "You can go to a company with a real dollar sign pitch and say, 'Here's how much it costs for an individual license to co-space, and we want 50 licenses to do the following projects and skills that you as a company Hex Bugs for \$5 or \$10 per unit, and your club keeps a \$1 or \$2 per unit of profit. That's a school-by-school decision. I find it's more effective to make the pitch to affiliated corporations that have real world reasons to donate, rather than try to get kids to sell something."

Federal Funds

To varying degrees, the federal government has also set its sights on

funding coding and computer science education. As reported in the Sept 25, 2017 USA Today and elsewhere, the White House directed the Department of Education to "commit \$200 million every year to K-12 computer science education, which Code.org is marking as a victory for its nonprofit organization." The memorandum reportedly called on the Department of Education to commit at least \$200 million of its grant funds to STEM education.

"Today's \$200 million-per-year commitment to computer science education marks a victory for Code.org, and for the movement we started four years ago to expand access to computer science and increase participation by women and underrepresented minorities," said Code.org founder and CEO Hadi Partovi in a statement to TechCrunch.

Student-Directed Coding Clubs

While school districts may indeed be building coding programs into their class structure, after-school clubs cost virtually nothing and are relatively unfettered by traditional curriculum structures. Zach Latta, executive director and founder of San Franciscobased Hack Club, has sparked the coding flames in recent years, providing curricula free of charge to help students in America and internationally to start coding clubs.

Latta points out that the willingness to solve problems and build applications through coding language ultimately costs nothing. With educational tools and inspiration from Hack Club, motivated students are successfully getting their peers involved in coding.

"One of the most important things about computer science is the idea of 'computational thinking' – using the same tools we use to reason about computers, like algorithms, to understand the world around us," said Latta. "This doesn't have to be done through a traditional computer science classroom. Scratch, developed at MIT, is a free visual coding playground that can be used in all types of learning environments. CS Unplugged (csunplugged.org/) is a popular set of resources to teach computational thinking without any computers."

Hack Club (hackclub.com) works with high school students to start after-school coding clubs at no cost to the school. "We keep the program free because we believe that every student deserves the opportunity to experience the joys of coding without financial barriers," said Latta. "To date, after having the program launched for 1.5 school years, students have brought Hack Club to 1 percent of U.S. high schools in 30 states and 10 countries."

Schools looking to pitch private companies for help with funding have powerful data points on their side. "Technology is increasingly the backbone of the modern economy," said the 20-year-old Latta, who was named one of Forbes' 30 Under 30 (Educational Category) in 2016. "Information technology is by far the fastest growing sector in the U.S., increasing by 148 percent in the past 5 years. Over 600,000 jobs in technology are currently unfilled, and 250,000 new jobs are projected to be created by 2026," according the United States Department of Labor's Bureau of Labor Statistics.

"An investment in coding programs is an investment in your community's future," he said. "Beyond paving the way for your future citizens to have high impact and fulfilling careers in technology, learning to code is a deeply empowering and self-actualizing experience. Coding shows young people that they can be the change that they want to see in the world." the

Greg Thompson is a freelance writer based in Fort Collins, CO.

UPCOMING STEM AND STEAM GRANTS

American Honda Foundation STEM Grants

Sponsor: American Honda Foundation Award: \$20,000 to \$75,000 Number of Awards: Not specified Application Deadline: Feb. 1 and Aug. 1 for new organizations; May 1 for returning organizations

TAF Project-Based Learning Grants for Grades 6–12

Sponsor: Toshiba America Foundation Award: Two categories: Up to \$5,000 and more than \$5,000 Number of Awards: Not specified Application Deadline: Up to \$5,000 awarded on a rolling basis; Feb. 1 deadline for applications for more than \$5,000

Innovative Practices in K–12 Education

Sponsor: Braitmayer Foundation Award: Two categories: Up to \$35,000 Number of Awards: Not specified Application Deadline: March 15 (grant opens April 1)

Academic Enrichment Grants

Sponsor: McCarthey Dressman Education Foundation Award: \$30,000 maximum (\$10,000 over three years) Number of Awards: Not specified (five awarded last year) Application Deadline: April 15 (submissions open Jan. 15)

Teacher Development Grants

Sponsor: McCarthey Dressman Education Foundation Award: \$30,000 maximum (\$10,000 over three years) Number of Awards: Not specified (two awarded last year) Application Deadline: April 15 (submissions open Jan. 15)

ESA Foundation STEM Grant

Sponsor: Entertainment Software Association Foundation **Award:** Not specified, but suggested upper limit for first-time applicants is \$50,000

Number of Awards: Not specified

Application Deadline: Letters of inquiry due May 15 (submission period opens April 14)

SparkFun Community Partner Program

Sponsor: SparkFun Award: STEM/STEAM-related prize packages, event and team sponsorships and other types of support Number of Awards: Varies

Application Deadline: Ongoing: third Thursday of each month; awards announced on the last business day of each month

Student Data Privacy: Building Trust Through Collaboration

IN OUR TECHNOLOGY-DRIVEN WORLD, any conversation about data invariably leads to questions about how that information is protected and used. That curiosity extends into school systems, which strive to create robust, engaging, personalized learning environments while ensuring that they implement mature governance practices to protect the privacy and security of student data – information stored in the classroom and by district technology providers on behalf of their school system clients.

In particular, school systems need to stay current with federal and state privacy laws, meet the expectations of their parents and other community stakeholders, build partnerships with a variety of vendors and manage complex networks capable of supporting hundreds of student devices. In addition, school systems need to translate that work into clear and comprehensible guidance to inform parents about school policies for technology and how student data are protected.

It's no wonder that school systems are increasingly seeking out trusted guidance to create and improve their governance programs and build trust within the communities that they serve. A community of trust encourages a healthy conversation between school systems and community members that moves from fear-based to fact-based about the school practices and educational progress of students.

CoSN's (the Consortium for School Networking's) Trusted Learning Environment

A community of trust encourages a healthy conversation between school systems and community members that moves from fearbased to fact-based about the school practices and educational progress of students.

(TLE) Seal Program was specifically designed to support these needs. Developed with 28 school system leaders, along with lead partners – the Association of School Business Officials (ASBO), the School Superintendents Association (AASA) and ASCD – the TLE Program helps school systems assess their privacy and security programs, identify the specific areas that require improvement and provide resources to support that work.

To date, 13 U.S. school systems – from small, large, urban and rural communities – have already earned the TLE Seal by carrying out robust data protection programs across the entire school organization, including leadership, business relationships with technology providers, data security and education for employees and community members, as well as for students in the classroom. In taking the tangible, measurable steps that help to ensure the privacy and security of student data, these Seal recipients demonstrate their commitment to student data privacy in a way that builds trust.

And the momentum is building. Today, school systems – from Montana to Connecticut to Ohio to Texas – are coming together to crowdsource their efforts and support each other statewide in building and improving their governance programs.

CoSN is supporting these cohorts by connecting each group with a TLE Seal Recipient to serve as a mentor, providing access to an online peer community dedicated to questions about data privacy, as well as providing free guidance on implementation of the laws, vetting technologies, writing contracts, understanding privacy policies and more. The cohort leaders are able to share with districts in need how to leverage the TLE framework and improve their efforts so they, too, can become leaders of tomorrow.

This 21st-century challenge for school systems has presented them with an opportunity to unite to build stronger practices, stronger connections and embark on a journey of continuous improvement for all. Together they are making a difference in the rigor with which they are protecting student data – and the trust they are building within their communities.

For more information on the TLE program or to build a collaborative TLE cohort in your state, visit trustedlearning.org. For more information on CoSN's privacy resources, visit cosn.org/privacy.

Linnette Attai is Project Director for the CoSN Protecting Privacy in Connected Learning Initiative and the Trusted Learning Environment Program. She is also President of PlayWell, LLC compliance consulting.



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KEYNOTE Jon Corippo, Interim Executive Director, CUE

BY DAVID NAGEL

CUE (cue.org) is an ed tech association on the move. Known nationally for its annual conference in Palm Springs (coming up March 14–17), which typically attracts 5,000 to 7,000 attendees – a massive figure for a regional organization – CUE is ramping up its efforts in several areas in the coming year, including teacher professional development and advocacy of education issues like E-rate, net neutrality and student data privacy.

CUE is also an organization in transition. When the non-profit's long-standing executive director, Mike Lawrence, stepped



down from his leadership role this fall, Chief Innovator Jon Corippo stepped in as interim ED. As of this writing, CUE's board had not yet chosen a permanent successor, but organizational changes are already happening, with the staff now composed of a majority of educators. (And for the record, Corippo himself is an Apple Distinguished Educator, Google Certified Teacher, Microsoft Innovative Educator and YouTube Star Teacher.)

CUE operates in California and Nevada, with 22 affiliates, and is itself an

affiliate of three major, national ed tech associations: ISTE, iNACOL and SETDA. Aside from its national conference, CUE also hosts a fall conference and several smaller events for administrators and teachers. It also operates "Rock Star Black Label Camps," which bring professional learning directly to schools. A single-year membership is free through mid-March for educators throughout the country.

THE Journal spoke with Interim Executive Director Corippo to get a sense of the direction in which the association is heading in light of organizational changes systems for significantly better member interactivity and support without growing our staff size. With our new directors (Cate Tolnai and Jason Seliskar) our CUE staff is made up of more educators than ever before (56 percent), so we truly understand our members' needs. We've added things like live chat for events, and we now have a four-person social media team made up of CUE members that will be sharing awesome pedagogical and ed tech ideas via social media – this team has an aggregate of over 60,000 followers on Twitter alone. At our Fall

... Ample bandwidth is critical for contemporary classrooms, and we'll continue to mobilize our members and ... CUE Learning Networks to help our legislators understand these critical educational needs.

and to find out what special surprises the upcoming national conference has to offer.

THE Journal: This is a big year for CUE. There's a lot of change happening in your organization, not to mention the ongoing change happening in the profession of teaching. Can you talk about the direction you see CUE heading in the coming year and in the longer term?

Jon Corippo: We are very excited about several developments internally, namely that we've modernized all our back-office

CUE Conference, we announced a new, multi-year effort to have our conferences become increasingly green (cue.org/ green), reducing our use of one-time use items, plastics and recycling more effectively. For example, we will stop using plastic lanyards and stop giving out conference bags altogether. CUE is also making a huge effort to support our 22 affiliates in California and Nevada – assisting them with things like bylaws and maintaining nonprofit status as well as event support and co-marketing efforts. New developments for CUE in professional learning will soon include online, asynchronous learning that will be priced so that teachers can self-fund their own upskilling. We have Apple-, Google- and Microsoft-centric versions coming online this spring. What's great about these online courses is that they will blend ed tech skills with excellent pedagogical approaches to teaching and learning. Great teaching is way more than gadgetry.

As far as professional learning at CUE, we are excited to continue with our wildly popular ... CUE Rock Star Black Label Camps (cue.org/BlackLabel), where we are able to bring very high-quality professional learning events directly to districts, saving them any associated costs for hotels and mileage....

THE Journal: can you talk a little about the format of the asynchronous courses and the way you'll be handling continuing education credits? Will these be open to all educators or just CUE members? **Corippo:** We'll be developing curricula that are very much hands-on and project-based (things folks will be able to use in class immediately). We'd love to have CEUs, but it's not finalized yet. These will be open to anyone – and CUE membership is free anyway....

THE Journal: What are some of the trends in education you see impacting your members now, and how will CUE be addressing those in its events and advocacy activities? **Corippo:** The big struggle we are seeing is that as more and more districts go 1-to-1, there is a real gap developing in how teachers are (or aren't) embracing the devices to actually teach differently. We are seeing the need for professional development towards SAMR and 4Cs type mindsets - the more devices, the bigger the problem is becoming. Districts are also wrestling with being able to continue refreshing almost everything, projectors and student devices especially. In California and Nevada, funding streams are drying up in the general budget, making additional professional learning more difficult

SPRING CUE KEYNOTERS

Palm Springs is once again the site for CUE's bi-annual education technology conference. CUE 2018 begins in the evening on Wednesday, March 14, and ends at lunch time on Saturday, March 17. Formerly known as "Computer-Using Educators," CUE is a nonprofit dedicated



to inspiring teachers and their learners with ed-tech innovation.

Each day attendees will have time to attend up to four hour-long sessions, participate in networking meetings and gain new perspectives in headliner presentations. Although the session schedule is still in development, the conference has announced its four keynoters:

Matt Miller, former teacher, current blogger and author, will be sharing the tenets of his philosophy (and the subject of his best-known book), Ditch That Textbook.

Meredith Walker, a television producer, will share her vision for helping young people "cultivate their authentic selves," a theme she has developed alongside actress Amy Poehler through their website, Smart Girls.

Brothers Peter and Paul Reynolds will share their stories, Peter as the author and illustrator of such books as *Happy Dreamer*, and Paul as the CEO and co-founder of FableVision and its education tech arm, FableVision Learning. Both companies produce educational media, mobile games and apps "designed to move the world to a better place."

Finally, educator and blogger **Erin Klein** will speak about the power of student voice, how the right kind of technology integration can enhance learning and how classroom design influences today's learners.

Pre-registration is \$359; on-site registration is \$399. Full-day workshops on Google and iOS are an additional \$225 each. - *Di* Schaffhauser

Learn more at spring.cue.org.

to fund at the same time as the needs in the classroom are dramatically increasing.

Another significant area of concern is the potential endangerment of E-rate and net neutrality for schools and educators. The CUE Legislative Advocacy Team recently scored a victory in this area, partnering with California State Assembly Speaker Pro Tempore Kevin Mullin to pass Assembly Joint Resolution 7 (AJR7) which states: "The new Chair of the FCC, Ajit Pai, has a history of opposing these programs while serving as a Commissioner and in his capacity as Chair has indicated that he plans to either roll back or decline to enforce many of these consumer protection regulations. It is my hope that members of Congress and other FCC Commissioners will work to protect these critical programs and AJR 7 provides them with ample rationale for their decisions."

CUE believes that ample bandwidth is critical for contemporary classrooms, and we'll continue to mobilize our members and their associated CUE Learning Networks to help our legislators understand these critical educational needs. *THE Journal:* Are you going to continue the push for E-rate and net neutrality in 2018? Are you joining up in any national efforts?

Corippo: Yes we will continue pushing on E-Rate and net neutrality – these are huge issues for education in 2018. We'll continue working with SETDA and CoSN on these campaigns. The outlook on these are both very dire – it looks as if the feds are locked in on denying or limiting the current funding and discounts, as well as rolling back connectivity speeds for education at a time when we need more bandwidth than ever.

THE Journal: Do you also see student data privacy as a growing issue? What are the peculiarities of student privacy in California?

Corippo: We think awareness of the loss of student privacy is a major issue –

whether the student data is vulnerable in systems like a district SIS, or the awareness we need to share with teachers when selecting tools for their classrooms and how they can balance innovation and protection for students' rights.

THE Journal: What are some of the special features at this year's national conference?

Corippo: The amazing keynote lineup (spring.cue.org/keynotes), including: Matt Miller (author of Ditch That Textbook), Meredith Walker (cofounder and executive director of Amy Poehler's *Smart Girls*), Peter and Paul Reynolds (award-winning authors and renowned children's publishers) and wrapping up with Erin Klein, a classroom teacher that is also SMART Technologies Exemplary Educator, ISTE 2012 Social Media Influencer, a National Association of Independent Schools Teacher of the Future, ASCD Emerging Leader [and] PBS Digital Innovator.

A new AR/VR Playground, where we'll have hands-on demonstrations from Google, California State Parks' PORTS virtual field trips and several other of the very hottest AR/VR tools on display, in addition to having the CUE STEAMpunk Playground again on Thursday and Friday, [where] attendees can go hands-on in stationstyle learning where educators can have time to use some of the hottest robots and STEAM tools and apps.

Spring CUE 2018 will feature almost 500 sessions and happenings between Wednesday and Saturday.

David Nagel is editor-in-chief of *THE Journal.*

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N LOUDOUN COUNTY, VA,

kindergarten students designed the games and toys used to stimulate the minds of orangutans in a zoo halfway across the country. Middle school students secured a historical marker for a local landmark that was instrumental to African American history. And high school students advised state leaders how they could use de-icing materials on roads and bridges that are less harmful to the environment.



DBJ with a **PURPOSE** Using projectbased learning in support of clear curriculum goals leads to deeper learning and engagement in these school systems.

BY DENNIS PIERCE

FEATURE | TEACHING & TECHNOLOGY

In Kankakee, IL, some middle school students have become aviation engineers, designing airplanes that can fly the farthest or fastest. Others have taken on the role of restaurant owners, planning a menu and writing ads or producing a website for their business.

Loudoun County Public Schools and Kankakee School District 111 are approaching project-based learning (PBL) in very strategic ways as part of a system-wide effort to support clearly defined instructional goals.

While the goals themselves are different in each case, both school systems have seen higher student engagement and deeper learning by using PBL with a purpose. Their keys to success include articulating a vision for instruction, giving teachers a structure for creating dynamic projects that advance this vision and providing training and other support.

Contributing to the World

In Loudoun County, PBL is used to support the school division's "One to the World" initiative. When Superintendent Eric Williams arrived in Loudoun County four years ago, stakeholders were discussing whether they wanted to implement a one-to-one computing or a "bring your own device" program. Under Williams' direction, Loudoun County leaders reframed the question to focus not on the technology but on the kind of teaching and learning the devices would enable.

With the help of community feedback, the school division developed a new mission: to empower all students to make meaningful contributions to the world. Loudoun County leaders also created a profile of their ideal graduate: They wanted to develop knowledgeable critical thinkers, communicators, creators, collaborators and – importantly – contributors.

"Project-based learning is a strategy," said Williams. "For us, it's a means of putting authentic, challenging problems at the heart of teaching and learning." These authentic problems give students opportunities to contribute to the world.

For instance, middle school social studies teacher Jay Dodson challenged his students to answer the question: What person or



A Loudoun County project resulted in a historic marker placed at a segregation-era school.

place in Loudoun County deserves a historical marker? Working in groups, the students researched local history using primary source documents with the aid of librarians, then chose a person or place and constructed an argument to support their decision.

"Each group of students presented their ideas to local experts, with many students using technology such as iMovie to make a more compelling presentation," Williams said. "Each group had to cite primary sources, making comparisons between local and national history, and also provide the specific text for their proposed marker."

One group suggested placing a marker at the old Ashburn Colored School, which served African-American students in a segregated setting until 1959. During their presentation, the students made connections between Jim Crow laws and the Supreme Court's decision in Brown v. Board of Education. The panel of experts chose these eight students as the group with the most compelling proposal, earning them the chance to submit their application to the Virginia Department of Historic Resources.

"They tried not to get their hopes up because they understood that only about one-fourth of all proposals for historical markers are approved by the state," Williams noted. Yet, the students' proposal was accepted — and last June they got to watch as their marker was installed outside the old schoolhouse. Not only had they learned about local history and developed their research and presentation skills, but they learned an even more powerful lesson: that they can make a real difference in the world.

"As an African-American student, it means so much that I have the opportunity to bring this school back into the light," said one student during the dedication ceremony.

To provide structure to teachers, Loudoun County is using a modified version of the Gold Standard PBL model from the Buck Institute for Education (BIE) as its conceptual framework for how to design a high-quality project. BIE's Gold Standard includes eight design elements, but Loudoun County has distilled these into four key characteristics: Projects must cover significant content and important competencies; involve authentic, challenging problems; result in a public product; and be connected to the world.

"That's immediately a game changer when students have an audience beyond their teacher," Williams said.

The school division has teachers attend a three-day training workshop, called PBL 101, in which they learn how to design high-quality products and integrate these into their instruction. Loudoun County has teamed up with BIE to deliver the training, and teachers are expected to try at least two full projects with their students per year once they have completed it. So far, more than a third of the county's 7,000 teachers have undergone the training.

Learning About Careers

In Kankakee – a high-poverty, high-minority school district located an hour south of Chicago – PBL is used to help students learn about various career paths, while also making instruction more active and engaging.

"We have a magnet program that has been around for 30 years, and we have a really strong gifted and honors program, but our general education students were not doing as well academically," said Superintendent Genevra Walters. "When I took the job as superintendent, I knew I needed to close the opportunity gap and restructure what was happening in these classrooms."

Her solution was to create college and career academy classes for all elementary students. The classes are built around crosscurricular projects that focus on a different career path at each grade level. This year, for instance, first graders are studying agriculture, while fifth graders are learning about the technical fields. "We want students to explore possible career paths by doing what would be required in those particular jobs," Walters said.

Beginning next year, students in grades 6-8 will engage in PBL to explore careers related to their individual interests. "That means the teachers are going to have to differentiate what happens in the classroom because students in the same class may have different career interests," she explained.

Students in the district's Montessori school have experienced this kind of instruction already, and the district is using this experience to inform its work in bringing this model to other middle school students.

Whereas Loudoun County is using BIE's Gold Standard PBL model to provide structure for teachers, Kankakee is using the Defined STEM curriculum from Defined Learning. Teachers can modify and adapt these project-based lessons as needed for their own classrooms.

In one recent lesson, students interested in engineering constructed airplanes out of paper and other materials to see which designs would travel the slowest, fastest or farthest. As they experimented with different designs, they began to understand which design elements led to certain characteristics of flight.

In another project, students became restaurant owners tasked with planning an executive dinner for 100 people. They had to plan a theme for the dinner, design a menu, set up a table arrangement, produce a cost analysis, work up a quote for the job and develop a presentation to secure the business. They also could choose from among other performance tasks, such as producing a radio ad, TV ad or website to promote their restaurant. The proj-



Kindergartners in Loudoun County work on games designed to stimulate the minds of orangutans.

ect not only touched on multiple subject areas such as English and math, but it gave students valuable exposure to various professions: chef, business owner, event planner and marketer, among others.

To support teachers in moving to PBL, Kankakee will hold a showcase in January. During the showcase, every teacher will have to demonstrate a project they have already done, are currently working on or hope to complete by the end of the month.

Higher Engagement, Deeper Learning

Using PBL in support of clearly defined instructional goals is paying off for these two school systems. They report that students are more actively engaged and are spending more time on assignments, which is leading to deeper learning.

Williams described a project involving two high school biology teachers who asked students to research the environmental impact of de-icing agents that are applied after snow and ice storms.

"Instead of just asking students to experiment and write a lab report, they arranged for students to share their thoughts with a wider audience," he said, including local homeowners' associations, reporters and representatives from the state Department of Transportation. "When the students realized they were going to present the findings of their scientific research to experts in the field and make the case for alternative de-icers, they really stepped up their game."

In a video about Kankakee's use of PBL, one teacher described the benefits this way: "The kids are all focused. And they're normally not like that. When they're looking at a book, it's hard to get them to concentrate. I think it's the way to go if we want to get our students ready for real life."

And when a Kankakee student was asked what he likes most about learning through projects, he said: "They get your mind thinking."

Dennis Pierce has been writing about technology and education for 20 years.

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EDTECHINSICLEY By David Nagel & Project Tomorrow

Coding Clicks for K–12

Parents, district administrators and the community agree that computer science and coding classes will help students develop the workplace skills they will need to be successful in the future.

Data collected as part of Project Tomorrow's latest Speak Up Survey revealed substantial increases in support for coding classes, including a 21-point gain from parents from 2014 to 2016, an 18-point gain for district administrators from 2015 to 2016 and an 11-point gain from community members from 2015 to 2016. (See Fig. 1.)

Students Young and Old Are Interested

About two-thirds (67 percent) of K-2 students are interested in learning "how to write programs to make computers do things, like in Scratch or Minecraft," and 8 percent said they already do this. A similarly substantial 61 percent of 3–5 students are interested, and 13 percent said they are already learning this skill.

Among the older students, 63 percent of middle school students said they would be interested in a class or after



Fig. 1: Support for Coding/Programming in K-12 Schools

	Parents	District Administrators	Community
Take a class to learn how to use computer applications	44%	45%	52%
Take a coding or computer programming class	50% (up from 28% in 2014)	49% (up from 31% in 2015)	34% (up from 23% in 2015)

Fig. 2: Student Participation in Online Coding and CS Courses

	6-8th graders	9th-12th graders
Already taken online	25%	15%
Interest in taking online	47%	42% (up from 20% in 2013)

Source: Project Tomorrow

school activity to learn how to do computer programming or coding (up from 52 percent in 2014); 58 percent of high school students agreed (up from 44 percent in 2014). Just 6 percent of 6th-12th graders are currently doing this.

Online Learning Is Here

Students told Project Tomorrow they have taken or would like to take computer science, programming and coding classes online. (See Fig. 2.)

The data here were compiled in a survey conducted by Project Tomorrow involving 435,510 K-12 students, 38,512 teachers, 4,592 administrators and 29,670 parents. The Speak Up Survey was conducted between October 2016 and January 2017.

Project Tomorrow is currently wrapping up its newest Speak Up Survey, which is open for participation through Jan. 19, 2018 at tomorrow. org/speakup.

David Nagel is editor-in-chief of *THE Journal* and editorial director for 1105 Media's Education Group.



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