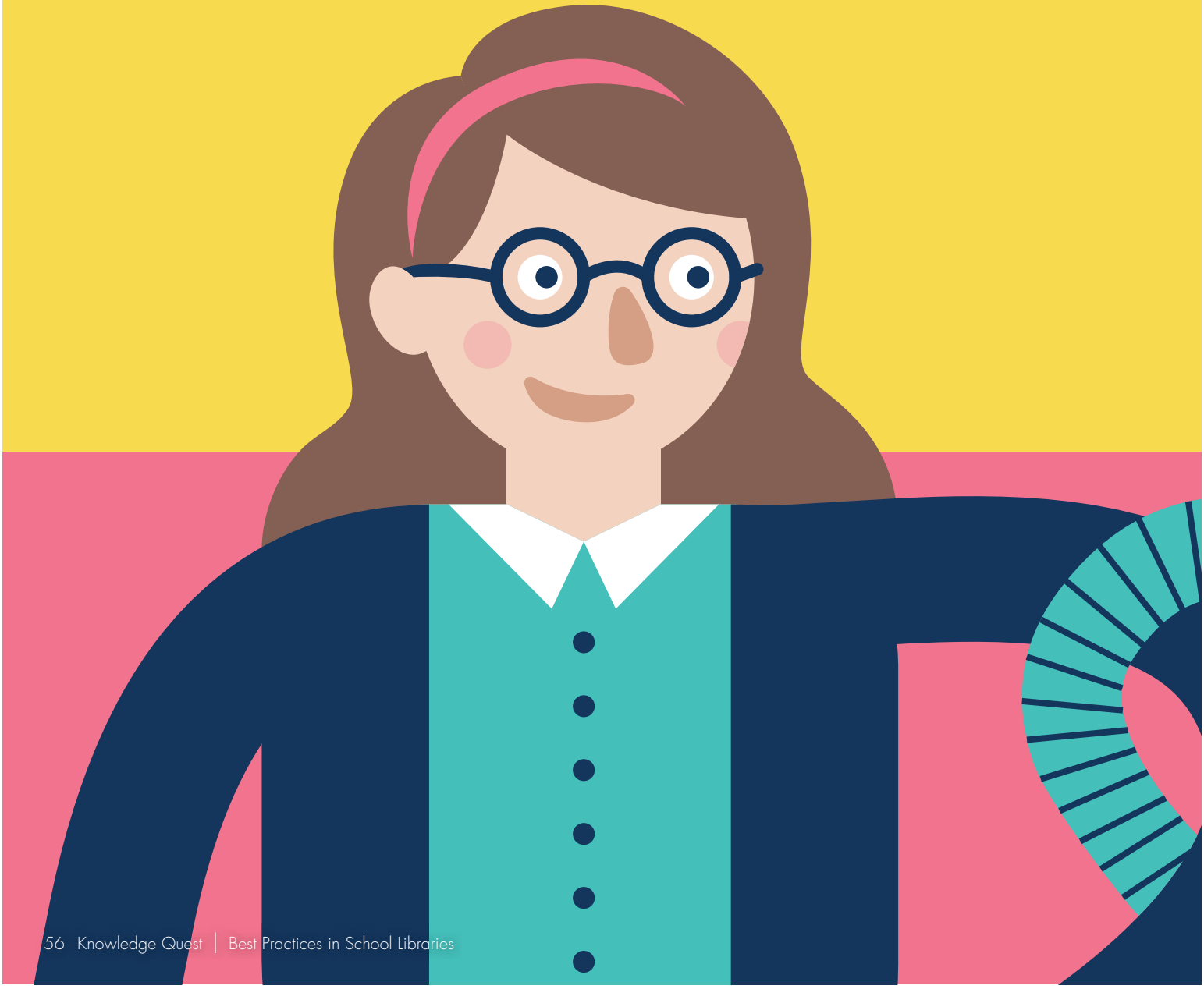
FEATURE

Best Practices in Empowering Learners & Teachers

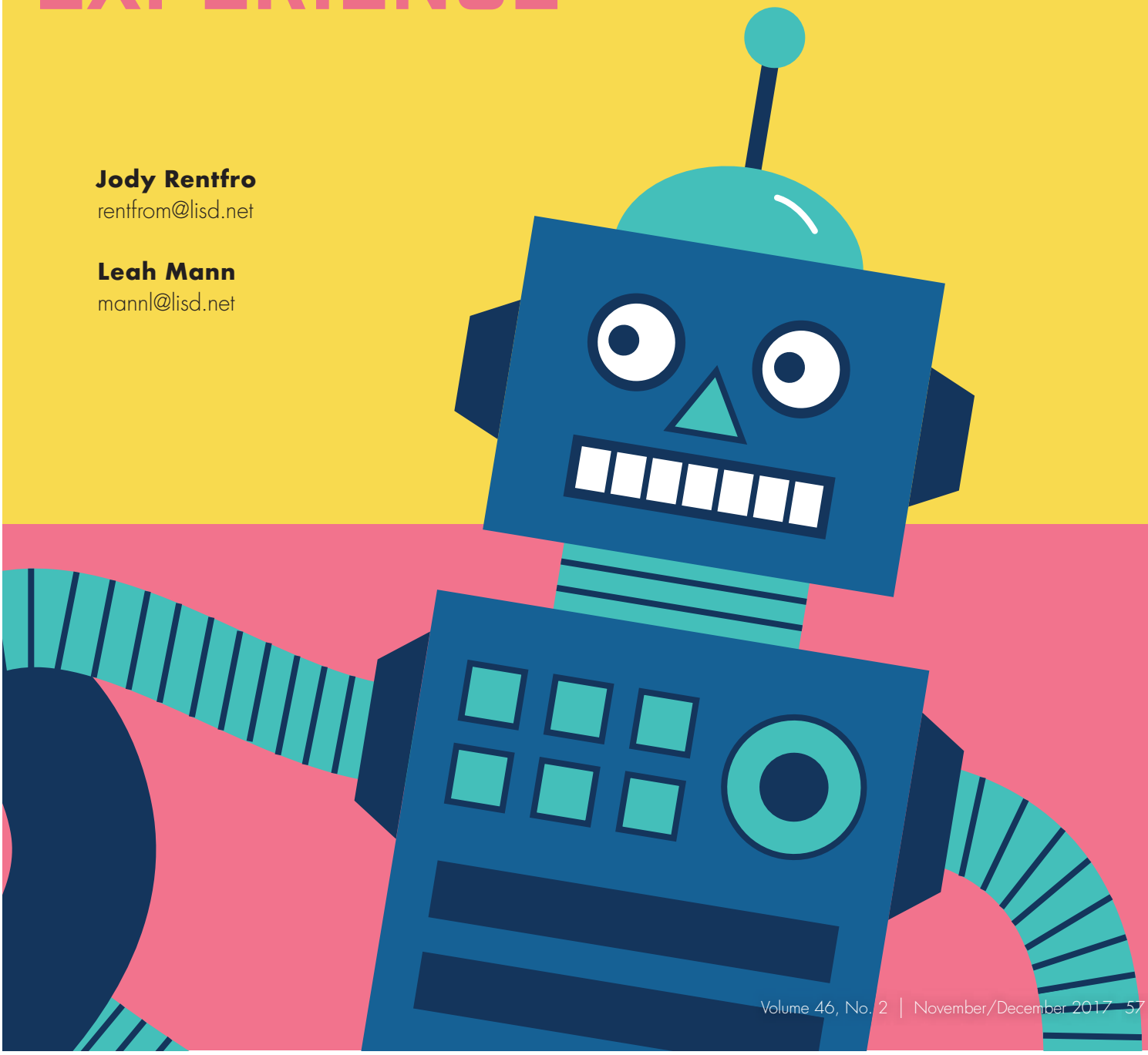
PARTNERS IN CREATING A SCHOOL



LEARNING 21st-CENTURY EXPERIENCE

Jody Rentfro
rentfrom@lisd.net

Leah Mann
mannl@lisd.net



Nationally, schools are going through a metamorphosis to meet the needs of 21st-century learners by focusing on student interests within the parameters of standards-based instruction. The future workforce will operate in highly interdisciplinary teams. Dan Schawbel wrote in *Forbes Magazine*, "38% of millennials feel that outdated collaboration processes hinder their company's innovation and 74% prefer to collaborate in small groups" (2013).

The heart of a Future Ready school librarian, recognizing these needs, focuses on personalized student learning and collaborative teaching. Under the larger umbrella of the Future Ready Schools initiative (an AASL coalition partner), among the key components for librarians to address are curriculum, instruction and assessment; personalized professional learning; community partnerships; and collaborative leadership (Future Ready Schools n.d.).

The increasing need for the school librarian to assume the role of coteacher and collaborator to support STEAM (science, technology, engineering, arts, and mathematics) instruction is the catalyst that prompted us—a library media services instructional specialist and an emerging technology specialist—to seek a pathway to bring district, community, and global resources together to support teaching and learning. Initially, some of the school librarians in our district dipped their toes in the waters of STEAM education through adding makerspaces to their libraries. We sought a way to better support our district's librarians in their endeavors.

What We Did

Mobile Transformation Lab

As we looked at national education initiatives and business models, it became clear that students needed to be immersed in what it means to design with someone else's needs in mind. Our observations indicate students are more engaged when they create through an empathetic lens. IDEO, a global design and consulting firm that inspired Stanford University to start a school and program devoted to design called the d.School, created a process called Design Thinking to imagine and develop products and experiences. Design Thinking occurs in five phases: empathize, define, ideate, prototype, and test. *[Editor's note: Links to more information about the d.School and other entities mentioned by the authors are at the end of the article.]*

Using concepts such as Design Thinking to create inquiry-based, hands-on learning opportunities centered on student ideation and creation, Lewisville Independent School District (LISD) in North Texas reimagined the role of library instruction through implementation of a Mobile Transformation Lab. The purpose of this lab is to serve the more than 53,000 students in LISD through a highly specialized coaching model that goes beyond the more-traditional materials and resources lending library, and includes two central-office specialists who work side by side with campus personnel when designing and coteaching a lesson.

When developing the concept of the Mobile Transformation Lab, we considered the importance of including information from the Texas Association of School Administrator's visioning document; the International Society for Technology in Education standards, known as ISTE NETS; LISD's strategic design plan; and the Future Ready Librarian initiative. In addition, we sought guidance from the work of a variety of education experts such as:

- Ruben Pentedura, who takes a fresh approach to the levels of student understanding characterized in Bloom's Taxonomy. Pentedura created the SAMR model of instructional technology integration levels identified as: Substitution, Augmentation, Modification, and Redefinition (SAMR).
- Grant Wiggins and Jay McTighe's Understanding by Design (UbD), which outlines a method to plan instruction backward, beginning with the end in mind.

Year One

During year one we focused on developing the lab's philosophy, services, and processes. Great time and thought were spent researching educational STEAM technologies and necessary supplies, and those we felt best met the district's needs were purchased. Included were:

- MaKey MaKey kits
- Ollie robots
- Bee-Bot robots
- Google Cardboard VR viewers
- Q-BA-MAZE sets
- Magna-Tiles sets
- LEGO Mindstorms EV3 sets
- Yarn
- String
- Wooden craft sticks
- Pipe cleaners
- Cubelets robot construction kits

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- littlebits electronic building blocks
- Crayons, markers, colored pencils
- Construction paper
- Scissors
- Glue sticks
- Connector straws

We devised a plan for a collaborative model to build capacity for schools as they aimed to transform instruction. Several campuses at each grade level district-wide were chosen to serve in the pilot. As the program was fleshed out and we began our initial meetings with pilot campuses, it became clear that librarians and teachers were looking for a central repository of lessons and ideas. To answer this request, an open education resource (OER) of lessons, reference materials, and emerging technologies was created. This OER, featured on the Mobile Transformation Lab website, serves as a framework as we partner with librarians, teachers, and other district curriculum specialists to create lessons.

This process required trial and error during the initial pilot phase, eventually leading to a proof of concept that is now being included in our curriculum resources. The LISD Library Media Services and Emerging Technologies team members partner with campus librarians, district curriculum specialists, and instructional technology facilitators to provide teachers access to technical tools, instructional support, and technical expertise for special projects.

The implementation process for collaborative cross-disciplinary campus projects is as follows:

1. LISD Library Media Services staff members meet with the campus librarian, teachers, administration, and district curriculum specialists.
2. Campus staff decides the curriculum areas to be addressed and ensures alignment with *Texas Essential Knowledge and Skills* (our state standards for students).
3. LISD Library Media Services staff members research emerging technologies that will support lesson transformation and design a day of learning for students.
4. Campus staff designs a lesson plan written in the UbD format; this plan embeds the recommendations made by Library Media Services staff.
5. Library Media Services central office staff members also connect the campus with experts and leaders in the field related to the topic of study, pre-teach lessons about Design Thinking to students, and provide hands-on assistance the day of instruction.

Year Two

Here are some examples from the program expansion that occurred in year two. While year one was open mainly to pilot campuses, the entire district was able to book the lab in year two. Additional materials, including Ozobot robots and Code-a-pillar sets, were added to the lab.

Middle School Math

One of our middle school principals pinpointed innovation and use of the Mobile Transformation Lab as key targets in the campus's improvement plan. Encouraged by principal Kelly Knight and supported by a data-driven decision, math teacher Trista Abernethy partnered with local experts in the community, the school's National Junior Honor Society, business leaders, community volunteers, the secondary math curriculum specialist, the instructional technology facilitator, the campus librarian, the library media services instructional specialist,

TRANSFORMATION DOES NOT HAPPEN IN ISOLATION. SEAMLESSLY PARTNERING WITH EXPERTS AND MULTIDISCIPLINARY TEAMS ALLOWS OUR DISTRICT TO TRANSCEND THE BRICK-AND-MORTAR SCHOOLHOUSE.

and the emerging technologies specialist to design an eighth-grade math lesson that targeted learning outcomes identified as difficult for students to conceptualize. Along with the critical math skills she needed to teach, this teacher wanted to encourage innovation and provide opportunities for students to formulate questions and solve relevant, real-world problems based on empathy in design. Her collaboration partners assisted her by creating lesson plans using the UbD framework, coteaching in their areas of their expertise, and judging the final projects and presentations.

Students were divided into teams of four. Each team selected a real-world problem related to recycling or waste management. The concepts addressed included problem-solving using volume, graphing, ratios, proportion, scale, and quantitative data analysis. Learners demonstrated their understanding of the concepts through a design challenge that encompassed 3-D printing, 3-D design, human-centered Design Thinking based on the IDEO model, working with local experts, research and digital-literacy skills, data analysis, and persuasive presentation techniques. The goal was to analyze the current recycling process at McKamy Middle School and create mathematical representations to express unknowns by using linear equations and graphs. Students would then design a better, tangible method to solve the problem, a solution that could be represented by 3-D models made by hand, 3-D models made using the Tinkercad online design tool, or 2-D nets.

Elementary Science

Bernadette Trammell, school librarian at Camey Elementary in The Colony, Texas, has been working with us since the Mobile Transformation Lab's inception. Our first lesson in year one focused on force and motion using Ollie robots in third-grade science. The second year's implementation for force and motion expanded the instructional team to include a district science curriculum specialist and an instructional technology facilitator. How did bringing together this cross-curricular group from LISD's Learning and Teaching Department support student outcomes? Involving a variety of content experts allowed us to view the lesson through many lenses and broadened student learning, creating a richer library experience through collaboration.

Middle School Language Arts

Fostering autonomy and educators' knowing how to connect with experts are primary goals of the Mobile Transformation Lab. Katie Shropshire, librarian at Hedrick Middle School in Lewisville, Texas, teamed with seventh-grade language arts teacher Jessica Dax to find an innovative way to address essential questions related to expository writing. At this point, Ms. Shropshire contacted LISD Library Media Services to see if there was a way to embed emerging technologies into the standards to meet Ms. Dax's needs. We reviewed their instructional goals and knew that Ozobot robots would be the perfect tool to support the lesson and increase student engagement. Ms. Shropshire and Ms. Dax then contacted the instructional technology facilitator and the secondary ELA content specialist to create a learning plan based on Understanding by Design and supporting resources for expository writing. The Mobile Transformation Lab team provided hands-on assistance and the technical materials.

Looking Ahead to Year Three

As we write this in July, we are looking forward to the 2017–2018 school year, which offers many possibilities for expansion and pushing our technical limits. We are excited to have been asked by Kristi Taylor, school librarian at Lamar Middle School in Flower Mound, Texas, to provide support as her students design, create, and code wearable objects that incorporate all elements of STEAM. This project will be part of her Circuit Girls club at the school.

Currently, we are in discussions with a local university to create a cohort made up of LISD librarians and other interested district employees to expand our understanding of maker education, STEM, and

STEAM in an effort to build capacity in school librarians and create a vertically aligned concept for students from preschool through college as they—and we—explore making as a modality for learning. Our hopes are to broaden our understanding of how children learn and design around empathy.

Finally, as our public libraries are adding makerspaces and expanding STEM and STEAM programming, we hope to partner with them to increase the services available to our students and their families as they all become makers.

Transformation does not happen in isolation. Seamlessly partnering with experts and multidisciplinary teams allows our district to transcend the brick-and-mortar schoolhouse. With the guidance of Library Media Services supervisor Robin Stout, we have the latitude to dream of a system to transform the role of instruction in school libraries. In the words of Andrew Carnegie, "Teamwork is the ability to work together toward a common vision. The ability to direct individual accomplishments toward organizational objectives. It is the fuel that allows common people to attain uncommon results" (Thapaliya 2017). We are common people striving to make lasting, uncommon learning experiences for students. We can't wait to see what happens next!

Works Cited:

Future Ready Schools. n.d. "Future Ready Librarians." <http://1gu04j2l2i9n1b0wor2zmgua.wpengine.netdna-cdn.com/wp-content/uploads/2017/01/Library_flyer_download.pdf> (accessed September 3, 2017).

Schwabel, Dan. 2013. "10 Ways Millennials Are Creating the Future of Work." *Forbes* (December 16). <www.forbes.com/sites/danschawbel/2013/12/16/10-ways-millennials-are-creating-the-future-of-work/#66d71b573105> (accessed June 15, 2017).

Thapaliya, Rajan. 2017. "How Teamwork Makes the Dream Work." *TheWorldPost*. <www.huffingtonpost.com/rajan-thapaliya/how-teamwork-makes-the-dream-work_b_9794438.html> (accessed June 15, 2017).

SOURCES OF MORE INFORMATION

IDEO Design Thinking: <www.ideou.com/pages/design-thinking>

International Society for Technology in Education standards: <www.iste.org/standards/standards>

Future Ready Librarians initiative: <http://futureready.org/program-overview/librarians>

Lewisville ISD Mobile Transformation Lab site: <http://hs.moodle.lisd.net/course/view.php?id=1010>

Lewisville Independent School District's strategic design plan: <www.lisd.net/domain/103>

Ruben Pentedura's SAMR Model: <www.hippasus.com/rrpweblog/archives/2012/08/23/SAMR_BackgroundExemplars.pdf>

Stanford dSchool: <https://dschool.stanford.edu>

Texas Association of School Administrator's visioning document: <www.tasanet.org/cms/lib07/TX01923126/Centricity/Domain/111/workinprogress.pdf>

Texas Essential Knowledge and Skills: <http://tea.texas.gov/index2.aspx?id=6148>

UbD and UbD 2.0 <www.grantwiggins.org/documents/UbDQuikvue1005.pdf>

Leah Mann *is a library media instructional specialist at Lewisville (TX) ISD. With Jody Rentfro, she coauthored the blog post "Supporting the Future Ready Student: The Mobile Transformation Lab" on the Texas Association of School Administrators* Vision in Practice *blog. She is a member of the Texas Library Association (TLA) Executive Board Nominating committee and TLA Legislative committee. She is currently pursuing her EdD in Educational Leadership at Dallas Baptist University.*

Jody Rentfro *is the emerging technologies specialist at Lewisville (TX) ISD. She is the current vice president of the Texas Computer Education Association's Virtual Learning Special Interest Group. With Leah Mann she coauthored the blog post "Supporting the Future Ready Student: The Mobile Transformation Lab" on the Texas Association of School Administrators* Vision in Practice *blog. She is a national and international presenter for digital citizenship implementation in a K–12 environment, and has been accepted to present the session "Build Your Own: Mobile Transformation Lab" at ISTE 2017.*