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Mastering Organizational Change Management to Drive Digital Transformation in Education

A white paper from Cisco's K-12 Executive Council

Most school leaders know we're in the midst of a digital transformation, with a size and scope larger and more significant than anything we've seen before. Some say this is the Fourth Industrial Revolution, connecting the physical, digital, and biological worlds.

Educators know they have to change but are challenged by the convergence of technology and pedagogy. What technologies can affect learning and experience? How can we get all educators on board? How can we build a case to support our goals? What's our future vision?

In this white paper, Cisco's K-12 Executive Council provides insight in applying organizational change management (OCM) principles to create next-generation digital learning environments, with a focus on combining the concepts of educational transformation and OCM to help schools take a practical and effective approach to change, enhancing teaching and learning while improving operational management.

About the K-12 Executive Council

The K-12 Executive Council is a diverse group of education thought leaders and change agents from education and industry who collaborate in a forum of open sharing to drive digital transformation in education, with the goal of engaging the broader ecosystem and improving learning outcomes and student success nationwide.

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Executive summary

Much has been written about educational transformation, and similarly, much has been written about strategy planning and organizational change management (OCM). This paper combines the two, providing a guide to help schools take a practical and effective approach to digital transformation.

Some schools use traditional consulting firms to assist with transformational efforts. Others use education consultants. The challenge is that there are few consultants, or consulting firms, who understand both technology and change management practice. Many large consulting firms take a business approach, using business process design to facilitate the implementation of technology and change within schools. Smaller education consultants miss the importance of OCM and business process design as they focus on changing pedagogical instruction.

Most school leaders already know that we're in the midst of a digital transformation of a size and scope that is larger and more significant than anything we've seen in the past. In fact, some say that we're going through the Fourth Industrial Revolution, which is a convergence of technologies connecting the physical, digital, and biological worlds (weforum.org).

Educators know that they have to change, but they're often challenged by the merging of technology and pedagogy. How should we begin? What technologies can affect learning and our campus experience? How can we get all educators on board? What do we do about all the technology we've already bought? How can we build a business case to support our goals and objectives? Where do we begin in creating a vision for the future?

This paper is for you. The K-12 Executive Council brings our experience from education, technology, and consulting, as well as the work we've done with hundreds of schools, colleges, and universities across the globe, and offers information and insights to help you begin the process.

We will focus on what the next-generation learning environment should include and how to apply principles of OCM to realize these environments. No change initiative is possible without a clear definition of intended outcomes. Equally important, no change initiative can be complete unless the roles that people, process, data, and things play are considered.

What are you trying to achieve in your school or district? Do you want better student engagement? Do you want to create world-class learning environments, the opportunity for students to take dual-enrollment courses while staying on their K-12 campus, or to ensure end-to-end safety and security for all educators, staff, and students? Your goal might be one of these, all of these, or something completely different. The most important factor is that your intended outcomes—whatever they are—must be thoroughly defined at the start of your initiative.

When 50 billion "things" connect

With the massive explosion of sensors and devices and connections to the Internet comes an increase in major cyber risks facing schools. Ransomware, identity theft, phishing, and malware all have the potential to bring school districts to their knees; threaten student, educator, and district data; and completely stop learning in its tracks.

At the same time, it is important to outline a strategy to measure results. In this paper, we will discuss the concept of evidence-based decision making. How do we find evidence to measure the impact of our efforts on the things we're trying to change or validation that a change is actually taking effect? Many change initiatives fail because these metrics, and the evidence to support them, have not been clearly identified or tracked.

We will further delve into culture and the importance of stakeholder buy-in to help move your change forward in a successful way. This begins with setting the right vision for the future, and then ensuring your leadership is in agreement with your vision.

Finally, we'll discuss the shifts necessary to move from past practice to future practice and the importance of technology platforms in planning and executing change, not only for today, but also for the future.

The next-generation learning environment and the need for change

We're seeing an explosion of connections, with an expectation that 50 billion things will be connected to the Internet by the year 2020 (Cisco Internet of Things) and the Internet of Things (IoT) accounting for nearly half of these connections (Cisco Visual Networking Index 2017). Sensors will be everywhere, in everything from agricultural production systems to your refrigerator, from the contact lenses in your eyes to parking garages, and from fitness devices and wearables to other monitoring devices. Ray Kurzweil, famous inventor and founder of Singularity University, predicts that 2026 will be the year when humans and machines converge (Kurzweil Accelerating Intelligence).

All of these trends point to one very scary effect. With the massive explosion of sensors and devices and connections to the Internet comes an increase in major cyber risks facing schools. Ransomware, identity theft, phishing, and malware all have the potential to bring school districts to their knees; threaten student, educator, and district data; and completely stop learning in its tracks.

Distributed Denial of Service (DDoS) attacks are also on the rise. According to *EdTech Magazine*, "When the Florida Department of Education introduced computer-based standardized tests two years ago, the rollout wasn't smooth. A distributed denial of service attack pummeled the testing vendor's server, preventing students throughout the state from taking the test for three days." To understand the scope of the threat, EdTech Strategies provides the K-12 Cyber Incident Map, which is a visualization of cybersecurity-related incidents reported about K-12 schools and districts from 2016 to the present.

Schools are at the heart of digital transformation. Many students bring multiple devices to school. Many school networks are in serious need of upgrade and refresh to handle the impact of these devices and new,

A next-generation learning environment

This environment should focus on creating the right capabilities so that the institution can expand its reach and the effectiveness of face-to-face learning with new distance learning and blended learning methodologies.

complex threats, and many districts simply do not have enough IT resources to manage the network or the risk. This calls for new technologies capable of machine learning and data analytics to help orchestrate, automate, and secure the technology environment. Identity management and single sign-on serve as a case in point. Larger school districts may have tens of thousands of authorized users, each with multiple passwords—a management nightmare. Through automation with technologies such as SAML, Microsoft's Active Directory, and Oracle's Identity Management System and standards such as IMS, school districts can build an infrastructure to provide secure, seamless integration and single sign-on for most, if not all, of their systems.

It's not only that schools do not have enough IT resources though. We are seeing more and more "Baby Boomers" retire and leave schools and districts, taking years and years of institutional knowledge with them. Training the new workforce is critical, and filling the gap of knowledge transference is imperative. Utilizing machine learning and data analytics can help fill the gap, making technology environments more manageable and automating many of the rote tasks required to keep systems up and running.

The Digital Vortex, produced by the International Institute for Digital Management in Zurich, studied the impact of digitization on a range of industries, including education. New entrants to industry are disrupting traditional players without having to replace the existing traditional value chain. This is thanks to 1) customer expectations for a different experience, 2) new technological capabilities, and 3) competitive demands (Louks, Macaulay, Noronha, and Wade).

This is no different in education where 1) students and educators are demanding a different experience from their schools, 2) technology is enabling new forms of learning with new tools, capabilities, and realities, and 3) new entrants in education are forcing traditional institutions to re-examine their approach or be outdone by non-traditional players. These new entrants include private, for-profit organizations; existing institutions that are "outsourcing" their brands; and a range of online providers who offer the opportunity to consume learning in new ways.

What is this next-generation learning environment? This environment should focus on creating the right capabilities so that the institution can expand its reach and the effectiveness of face-to-face learning with new distance learning and blended learning methodologies.

These methodologies put the learner at the heart of learning and include flipped, adaptive, and personalized learning. New technology makes it possible to create environments where students get what they need, when they need it. New data analytics programs make it possible for teachers to have a better understanding of where students are in the learning process, and to serve up customized assistance for the student.

New social collaboration spaces make it easier for teachers and students to connect before, during, and after traditional or virtual courses. These

Organizational change management

Organizational change management is a framework for managing the effect of new business processes, changes in organizational structure or cultural changes within an enterprise. Simply put, OCM addresses the people side of change management. A systematic approach to OCM is beneficial when change requires people throughout an organization to learn new behaviors and skills. By formally setting expectations, employing tools to improve communication and proactively seeking ways to reduce misinformation, stakeholders are more likely to buy into a change initially and remain committed to the change throughout any discomfort associated with it (TechTarget).

spaces create persistent learning environments, with ongoing interaction that helps the teacher serve as coach and mentor to students, and that positions students to help one another.

Therefore, the process of defining how transformed learning spaces should look must consider the teaching methods that will provide the types of experiences we want to deliver to educators, staff, and students:

- For students to take classes anywhere, anytime, on any device

- To deliver a range of learning models, including online, hybrid, and flipped learning

- To connect with outside experts and bring them into courses as lecturers or guest educators

- To work with other schools and universities in the region, state, or nation to share courses, content, and educators, thus increasing the number of courses offered and the number of students served

- For educators, staff, and students to connect seamlessly to the network

- To ensure a safe, secure, and reliable network

- To ensure student, educator, and staff safety across the campus

- For educators, staff, and students to connect and collaborate, regardless of location

This process should also include ways to create both online and campus-based programs for a more individualized approach to teaching that ensures that all students can graduate career or college ready, offers feedback on instruction and methodology and the process of delivering courses, and shares best practices for incorporating technology into teaching and learning.

Organizational change management: what is it?

Organizational change management (OCM) focuses on the people side of change. It's great to buy new technology and to develop a roadmap and implementation plan for change, but if the people aren't on board, the change will fail. TechTarget defines OCM:

> Organizational change management is a framework for managing the effect of new business processes, changes in organizational structure or cultural changes within an enterprise. Simply put, OCM addresses the people side of change management. A systematic approach to OCM is beneficial when change requires people throughout an organization to learn new behaviors and skills. By formally setting expectations, employing tools to improve communication and proactively seeking ways to reduce misinformation, stakeholders are

What is a vision?

A vision is a short statement that crystallizes the point on the horizon where you would like your institution to be in the future, typically, within three to five years.

The vision is a rallying cry that is purposefully short and pointed, helping everyone get behind an idea and providing a guiding light under which all key strategies, execution components, and metrics can be aligned.

more likely to buy into a change initially and remain committed to the change throughout any discomfort associated with it.

So which people? You. Whether you are in academics, administration, IT, or the student body, you are at the heart of change, and this is the basic principle of OCM. Whether you are at the district, or in the actual buildings/schools within the district, you are responsible for helping to drive change across multiple functional areas with your colleagues. And, with this guide and these principles, you can do this.

It's important to know that all functions and roles should help drive the change, regardless of the size of a district. Having passionate advocates, regardless of where they sit in the district, is critical in any OCM initiative. Managing OCM in learning organizations requires generating sufficient leverage to catalyze positive change. This means developing and empowering change advocates in a variety of organizational roles who are committed to helping with the heavy lifting associated with OCM. Positive change happens when an organization reaches a critical mass of change advocates who are all pulling in the same direction on the same lever.

Setting a vision

What is a vision? A vision is a short statement that crystallizes the point on the horizon where you would like your institution to be in the future, typically, within three to five years. The vision is a rallying cry that is purposefully short and pointed, helping everyone get behind an idea and providing a guiding light under which all key strategies, execution components, and metrics can be aligned.

The digital vision should articulate the school's future state: What are the most important and relevant areas of focus? What type of experience would you like to deliver for students, educators, and staff, both on and off campus?

A strong vision will help all stakeholders align around a key theme; for example, the transformation of traditional and physical learning to robust, engaging, virtual learning environments, where the physical and virtual converge for maximum benefit of students, educators, staff, and the community.

Vision statements convey a commitment and can be meaningful and powerful. Some you might recognize are, "Changing the Way We Live, Work, Play, and Learn" (Cisco), "Spreading the Power of Optimism" (Life is Good), or "The Exemplary Comprehensive Research University" (Cornell University).

Other vision statements pertaining to education might be "Learning without Limits," "Ubiquitous Learning," "Preparing the Knowledge Society," or "Equipping the Workforce of the Future." The challenge is to find a vision statement that is broad enough to be inclusive of all your stakeholders, but specific enough to differentiate your institution.

An IoT-OCM connection

Both IoT and OCM bring together people, process, data, and things to make networked (and other) connections more relevant and valuable than ever before—turning information into actions that create new capabilities, richer experiences, and unprecedented economic opportunity for businesses, individuals, and countries.

Leadership and accountability

Leadership and accountability are essential components of digital transformation success. The school leader and other senior leaders will set the tone for change and demand action, but the champion for change will probably be someone else.

The assigned leader or champion will work to establish the vision and set the broader team into motion. He or she will help to propagate understanding across multiple departments for the need to change, breaking down silos and identifying other like-minded individuals. The champion will drive the initiative until it's complete. Having a champion who is also a recognized school leader, e.g., the principal, is a critical component of owning and driving the vision, showing how pedagogy is enhanced by using the right technology.

Finally, involving the right people in the visioning process is highly important since many of these individuals will naturally become standing members of task forces that implement the strategy and plan. The collaborative effort among senior management, educators, and IT experts is essential to build the adequate plan and implementation.

People, processes, things, and data

There is a strong connection between descriptions of the Internet of Things (IoT) and the elements that need to be in place for a successful OCM initiative. IoT brings together people, process, data, and things to make networked connections more relevant and valuable than ever before—turning information into actions that create new capabilities, richer experiences, and unprecedented economic opportunity for businesses, individuals, and countries. The same can be said of OCM.

Let's take each separately. **People** have devices and connect to the Internet through these devices and through social networks. They are now increasingly connecting through sensors. In education, educators and students connect to the Internet and social media to access knowledge and information, engage with outside experts or students in other schools or countries, and enhance the learning experience.

People are also at the heart of effective change initiatives, and their interactions with technology will evolve over time. Again, if you're reading this, this means you. Educators are stewards, identifying ways to optimize these experiences and create better, more engaging environments. And, they are critical champions in driving change.

Other people—like superintendents, CFOs, CBOs, CAOs, CIOs, CISOs, principals, directors of technology, department chairs, teachers, students, and community members—must also be considered and included as key components of change and as change champions. In larger school districts, the COO is a critical part of the equation and should drive the governance of change, in collaboration with the other C-suite executives.

Process considerations

Data accessibility, acceptable use policies and guidelines, and consideration of FERPA, CIPA, and E-rate are critical. To enhance organizational change, Service Level Agreements (SLAs) between divisions, memorandums of understanding (MOU), and other organizational agreements should be considered.

Of course, districts vary in size, and smaller districts may not have all of these roles. But, regardless of a leader's formal title or job description, there is a role that everyone who is driving change can play. For example, IT might need to consider facilities if there isn't a formal facilities department. The librarian might be the technology advocate and bridge between faculty and student needs and enabling technologies.

It's important to make sure that all areas of the district and schools are considered across academics, administration, and information technology. Define the roles, responsibilities, and attributes, and recognize that these individuals may sit anywhere within a school or district. Do these individuals have the right attributes to make sure change takes place? Leadership for change can happen at all levels, but often, success is a function of mind-set, the ability to imagine new future states combined with the ability to execute.

Processes are needed to manage the massive technology disruption taking place in education. These include processes to increase automation and embed security as the number of connections to the Internet within our schools and districts increases; more and more data is accessible and an increasing amount of this data needs to be analyzed. Process also plays a role in how people, data, and things will interact and the value that can be derived from change.

In K-12, process is particularly important. Data accessibility, acceptable use policies and guidelines, and consideration of FERPA, CIPA, and E-rate are critical. To enhance organizational change, Service Level Agreements (SLAs) between divisions, Memorandums of Understanding (MOU), and other organizational agreements should be considered.

Things include sensors, meters, and mobile phones, anything that can be attached to any object that can then connect to the network and share information. These things will sense and deliver data to help people make decisions that are more intelligent. In schools, these things might be security cameras in campus buildings or on buses, sensors in science labs, or student mobile devices.

Data results from people, process, and things. Not all data can or should be stored, but higher-level information and insights should be sent back to machines, computers, and people in real time for evaluation for more informed decision making. The network can generate and scale the intelligence required to meet the variety of data streams generated across schools and districts. For example, data from the wireless network can be gathered and cross-referenced to show student location and levels of success. Are students who spend more time in the library more successful? Are students who take part in after-school activities more engaged?

Defining outcomes

Before starting any change initiative, school leaders must decide what they would like to accomplish in light of their larger strategic plan. Starting with the

Where are we today, and where would we like to be?

What is currently working well at our institution?

What do you like most about what we do?

What do you like least? If you could change anything, what would you change?

How do you think technology could improve our school?

Where are we making, saving, or wasting money?

How are we preparing students for the future?

What kinds of college and career pathing options do we have for students?

What kind of experience do we provide students?

How effectively, or not, are we supporting students who most need help?

end in mind and identifying intended outcomes will help to identify areas of focus and ensure the initiative is properly scoped.

Start with the existing strategic plans, financials for public institutions, current educational programs, special programs, enrollment and retention numbers, the background of your leaders, where technology is currently being deployed, a clear understanding of who your students are and what they need to be successful, and anything related to student experience. From here, focus on outcomes. If you don't think you can realize better outcomes throughout a change initiative, why change? One effective method to define outcomes is to interview key stakeholders, including students, asking questions like, "What is currently working well at our institution? What do you like most about what we do? What do you like least? If you could change anything, what would you change? How do you think technology could improve our school? Where are we making, saving, or wasting money? How are we preparing students for the future? What kinds of college and career pathing options do we have for students? What kind of experience do we provide students? How effectively, or not, are we supporting students who most need help?"

Many institutions choose to gather this input through more structured surveys, which they normally do on a regular basis anyway. Surveys are a good way of getting representation from a broader set of constituents and serve as a great metrics tool to measure sentiment after the changes have been implemented.

In working with hundreds of educational institutions, we see a number of similar outcomes emerging:

- Improve the student experience

- Better support struggling students

- Increase student achievement

- Provide ubiquitous learning—anytime, anywhere, on any device

- Make learning more flexible; provide multiple paths to graduation

- Better engage educators in using new technologies to improve teaching and learning

- Make it easier for educators to use technology; make it "transparent," like electricity

- Provide high-quality and persistent professional development for teachers

- Make schools more efficient (HVAC systems, lighting, parking, garbage collection)

- Get the community more involved in a school's success: parental support, mentoring, internships, guest lectures, etc.

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https://www.ciscospark.com/downloads.html

Then, send an email to repatton@cisco.com so that we can invite you to the space via your email address.

- Make it easy to bring in outside experts

- Provide virtual tutoring for students

- Create a persistent learning environment: before, during, and after class

- Make it easier for students to connect with faculty, staff, and the community

- Personalize the learning experience

- Get better insights into where students are spending time on campus and correlating that to student success

- Better connect students to the resources they need, when they need them

- Engage students (potentially through student government) in using new technologies to improve their academic experience, in and out of the classroom

- Make sure students are connected and engaged on and off campus; retain them and ensure academic completion

- Provide virtual concurrent enrollment for students

- Protect schools and campuses from physical and cyber attacks

- Provide students with a global view of society

- Help students become better critical thinkers and problem solvers

If we're missing potential outcomes in this list and you would like to see them added, please include them in our Spark Room! Please 1) download Spark to your mobile, desktop, or web device at https://www.ciscospark.com/downloads.html*, and 2) send us an email (*repatton@cisco.com*) so that we can invite you to the space via your email address.*

Measuring effectiveness: evidence-based decision making

How then, do you measure effectiveness and take an evidence-based decision-making approach? There are obviously qualitative and quantitative measurements and many case studies and other types of documentation that measure change initiatives.

Evidence is both iterative and evolutionary. If you focus on year one, for example, and only look at grades, your change will likely be deemed a failure. Starting with grades is emotional, and if this is the measurement, many teachers will go back to what they know has worked in the past. If you try a soft-measurement, though, like cultural shifts or adoption over time, you will be able to see how your focused efforts have engaged, or not, the faculty

A culture shift

The starting point should be the creation and development of a culture where educators and staff use technology tools on a day-to-day basis to gain the real benefits of collaboration-enabled processes, and to role model the use of these technologies for their peers. Regular and persistent use of technology by educators and staff is the best way to create and propagate the creation and growth of a digital culture, and thus, to create a new digital learning environment.

community. Perhaps the most important elements of organizational evaluation are to begin with the end in mind and recognize that change comes slowly.

Effective OCM takes time. There are no silver bullets, and so letting go of the myth of quick-fix solutions to complex phenomena is necessary to help systems make the shift from valuing what is measured to measuring what is valued. That means taking the time to identify leading indicators of success. This should include, but not be limited to, student and teacher safety, instructional quality, student achievement, student learning productivity and confidence, and teacher competence and confidence.

Establish diverse vision planning groups in your learning organization. Then invest the time necessary to articulate the most highly desirable outcomes. These will evolve into your leading indicators. Working backward from your organization's collective vision, establish categories of evidence, the intended outcomes for each category, and success criteria. Use some odd-numbered nominal scale of efficacy that makes sense to your organization: using Likert scales of 1-3 or 1-5 works well for most OCM practices. Taking the time to articulate and plan for positive change is tantamount to ensuring the people, resources, and ideas are in place to help make your vision a reality.

Culture and professional development

To ensure the successful implementation of digital transformation initiatives and the adoption of next-generation learning environments by educators, staff, and students, a deep and informed approach to digital culture must be at the heart of the institution.

The starting point should be the creation and development of a culture where educators and staff use technology tools on a day-to-day basis to gain the real benefits of collaboration-enabled processes, and to role model the use of these technologies for their peers. Regular and persistent use of technology by educators and staff is the best way to create and propagate the creation and growth of a digital culture, and thus, to create a new digital learning environment.

Changing culture is not easy. It requires that all leaders be linked to programs for digital skills development and significant cultural and process change. And, continued investment is necessary.

The adoption of a digital culture by educators and institutional administrators will eventually encourage all stakeholders to work in teams to solve problems, deepen their understanding of various concepts, and increase their knowledge. This experience, once integrated into pedagogical practices, ideally will generate the skills colleges and employers seek in new graduates, such as subject-area expertise, creativity, strong communication abilities, interdisciplinary thinking, and team-based problem solving.

Finally, it is important to note the critical nature of teaching the teachers; the development of front-line capabilities must be pervasive, extending

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> —Charles Duhigg, *The Power of Habit: Why We Do What We Do in Business and in Life*

far beyond a single information technology training course. Many teachers are intimidated by new approaches and unconvinced of their value, but the frequent use of technology tends to help them overcome these hurdles and become passionate advocates.

Consider ways to "fill the generation gap" between the new teachers (techies) and earlier generations who might be challenged to embrace technology and the associated changes in process and/or pedagogy. Another approach to filling generational gaps while better engaging students is to work with organizations like Generation Yes. Generation YES is a nonprofit 501(c)(3) that prepares teams of student technology leaders (STLs) in grades 4–12 to give professional development and IT support to educators and IT staff.

Importantly, teachers often know how to use the technology, but they may not clearly understand how to incorporate technology effectively to change teaching pedagogy. Training, progress monitoring, and flexibility are all a part of the recipe for success. For example, we must ensure that those overseeing the deployment of devices have a support system in place to troubleshoot and find the answers to their own questions. Teachers need ample time for learning the basics, and leaders should understand that there is some trial and error. This is why flexibility is key.

All of us have been in a typical professional development meeting where we're asked to do something differently, and then to define how our Monday morning will change as a result of whatever meeting or training we had. We're creatures of habit and know that change, and lasting change, takes a different approach.

Charles Duhigg, author of *The Power of Habit: Why We Do What We Do in Business and in Life*, said, "Change might not be fast and it isn't always easy. But with time and effort, almost any habit can be reshaped." The goal is not to replace teaching with technology, but to augment what teachers are doing today to make them more effective and better able to engage students tomorrow.

Technology alone will not transform teaching and learning. A solid plan for use must be implemented, and we must incorporate the vision, determine expectations, and identify applications and programming that will be used. Leaders should be able to answer these questions: What are we doing? Are we achieving our desired results? How do we know? And, where do we go from here? Understand this may evolve and change as you find things that do and do not work. A narrow focus with clear-cut initiatives is the best approach to begin.

Partnerships with the broader industry should also be considered to help drive change. Organizations like the Center for Interactive Learning and Collaboration (CILC), the iSchool Initiative, the One-to-One Institute, Flipped Learning with Jon Bergman, and Magana Education all provide valuable resources to help schools make the shift to digital and support faculty

The power of partnership

Partnerships with professional associations, the broader education industry and the vendor community can offer insights to help drive change.

members through the change. (Dr. Sonny Magana is a member of the Cisco K–12 Council and author of the book Disruptive Classroom Technologies: A Framework for Innovation in Education.) Professional associations such as the Consortium for School Networking (CoSN), the International Society for Technology in Education (ISTE), the United States Distance Learning Association (USDLA), and many others offer an array of professional learning opportunities, industry insights, and venues for networking with others.

Another avenue to beneficial partnerships is with your vendor community. Companies like Cisco, Intel, and Apple have gone through large change initiatives, and they have expertise in education, which makes them prime for supporting schools with their knowledge and experience. Cisco helps faculty members integrate technology and pedagogy with a bevy of education solutions, experts, and advisors. The Apple Distinguished Educator Program helps teachers to use technology to transform learning, and, Google offers free, online training for their tools.

The shifts necessary to move from past practice to future practice

Dr. Sonny Magana, author of Disruptive Classroom Technologies: A Framework for Innovation in Education and one of the authors of this paper, says that we need to expand, articulate, implement, and evaluate our epistemology for leadership in the third millennium and that this requires certain significant shifts in educational systems.

The **first** of these shifts is a shift away from the perception of leadership as a series of managerial tasks toward a perception of leadership as organizational change management.

· This requires visioning, articulating, implementing and continuously evaluating progress toward a highly desirable future reality.

· The initial step is imagining and sharing a highly desirable future organizational state.

· The second step is sharing that vision in a highly compelling manner.

· Leadership as management is marked by using tools and processes to solve well-defined and known problems for which there are clear and previously "proven" solutions.

· Such managerial leadership is important, yet an expansion of this managerial role is necessary in order to catalyze higher levels of collective creativity, ingenuity and innovation.

· Leadership as management runs the risk of relying on a finite set of skills, experience and tools with which to resolve well-known, defined, and identified problems for which there have been existing solutions for many, many years.

Six shifts are necessary to move from past to future practice.

- Leadership as management is analogous to tumblers of a combination lock; e.g., aligning time-tested solutions to known problems.

- However, the pace, gravity, and implications for global disruptive change has increased the need for expanding our leadership epistemology in order to invent new solutions to solve unsolved extant problems.

A **second** critical shift that is required is moving away from traditional teacher professional development toward a more systems-based organizational development that puts the leadership shifts into action.

- Traditional teacher professional development has not made any significant changes in instructional practices for the last 50 years.

- What is needed is a clarion call to ring in the need for an emergent leadership where leaders draw out the leadership capacity of all members of the learning organization.

- An expansion in our leadership epistemology is required for creating the conditions necessary for leadership to emerge from all elements of the organization: the state level, the regional level, the district level, the school level, and on to the classroom level.

- This is a shift that's underpinned by a preponderance of research evidence on organizational change management in the service of building collective efficacy.

A **third** critical shift is an instructional shift that moves away from privileging surface learning and rehearsal of that surface learning.

- There are three phases of learning: surface learning, deeper learning, and transfer of knowledge.

- A requisite instructional shift is moving from the tell-and-practice model of instruction to a model of instruction that supports students' knowledge transfer.

- This necessitates ample opportunities for students to apply their newly acquired deep knowledge to identify, investigate, hypothesize, and generate more robust solutions to wicked problems that matter to them.

A **fourth** shift is moving from a model of technology integration to a model of innovation.

- Such a shift is illustrative of shifting classroom technology use from translational to transformational and transcendent uses.

- This aligns with the shift toward deeper learning and knowledge transfer.

- The T3 Framework for Innovation was designed to articulate, implement, and continuously monitor progress toward transcendent learning with technology.

Education platforms

Education platforms consist of well-integrated network capabilities that support digital learning and a digital campus. These two key areas can be embedded within the network—think of it as sensors embedded within specific hardware and software products that themselves become intelligent nodes within the network. They then can draw upon network services while also linking to one another as appropriate based on use cases. Each of those two key areas—digital learning and the digital campus—is comprised of both physical and virtual elements that interplay and connect. Some of the key success factors of a digital education platform rely on the core network infrastructure—wired and wireless connectivity and the underlying cybersecurity solutions that enable what is essentially the heartbeat of an institution.

—Wainhouse Research

A **fifth** shift is shifting from learning organizations as knowledge acquisition systems to systems of continuous growth and mastery.

- This requires a shift from systems that prioritize knowledge that is known toward systems of continuous ideation, iteration, and entrepreneurship, a shift from learning organizations to intentional learning, for example.

A **final** shift is shifting from summative lagging indicators of measurement to systems that incorporate leading indicators that are illustrative of a highly desirable future state.

- Such a shift is based on systems of knowledge and awareness, using leading indicators in advance of change management to clarify the pathway forward and establishing precise categories for growth toward mastery.

- Whole systems can make intentional steps and plan to achieve progress using a backward design process—beginning with the end in mind and working backward in successive steps until the initial step is enacted.

Such a design process will help develop a collective mastery mindset, empowering learning organizations to realize their collective efficacy potential.

Technology and the importance of platforms

Technology plays a key role not only in enabling new ways of learning and but also in supporting the new models required to drive the very transformation that schools are trying to effect. Today's students demand always-on access to the network resources and information needed to realize success.

- They expect speed in their wireless access and a simple and seamless online interface to their courses, academic and administrative information, and student services.

- They want access to information when they need it and where they can most easily find it.

- They want to attend classes anytime, anywhere. They don't necessarily want to physically attend every class.

- They want a persistent social environment that is easy to find and creates a continuous learning environment, before, during, and after class.

What is a platform, and why is it important to take a platform approach in education? Wainhouse Research says:

> …[Education platforms] consist of well-integrated network capabilities that support digital learning and a digital campus. These two key areas can be embedded within the network—think of it as sensors embedded within specific hardware and software products that themselves become intelligent nodes within the network. They then can draw

The right education platform enables...

- The Network: Ubiquitous School Connectivity
- Cybersecurity
- Virtualization of the Digital School
- Collaboration and Personalization

upon network services while also linking to one another as appropriate based on use cases. Each of those two key areas—digital learning and the digital campus—is comprised of both physical and virtual elements that interplay and connect. Some of the key success factors of a digital education platform rely on the core network infrastructure—wired and wireless connectivity and the underlying cybersecurity solutions that enable what is essentially the heartbeat of an institution.

Having the right platform in place provides the foundation for today and the future. At Cisco, our Cisco Digital Education Platform is based on the Cisco Digital Network Architecture. It includes a solid core network with security everywhere (not just as a "bolt-on"), unified voice, state-of-the-art wireless, and applications for virtual learning, connected classrooms, connected knowledge, smart workspaces and schools, and secure campuses. The platform should also include a set of open APIs that allow schools to integrate for a more seamless teaching and learning experience. Everything that follows is dependent on a strong, reliable core network that ensures:

- The Network: Ubiquitous School Connectivity
- Cybersecurity
- Virtualization of the Digital School
- Collaboration and Personalization

The network: ubiquitous school connectivity

A school's infrastructure must be stable, scalable, reliable, and capable of handling the increased rate of traffic from the explosion of mobile devices, the use of video, and the implementation of new applications for communications and collaboration.

Again, a strategy for continued investment to keep pace with user demands is critical. Although the "plumbing" of a school might be invisible, it must be included for strategic investment during the budgeting process.

Additionally, the network must be safe, secure, wired, and wireless, easy to manage and administer, and designed to meet future growth requirements for the connection of people, processes, data, and things. This network represents the confluence of multiple technology trends:

- Mobility (ubiquitous, high-speed mobile networks, smart devices, and apps)
- Cloud computing, social networks, instant collaboration with anyone, anywhere
- Data analytics
- An explosion in connected "things," including mobile devices, sensors, and cameras, and a similar explosion of network traffic generated by data plans and video content, driving the need for greater bandwidth

> "Since Jan. 1, 2016, 141 U.S. K–12 schools and districts experienced one or more publicly disclosed cyber incidents. Sixty-seven incidents were reported during 2016, and 74 have been reported during the first five months of 2017. If the pace continues at the current rate, that will represent a more than 100 percent increase in 2017, compared to last year."
>
> —THE Journal

Cybersecurity

Cybersecurity has become an enormous issue across all markets—but particularly in education. Cyber attacks have been on the rise in K–12. Doug Levin, creator of the K–12 Cyber Incident Map, indicated in a recent THE Journal article that "Since Jan. 1, 2016, 141 U.S. K–12 schools and districts experienced one or more publicly disclosed cyber incidents. Sixty-seven incidents were reported during 2016, and 74 have been reported during the first five months of 2017. If the pace continues at the current rate, that will represent a more than 100 percent increase in 2017, compared to last year."

Levin attributed this rise to a few different factors: more awareness of nefarious cyber activities; more schools using more hackable technologies; more schools going 1-to-1 and relying on digital tools; and bad actors who continue to look for soft targets, such as students and school staff.

The expected academic culture of open access to knowledge and information for better learning has created a unique and growing challenge, not only for IT but also for senior management protecting confidential and sensitive information against threats and attacks over the Internet. Best practices from education institutions highly recommend a strategic and holistic cybersecurity plan that combines a robust technology architecture, people awareness and training, and security policies and data management processes. Digital devices and 1:1 initiatives are opening new avenues for student behavior, e.g., cyberbullying is on the rise. Disciplinary action has changed, whereas setting the groundwork for student dismissal, corrective action, etc. needs to be part of the student's acceptable use policy for technology. An effective cybersecurity architecture should make information available—yet segmented and secure—with the owner of the information deciding which people, groups, or organizations should have access to it based on user profiles.

In addition to student profiles and safety measures taken from an IT perspective, there is much to be concerned about in the way of cyber bullying and digital responsibilities. Teachers and students should be trained in responsible use and held to a high standard of decorum, respect, and integrity when using devices. Programs are available free of cost for students to learn about digital citizenship, and leaders should choose a program that ensures alignment to the vision and expectations for use.

Virtualization of the digital school

An intelligent digital campus allows for the connection of people, process, things, and data. It incorporates a wide range of IoT applications operating over the platform to support the business of the school, enable "outdoor" teaching and learning activities, and deliver a good student experience, such as school Wi-Fi, smart buildings, smart parking, smart lighting, smart transportation and school security systems.

Within the school, enabling location-independent work is a top priority in creating a next-generation learning environment. Having a virtualized IT

Collaboration is already the tool of today's learners and employers and should logically become the tool of today's teachers, schools, and education systems as a whole.

infrastructure can accelerate productivity of expensive and often scarce IT resources, generating benefits such as:

- Provide better financial efficiency and business agility for dynamic allocation of ICT resources.

- Maximize return on assets and investments in IT resources (e.g., HPC, storage, applications, etc.)

- Reduce under-utilization of expensive IT resources

- Reduce total cost of ownership of maintaining data center infrastructure (e.g., energy, IT management, etc.)

- Virtualizing IT infrastructure with such capabilities increases agility and the financial efficiencies of online administrative services to faculty, staff, students, and the community.

Collaboration and personalization

Collaboration is already the tool of today's learners and employers and should logically become the tool of today's teachers, schools, and education systems as a whole. Inside the classroom: teachers and students can adopt connected and collaborative technologies to support online and blended learning; for example, connecting peers and bringing experts—who are physically distant from students—virtually into the classroom will provide students with a unique, value-added learning experience. Connected and collaborative environments (physical and virtual) allow students, faculty, and staff to use video and virtual interactive spaces or cost-effective online distance and blended learning.

Technology can help break down walls that have traditionally existed in education to make collaboration easier and more ubiquitous. The ability to hold online meetings, deliver collaborative workspaces, and use video across the district helps foster connections and enables more frequent sharing of best practices, course design approaches, and access to outside expertise. Not having to travel across the district makes it easier for leaders to meet, educators to hold office hours and other meetings, and students to work with one another.

These new collaboration technologies also make it easier for students to engage on their own terms, and receive the personalized attention they need to be more successful in school.

Beginning the journey

The journey toward the digital transformation of education is dependent on a broader vision and OCM approach for the implementation of key priorities to enhance the quality and innovation in teaching and learning while improving the operational efficiency of administration and management.

The effective adoption of new digital technologies and approaches will make education more relevant, engaging and motivating for learners, enabling

To make a real difference, technology must be deployed thoughtfully by IT leaders who understand the pedagogical goals of educators, cooperating with and receiving professional guidance from education experts who can help them apply new technologies to learning.

faster time to mastery. But teachers must implement these new technologies in a way that transforms learning environments, creating more virtual opportunities for students, and merging the physical with the virtual.

We believe that technology can make a real difference, but it must be deployed thoughtfully by IT leaders who understand the pedagogical goals of educators, cooperating with and receiving professional guidance from education experts who can help them apply new technologies to learning.

To realize the full benefits of digital technologies for education, a secure and reliable connected network and failsafe collaboration tools must be guaranteed.

Tools and resources

Student Data Security: A Call to Arms for K-12 *CIOReview*, November 2017.

Orange County Public Schools, "Even Kindergarteners Need Info-Security Training," *Toggle Magazine*, September 2017, written by Christine Fisher and produced by Zachary Brann.

Building Technology Infrastructure for Learning, June 2017, U.S. Department of Education, Office of Educational Technology.

Disruptive Classroom Technologies: A Framework for Innovation in Education, Dr. Sonny Magana.

The Future of Education: Transcending the Status Quo, a five-part blog series authored by Dr. Sonny Magana for *edCircuit*.

Download Cisco Spark free: https://www.ciscospark.com/downloads.html

Author biographies

Rod Houpe
A strong network of technological solutions is a vital part of any organization, especially one with 40,000 students to track.

In his role as chief information officer for the Cleveland Metropolitan School District (CMSD), Rod Houpe is in charge of coordinating information services for the state's second largest K-12 school system and the nation's most impoverished student population. With more than 100 schools, CMSD is a $984 million entity that spends approximately $11 million annually on information technology needs alone.

"We're not focusing only on K–12 education services; we're also looking at leveraging best practices and becoming a best practices delivery organization," says Houpe, whose team of 32 IT professionals provides support for CMSD's 5000 full-time employees, 2500 part-time employees and more than 40,000 students.

Houpe's team is preparing to roll out a new enterprise resource planning (ERP) system, a $20 million endeavor that will allow the district to

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control and monitor all human resource and financial functions from one centralized platform. "We're transcending the K-12 realm to become a far more business process-oriented organization," says Houpe. "We are a midsized organization, committed to building our brand through process re-engineering."

Renee Patton

As director of Education, U.S. Public Sector, Renee Patton is the leader of US Public Sector Education at Cisco. She and her team help schools, colleges, and universities envision the future of learning and start planning and executing on their vision today. With more than 20 years of business, management, sales, and marketing experiences in both small start-ups and large corporations, Renee has managed through adversity and diversity to help customers realize technology solutions that drive business outcomes.

Including a master's degree in Education from Stanford, Renee has spent 18 years in education, giving her a clear perspective to address business issues and changing landscapes. Always a curious learner herself, it was after earning her undergraduate degree that she became a high school English and French teacher. She coached cross-country and moderated the student yearbook and newspaper, becoming deeply ingrained in the school culture. She then spent four years on the district side managing policy and a $20M budget for Los Gatos-Saratoga JUHS Board of Trustees, learning firsthand how a district runs and understanding regional challenges.

Prior to joining Cisco full time, she ran her own marketing consulting firm for seven years, working with agility to develop strategy and customize marketing programs and projects to meet client needs.

After seven years at Siemens serving as the key global marketing interface with Munich and managing national sales programs, Renee joined Cisco to lead U.S. Education Field Marketing and manage the company's national E-rate Program. She then served as global industry vertical team manager and marketing education lead in Cisco's Corporate Marketing Organization where she was responsible for content marketing, positioning, and strategy. In her current role, she helps deliver $2B of education sales per year to Cisco.

Renee is excited about the future of education and the trends driving massive shifts in how always-connected students are learning today. Working with customers, Renee and her team are deploying technology that addresses new educational approaches and supports ways to better engage learners and prepare teachers.

Renee is a Lions' Club Member and involved in her local community. She holds a B.A. degree in English from Santa Clara University and an M.A. in Education from Stanford University.

Kathryn Francis M.Ed.

Kathryn Francis currently serves as the principal of Orchard STEM School in Cleveland Metropolitan School District (CMSD). She was the recipient

of a ConnectEd Grant from Apple and has facilitated the first 1:1 learning environment in CMSD. Her background is in special education. She received a bachelor of science in education from the Ohio State University and taught for five years in multiple special education settings including grades 3-12 inclusion and resource room support as well as work with students with emotional disabilities. Shortly after her teaching career began, she joined a cohort of Cleveland teachers to obtain her masters of art in education from Baldwin Wallace College with a focus on leadership and administration. In 2013 Kathryn participated in a one-year residency program called the Aspiring Principal Program in CMSD based on the New York Leadership Academy's work. This led to her current position as principal at Orchard.

Kathryn's commitment to technology integration is evidenced not only through her partnership with Apple, but she is also a member of Cisco's K-12 Executive Council. This council was established with the purpose of helping to drive the digital transformation in education. Kathryn also serves on the board of Cleveland Council of Administrators as a representative for all K-8 building principals. Her relentless drive for student achievement and technology integration continue to be at the forefront of her work and continued education.

Dr. Sonny Magana Ed.D.

Dr. Sonny Magana is an award-winning teacher, best-selling author, and pioneering educational technology researcher. Sonny is a highly sought-after leadership consultant, speaker, and instructional coach with more than thirty years' experience helping educational systems around the world realize the power of transcendent learning. The author of numerous research studies and articles, Sonny's newest book, Disruptive Classroom Technologies: A Framework for Innovation in Education, was recently published through Corwin Press to wide international acclaim.

A tireless advocate for transcending the status quo, Sonny founded and served as principal of Washington State's first CyberSchool in 1996, a groundbreaking blended learning program that continues to meet the needs of at-risk students in Washington. He is a recipient of the prestigious Milken Family Foundation National Educator Award and the Governor's Commendation for Educational Excellence. An avid musician, yoga practitioner, and beekeeper, Sonny holds a bachelor of science degree from Stockton University, a master of education degree from City University (where he was honored with the Presidential Award for meritorious scholarship), an educational administration endorsement, and a doctorate in educational leadership from Seattle University.

Jim Pulliam

Jim Pulliam's career spans over 35 years in technology, which has included positions in the aerospace industry, state and local government, and public education. Jim is currently the chief information officer for Orange County Public Schools, the fourth largest school district in Florida and the ninth largest in the country.

Jim has held the roles of CIO, CISO, and combined CIO/CISO in public education. At the state level, Jim served as the CISO for the Minnesota State Colleges and Universities (MnSCU) system and held leadership positions for both disaster recovery and information security committees within the Utah State Higher Education (USHE) system.

Jim's enthusiasm for working with organizations in the public education sector to integrate and align information security within the enterprise has brought an enhanced awareness to school administrators and members of the community. Jim has acquired a passion for student success and enjoys lecturing and mentoring students in the area of information security.

Jim is a graduate of Regis University in Denver, Colorado, where he earned a bachelor of science degree in Computer Information Systems and a master of science degree in Information Assurance.

Dr. W. Wesley Watts Jr.

Dr. W. Wesley Watts Jr., is the Chief Operating Officer for Prince George's County Public Schools (PGCPS), one of the largest school districts in the U.S. with 133,000 students and 19,600 employees. Wesley is a hardworking, passionate educator determined to afford all youth the opportunity of post K–12 education by providing them with the skills to enter college.

Wesley created, designed, and implemented a four-year Information Technology (IT) Academy at Fairmont Heights High School in August 2011. The Academy is integrated into the division of Information Technology in a "Blended Operations" model. This IT operation has technology distribution centers strategically located throughout the county to support the school district. All students study computer repair in the ninth grade. In the tenth grade, students chose a career path of either programming or systems engineering. Students will be career and college ready, get an acceptance letter to college, and graduate with a professional IT certification. Two additional Academies opened at Gwynn Park High School in August 2012 and Duval High School in August 2013. In November 2013, Wesley received the (ASBO) Brice and Shirley Phillips Award for Best Practice.

Wesley has had a dynamic management career with strong leadership, team building, problem-solving, decision-making, project management, and communication skills. He is experienced in recruiting, developing, and retaining staff and building a highly effective team. Additional experience: military academy, Army Reserves, business owner, teacher, trainer, technologist, chief information officer and chief operating officer. He is married with three children.