BEST PRACTICES IN BUILDING A DIGITAL LEARNING ENVIRONMENT

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In the following report, Hanover Research explores technology and digital learning in school districts, with an emphasis on strategic planning and creating comprehensive digital learning plans. This report investigates several issues concerning digital learning, including 1:1 device implementation, personalized learning, digital learning platforms, and drafting effective and clear strategic documents.

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INTRODUCTION

Advances in recent years have allowed schools, teachers, and students to access low-cost technology that provides opportunities for information gathering, communication, and connectivity. According to the U.S. Department of Education, "these technological advances hold great potential for improving educational outcomes, but by themselves hardware and networks will not improve learning." [1] Digital learning allows for an expanded learning environment—offering capabilities such as visualization, simulation, games, collaboration, and assessment—but school districts and educators must effectively plan technology use in order to experience the full range of benefits offered through digital learning. Because these new technology-driven pedagogies are often difficult to implement well, experts encourage school systems to carefully plan their roll-out, from blended learning strategies to teacher training and technological infrastructure.[2]

To this end, this report examines strategic planning for digital learning initiatives. This report addresses multiple factors that can influence how school districts plan, implement, and monitor digital learning environments to provide a comprehensive strategy for the various elements of digital learning. It is intended to inform public school district strategic planning processes. This report is presented in three sections:

- **Section I: Developing a Comprehensive Plan for Digital Learning** reviews the key elements of strategic plans that address digital learning, including goal identification, stakeholder involvement, action steps, and monitoring implementation.
- **Section II: Planning for Core Elements of the Digital Environment** addresses three aspects of digital learning: 1:1 implementation, personalized learning, and digital learning platforms. This section discusses how each of these elements is important to digital learning, and provides considerations for strategic planning.
- **Section III: District Profiles** discusses digital learning plans at selected school districts. These profiles examine technology in these districts, as well as how district leaders planned for and implemented digital learning initiatives.

[1] "Expanding Evidence Approaches for Learning in a Digital World." Office of Educational Technology, U.S. Department of Education, February 2013. p.9. https://tech.ed.gov/wp-content/uploads/2014/11/Expanding-Evidence.pdf

[2] Jacob, B.A. "The Opportunities and Challenges of Digital Learning." Brookings, May 2016. https://www.brookings.edu/research/the-opportunities-and-challenges-of-digital-learning/

KEY FINDINGS

- **Administrators should develop strategic implementation plans that guide the planning, roll-out, and monitoring of digital learning initiatives.** The Office of Educational Technology at the U.S. Department of Education espouses strategic planning that is specific to technology and digital learning, and other experts in the field recommend that districts undergo technology planning that considers all aspects of implementation, from infrastructure to device roll-out, professional development, and the development of digital learning goals.
- **Districts need to establish a clear vision of how and why digital learning can contribute to broader student and teacher success.** Given the varied uses for educational technology, school systems should expect to see a significant shift in teacher and student approaches to learning. A clearly-defined vision can help guide stakeholders through these transitions. The digital learning plan can establish how technology will support broader goals and how a district can align resources to achieve those goals.
- **A comprehensive digital learning plan should include a specific mission statement and actionable goals aligned to broader learning objectives.** Indeed, because this process requires districts to re-examine learning objectives and policies, it can help administrators and technology experts recognize the various ways that digital learning can permeate other aspects of school administration and learning. Districts with the most effective digital learning plans have successfully "connected the dots" between technology, digital learning, assessment, and culture.
- **After developing a shared mission and clear goals, districts need to formulate action steps that lay out how schools will accomplish the digital learning vision.** The action steps must address any gaps or shortcomings in current processes and policies and outline how technology will be integrated into the existing learning framework. Digital learning is highly connected, so key areas to address in action planning include peer-supported and interest-driven learning and professional development goals and expectations.
- **Strategic planning should include opportunities for periodic evaluations that consider both technology use and implementation, as well as how technology impacts broader district outcomes.** Regular evaluation of educational technology allows school systems to continually adjust learning pathways to maximize the effectiveness of digital learning initiatives. Evaluation data can come from a variety of qualitative and quantitative sources and should be assessed at all phases of implementation (e.g., initial planning, roll-out, etc.).
- **Stakeholders from all groups should be represented in the planning efforts.** This includes, for example, administrators, school board members, teachers, teaching specialists, technology staff, and community members. Most importantly, local leadership (i.e., principals) are critical for making sure that district-wide planning teams have detailed and accurate information. This involvement also serves to establish and maintain support for any new or revamped digital learning initiatives.

- **Strategic planning should be implemented at all levels through empowered leadership beyond district administrators.** While district leaders should model the use of technology, local leaders (both teachers and administrators) should be encouraged to assume leadership roles, as strong school-level leadership has been consistently linked with successful 1:1 implementation. In particular, a school's technology staff should be given an extensive role in implementation, as they will be chiefly responsible for troubleshooting.

SECTION I: DEVELOPING A COMPREHENSIVE PLAN FOR DIGITAL LEARNING

In this section, Hanover reviews approaches for adopting a holistic strategic plan for digital learning and key considerations that school districts make as they develop these plans.

DIGITAL LEARNING IN TODAY'S CLASSROOMS

In recent years, technology and digital learning in schools has evolved significantly. First and foremost, "the conversation has shifted from *whether* technology should be used in learning to *how* it can improve learning to ensure that all students have access to high-quality educational experiences."[3] That is, technology is now seen as an integral component of student learning, and digital learning is an increasingly ubiquitous strategy in most classes. With the proper support infrastructure in place (Figure 1.1), schools can ensure equity, accessibility, and connectivity for all students in all places.

Figure 1.1: Key Pieces of Digital Learning

Source: Office of Educational Technology[4]

With the advances in and acceptance of technology across classrooms, teachers and other staff are making progress in leveraging digital learning in new ways. One key strategy that this digital learning has encouraged, for instance, is personalized learning that "gives students more choice over what and how they learn and at what pace, preparing them to organize and direct their own learning for the rest of their lives."[5] Further, digital learning has allowed many schools to improve their assessment capabilities and better adapt instruction to the needs of diverse learners. As the cost of digital learning devices continues to decrease, experts posit that the availability of high-quality educational tools will grow and schools will continue integrating technology in new and efficient ways. However, districts with existing digital learning experiences are cautioned to avoid a "digital use divide" as educators and students become more accustomed to technology in classrooms. The digital use divide can result in separation between "learners who are using technology in active, creative ways to support their learning, and those who

[3] "Reimagining the Role of Technology in Education: 2017 National Education Technology Plan Update." Office of Educational Technology, U.S. Department of Education, January 2017. p.7. https://tech.ed.gov/files/2017/01/NETP17.pdf
[4] Adapted from: Ibid., p.6.
[5] Ibid., p.7.

predominately use technology for passive content consumption."[6] Of course, the ultimate goal of digital learning is often to allow students to take an active role in their learning experiences, so teachers need to encourage active technology use across the school day and in both formal and informal settings.

Researchers in the field identify three key ways that digital learning promotes deeper learning in schools:

- **Personalized skill building in preparation for deeper learning**, which offers customized learning experiences, engaging and adaptive instructional experiences, and more learning hours per day/year;
- **Schools and tools that foster deeper learning** through production (i.e., produce, publish, and present high-quality work products), collaboration (i.e., dynamic grouping and scheduling, and virtual teams), and simulation (i.e., immersive complex problem solving); and
- **Extended access and expanded options**, which include 24/7 access to great teachers and content, more and faster performance feedback, and many new pathways to mastery.[7]

Together, "these three elements represent complementary theories of change, important lines of evidence and research, and three distinct rationales for investment."[8] Many of these considerations will be explored in additional detail in Section II of this report.

Since the widespread roll-out of technology in schools, teachers and administrators have struggled with how best to incorporate it into traditional classroom settings in order to best help students achieve this deeper learning. As districts, and particularly teachers, have grown more comfortable with technology initiatives, however, certain strategies have been used. For example, schools have experimented with having "students rotate through different learning modules at different times, including time for online learning, working with the teacher face-to-face, and working on projects in groups fluidly."[9] As explained by teachers familiar with effective digital learning, "for any of [these] tactics to work, **educators agree that the key is to have a clear vision of what the technology is being used for, and how that will affect the teacher's role**."[10]

[6] Ibid.
[7] Bullet points adapted from: VanderArk, T. and C. Schneider. "How Digital Learning Contributes to Deeper Learning." Educause and Getting Smart, December 2012. p.12. http://net.educause.edu/ir/library/pdf/CSD6152a.pdf
[8] Ibid., p.11.
[9] Schwartz, K. "To Make Blended Learning Work, Teachers Try Different Tactics." KQED News, November 2012. https://ww2.kqed.org/mindshift/2012/11/02/whats-the-best-way-of-using-computers-in-schools/
[10] Ibid. Emphasis added.

COMPONENTS OF AN EFFECTIVE PLAN

As one leader in progressive education suggests, "Technology must be like oxygen: ubiquitous, necessary, and invisible […] The best technology allows students to explore and create 'artifacts of their own learning'."[11] However, schools cannot reach this ubiquitous level of technology use without a detailed plan that covers all aspects of digital learning from strategic planning to roll-out and assessment. The Office of Educational Technology at the U.S. Department of Education supports strategic planning regarding technology in schools, stating that **"although vision is critical to transforming teaching and learning, a strategic implementation plan is key to success.** In some states, districts or schools will develop their own technology implementation plans; in others, state education leaders take the lead and districts follow." [12] The State Educational Technology Directors Association (SETDA) also advocates for districts to undergo technology planning, asserting that "the careful planning for digital learning with the necessary infrastructure are critical for digital learning success. Districts have begun moving away from technology planning as a standalone activity in favor of more comprehensive planning efforts."[13]

According to SETDA, although most districts aim to produce a technology plan that ensures efficient and effective digital learning, many "often find the whole planning process to be at least as equally valuable as the plan itself. The discussions and collaboration lead to buy in and an understanding of what needs to be accomplished and why."[14] Comprehensive digital learning planning has many benefits, including:

- Planning orients districts and schools toward long-term thinking about reform and improvements. With a future-facing approach, **leaders can establish vision for how technology can support broader goals and objectives that help to align resources for successful technology implementation.**
- Planning can encourage districts to emphasize **excellence over compliance**. Even though most technology plans include similar elements, districts have the freedom to populate plans with various ways of exceeding, and not just meeting, expectations.
- Good planning can cultivate a healthy school culture by calling for **decisions rooted in accurate data and valuing the input of a variety of stakeholders** throughout the process.[15]

For example, both Wisconsin and North Carolina have developed nationally-recognized, statewide digital learning plans that help school districts effectively implement and operate

[11] Barseghian, T. "What's Worth Investing In? How to Decide What Technology You Need." KQED News, October 2012. https://ww2.kqed.org/mindshift/2012/10/11/whats-worth-investing-in-criteria-for-choosing-technology-for-learning/

[12] "Reimagining the Role of Technology in Education: 2017 National Education Technology Plan Update," Op. cit., p.46. Emphasis added.

[13] "Technology Planning: Overview." State Educational Technology Directors Association. http://digitallearning.setda.org/planning/#!/overview

[14] Ibid.

[15] Bullet points taken verbatim from: Ibid. Emphasis added.

technology in a way that is in-line with broader learning objectives. In Wisconsin, the State Superintendent's Digital Learning Advisory Council established a shared vision for all digital learning in the state.[16] This Council developed the Wisconsin Digital Learning Plan, a framework that provides school districts with a roadmap for effective technology use that relies on alignment across seven key categories:

- Curriculum, instruction, and assessment
- Use of space and time
- Robust infrastructure
- Data and privacy
- Community partnerships
- Personalized professional learning
- Budget and resources[17]

Likewise, North Carolina's Digital Learning Plan aims to "build upon the existing foundation to develop a coherent long-term strategy that sets directions and priorities, supports innovation, and provides resources to enable the state's educators and students to benefit fully from digital-age teaching and learning."[18] The planning process for the statewide learning plan—which was facilitated by the Friday Institute for Education Innovation—relied on a multi-faceted approach to collecting, analyzing, and presenting data from the state's existing digital learning initiatives, including student data, information from model programs, school visits, and input from a wide range of stakeholders.[19]

As shown in Figure 1.2, digital learning in North Carolina considers several different elements to provide a holistic roadmap to district administrators.

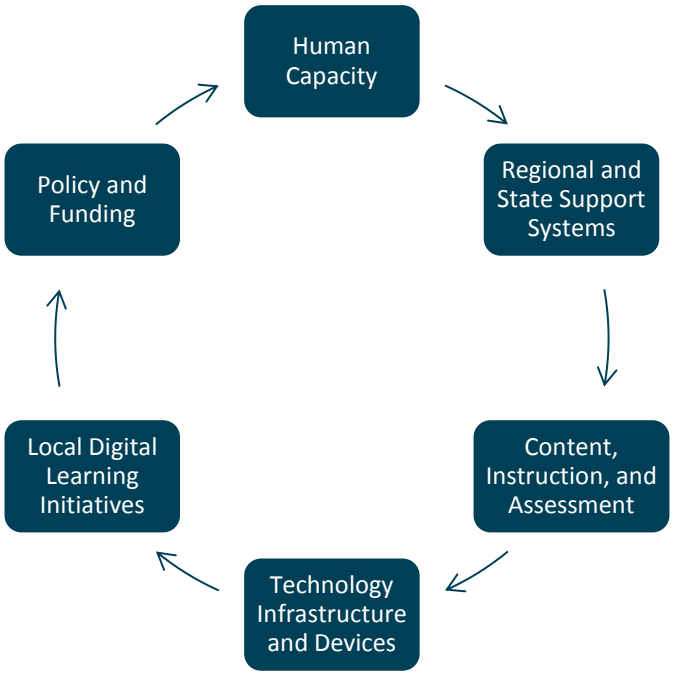
[16] "Wisconsin Digital Learning Plan Goals and Overview." Wisconsin Department of Public Instruction. https://dpi.wi.gov/digital-learning/digital-learning-plan

[17] Bullet points adapted from: "The Future Ready Framework." Future Ready Schools. https://dashboard.futurereadyschools.org/framework

[18] "North Carolina Digital Learning Plan." Friday Institute. http://ncdlplan.fi.ncsu.edu/

[19] "North Carolina Digital Learning Plan: Summary September 2015." Friday Institute, September 2015. p.3. http://ncdlplan.fincsu.wpengine.com/wp-content/uploads/sites/10/2015/09/NCDLP_Summary8.31.15.pdf

Figure 1.2: Core Elements of Digital Learning Platforms in North Carolina



Source: Friday Institute[20]

In the remainder of this section, Hanover discusses important elements of strategic plans for digital learning. The statewide plans and procedures used in Wisconsin and North Carolina will supplement the secondary literature throughout to provide a comprehensive review of effective practices and key considerations.

STRATEGIC MISSION AND GOALS

It is important to develop a broad learning strategy for implementing and leveraging digital learning. According to the International Society for Technology in Education (ISTE), in fact, "a school- or district-wide digital learning strategy provides a paddle to help steer your organization toward its learning and teaching goals. It [is] the shared vision that educators rally around to guide effective technology implementation."[21] **The first step in establishing this broader strategy is to identify the specific mission, values, and goals of a digital learning initiative.**

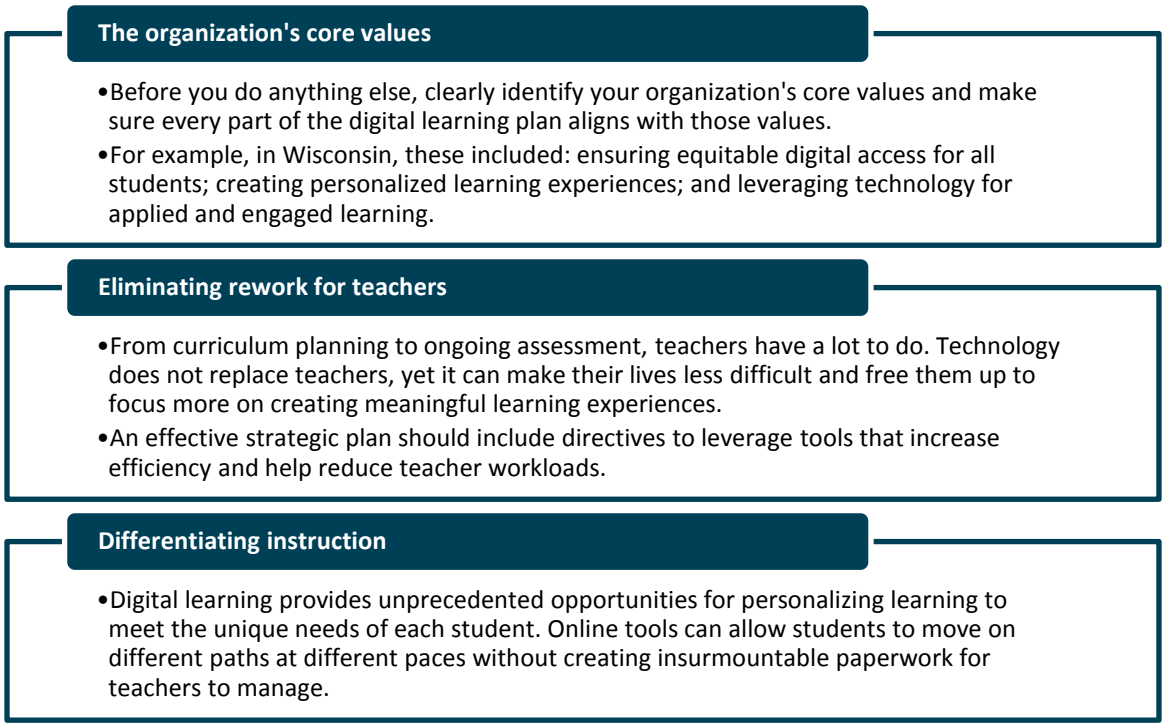
This often requires districts to re-examine their learning objectives and policies, since these considerations do not always take into account changes in technology and digital learning. For example, experts in 21st century learning explain that "to fundamentally change our practices, educators need to thoughtfully examine all aspects of the education system. Too often, in the past, experts have failed to recognize the interconnectedness of components

[20] Adapted from: ibid., p.1.
[21] Krueger, N. "3 Things to Include in Your Digital Learning Strategic Plan." International Society for Technology in Education, February 2014. https://www.iste.org/explore/ArticleDetail?articleid=51

like technology and leadership, or teaching and accountability."[22] Districts with effective digital learning programs have successfully "connected the dots" between technology (e.g., broadband, devices), digital learning, teaching, assessment, and culture, for instance. Strategic missions have evolved accordingly over time in these districts, with modern digital learning platforms requiring school leaders to "fundamentally change their practice […] and they must facilitate learning through means that align with the defining attributes of this generation of learners."[23]

As seen in Figure 1.3, it is critical for school districts to consider their core values when designing and implementing an educational technology plan. By clearly defining values and goals at both the district level and regarding digital learning, specifically, school districts can ensure that any technology plans are cohesive and align across various departments and student groups.[24]

Figure 1.3: Essential Considerations for a Digital Learning Strategic Plan



Source: International Society for Technology in Education[25]

According to team of experts led by the Cable Impacts Foundation (CIF), the Partnership for 21st Century Learning (P21), and SETDA, designing the mission and vision of a strategic plan

[22] "Building Your Roadmap to 21st Century Learning Environments: A Planning Toolkit for Education Leaders." Cable Impacts Foundation, Partnership for 21st Century Learning, and the State Education Technology Directors Association. p.5. http://www.roadmap21.org/assets/Creating-Your-Roadmap-to-21st-Century-Learning-Environments1.pdf
[23] Ibid., p.8.
[24] Krueger, Op. cit.
[25] Adapted from: Ibid.

for digital learning should center on five "overarching components" essential for building learning environments that adequately prepare students for the digital world.[26] These components include: **1)** learning; **2)** teaching and professional learning; **3)** assessment and accountability; **4)** leadership and culture; and **5)** infrastructure (Figure 1.4). By defining goals associated with each of these core components, districts are then able to create a framework with which to build actionable steps for implementation, support, and assessment.

Figure 1.4: Key Components for Building Digital Learning Environments

TOPIC	DESCRIPTION
Learning	Dependent upon success across the following four components, transformative learning results in college- and career-ready graduates who are lifelong learners.
Teaching and Professional Learning	The instructional strategies and over-arching approach to teaching, as well as the ongoing development of teaching professionals.
Assessment and Accountability	The use of valid and reliable tools to measure, monitor, and optimize learning, alongside efforts to improve the effectiveness of the organization through ongoing measurement, analysis, and communication.
Leadership and Culture	The organization's philosophies and prevailing norms, which are influenced by its leadership and those who work for, or influence, its operation.
Infrastructure	The varied technical components that support effective learning environments – from physical assets to human resources and support.

Source: Roadmap21[27]

The Wisconsin Digital Learning Plan, for example, considers the needs and goals of the state's school districts and their partners (e.g., public libraries, community organizations, and local employers). The Wisconsin Department of Public Instruction (WDPI) aimed to create learning environments that were equitable, personalized, applied, and engaging;[28] thus, the Digital Learning Plan reflects those overarching goals and incorporates strategic planning elements that specifically address the state's focus on these objectives:

- **Equitable Access:** Recommendations in all areas focus on providing equitable access to technology for all students, learners, and educators across the state. This includes Internet connection speeds and infrastructure support that allow learning to occur anywhere and anytime.
- **Personalized Learning:** The learner experience must be personalized using technology so learning is engaging and relevant, with the goal of maximizing each person's learning potential. Recommendations regarding infrastructure, professional

[26] "Building Your Roadmap to 21st Century Learning Environments," Op. cit., p.11.
[27] Adapted from: Ibid., p.14.
[28] "Wisconsin Digital Learning Plan Goals and Overview," Op. cit.

development, curriculum, assessment, and leadership promote these dynamic and flexible learning formats.

- **Applied and Engaging Learning:** Critical skills such as problem-solving, creativity and innovation, communication, and collaboration are central to being career and college ready.[29]

The WDPI states that "while formal technology plans are no longer required by state or federal statutes, it is strongly recommended that **districts use the 2016 Wisconsin Digital Learning Plan as a planning guide to achieve short- and long-term digital learning goals.**"[30] The Digital Learning Plan is already aligned with federal and state laws, policies, and initiatives, allowing districts in Wisconsin to fully incorporate it into strategic planning and continuous improvement planning. Overall, this strategy has changed the WDPI's role in technology planning at the district level; indeed, WDPI's role in technology planning "has moved away from providing districts with a set of forms to be filled out, and toward providing a set of tools and guidance to help districts develop action plans in the most useful format for them."[31] Individual school districts can consider similar approaches to developing strategic missions and goals for schools.

INVOLVING STAKEHOLDERS

Developing this shared vision can help districts implement and maintain high-quality digital learning programs. However, experts recommend that school systems involve stakeholders in setting this vision beyond school, district, and technology administrators. SETDA promotes planning teams that include "representatives from a variety of groups such as school board members, administrators, teachers, assessment and data specialists, technology staff, and community members. **Local leadership (e.g., school principals) is key for making sure the planning team has detailed and accurate information.**"[32] Moreover, "initiating the planning process with a shared vision serves as a firm compass point for how technology will support teaching and learning goals."[33] An important way to ensure a shared, unified vision thus includes considering the opinions, attitudes, and experiences of diverse stakeholder groups from around the district.

Involving stakeholders in the planning and implementation process also helps to garner and maintain support. Often, the implementation of technology plans depends in large part on the buy-in and support of all school and district members. For example, "only when teachers are attuned appropriately to purposes of the plan, given sufficient ownership in ideas and opportunities for growth through the plan, and provided the level of training they deserve

[29] Bullet points adapted from: Ibid.
[30] Ibid.
[31] "Integrated Library Media and Technology Planning Toolset." Wisconsin Department of Public Instruction. https://dpi.wi.gov/imt/toolset
[32] "Technology Planning: Vision Setting." State Educational Technology Directors Association. Emphasis added. http://digitallearning.setda.org/planning/#!/visionsetting
[33] Ibid.

will they ensure full infusion of technological concepts into the curriculum."[34] By opening strategic planning to a wider range of interested parties, school districts can facilitate faster and more holistic integration of digital learning throughout the district.

North Carolina's planning process for its digital learning initiative relied heavily on community engagement to accomplish successful roll-out and maintenance. The North Carolina Department of Public Instruction (NCDPI) attributes much of the success of their digital learning initiative to its "well-articulated vision and rationale […] along with a strategic plan for implementing the approach [and] engagement and support from all constituents of the school community, including the LEAs, local government, the business community, and parents."[35] A key aspect of their vision planning was garnering support from stakeholders, and the NCDPI made sure to include community members at all stages of the planning and roll-out process (Figure 1.5).

Figure 1.5: North Carolina Framework for Planning Components

Vision	Plan	Implement	Assess
•It is essential to begin any new initiative by establishing a common vision to create buy-in and engage stakeholders. It is through the visioning process that consensus building will assist with goals, rationale, and core principles for the initiative approach. **It is beneficial for stakeholders to see the vision early in the process and modeled throughout.**	•Once the shared vision is established and stakeholder support has been secured, leadership teams are encouraged to seek resources at both the state and local levels to assist with effective planning. Detailed guidelines should be developed for implementing and sustaining the new learning technology initiative as designed by the master plan.	•Utilizing the steps outlined in the master plan, leadership teams should begin to discuss the guiding questions in the customized implementation plan to lead to implementation. High quality professional development for staff and administrators should be planned and implemented at least six months to one year prior to student roll-out.	•New instructional technology innovations emerge on a regular basis. This component focuses on methods of evaluating new and existing technology initiatives toward helping districts and schools make informed decisions about adopting and appropriately implementing innovative practices in schools.

Source: North Carolina Department of Public Instruction[36]

DEVELOPING ACTION STEPS

After identifying the key mission and goals of digital learning, it is important to develop explicit action steps that will help a district accomplish those objectives. This requires strong leadership at both the district and school levels – according to the Office of Educational Technology, "taking full advantage of technology to transform learning requires strong

[34] Ibid.
[35] "North Carolina Learning Technology Initiative (NCLTI) Framework for Planning." North Carolina Department of Public Instruction, June 2012. pp.1–2. http://fidelitycheck.ncdpi.wikispaces.net/file/view/NCLTI%20Framework%20for%20Planning_Jan2012Update.pdf
[36] Adapted from: Ibid., pp.2–3.

leadership capable of creating a shared vision of which all members of the community feel a part."[37] The development of clear action steps facilitates this shared vision by showing all stakeholders how and when the district's strategic plan and technology program will be implemented, and allows teachers, students, parents, and community members to participate in the process as appropriate.[38]

Developing action steps for incorporating digital learning throughout a district requires that district leaders re-examine existing processes and policies that may have been introduced in the past. Because digital learning and access to technology changes the way that students learn and access information, administrators and teachers need to align action steps with new ways of thinking and modern pedagogical approaches. Indeed, the traditional system of education "assumes that knowledge is transferred from an external source—teachers, books, and schools—to a student […] This long-held model is struggling to engage a new generation of students for whom learning is happening all the time – online, off-line, in classrooms, as well as after school."[39] It is the responsibility of schools to help stakeholders adapt to this "new culture of learning" through action steps that seamlessly integrate technology and digital learning into everyday instruction. Ultimately, the connected learning (Figure 1.6) that is facilitated by technology in schools "offers opportunities not just for students but also for teachers who can participate in online communities around the subjects they teach, crowdsource new lesson plans, or create and share new content."[40]

Figure 1.6: Key Components and Properties of Connected Learning

Key Element	Description
Critical Contexts for Connected Learning	
Peer-Supported	In their everyday exchanges with peers and friends, young people are contributing, sharing, and giving feedback in inclusive social experiences that are fluid and highly engaging.
Interest-Powered	When a subject is personally interesting and relevant, learners achieve more higher-order learning outcomes.
Academic	Learners flourish and realize their potential when they can connect their oriented interests and social engagement to academic studies, civic engagement, and career opportunity.
Core Properties of Connected Learning	
Production-Centered	Digital tools provide opportunities for producing and creating a wide variety of media, knowledge, and cultural content in experimental and active ways.

[37] "Reimagining the Role of Technology in Education: 2017 National Education Technology Plan Update," Op. cit., p.42.
[38] Ibid., p.44.
[39] "Learner at the Center of a Networked World." The Aspen Institute Task Force on Learning and the Internet, 2014. p.26. http://csreports.aspeninstitute.org/documents/AspenReportFinalPagesRev.pdf
[40] Ibid., p.28.

KEY ELEMENT	DESCRIPTION
Shared Purpose	Social media and web-based communities provide unprecedented opportunities for cross-generational and cross-cultural learning and connection to unfold and thrive around common goals and interests.
Openly Networked	Online platforms and digital tools can make learning resources abundant, accessible, and visible across all learner settings.

Source: The Aspen Institute Task Force on Learning and the Internet[41]

Professional development is a critical action step in digital learning plans. Because of the shifts is learning models and attitudes (as described above), educators and administrators should participate in professional learning activities at all stages of implementation. In fact, the Alliance for Excellent Education asserts that "formal and informal educators are an essential component of a comprehensive digital infrastructure. *They need their own systems of support and training in order to fully realize and take advantage of the potential digital learning.*"[42] With the goal of ensuring professional development and support to instructional staff to increase use and application of technology in instruction, a district must then clearly outline how professional learning will be supported. The Aspen Institute Task Force on Learning and the Internet, for example, recommends that schools:

- Invest in research and professional training to better prepare educators for changing roles in supporting students' use of new and existing learning networks.
- Align teacher quality policies and professional development funding to ensure that educators have the necessary support, resources and skills to leverage technology and to enhance learning for their students.[43]

Districts should specifically identify the types of training and tools that will be supplied to educators to support their ability to integrate technology in the classroom as well as the standards that may be added to teacher quality policies aligned with digital learning.

The NCDPI's Digital Learning Plan identified several specific and actionable goals to help school districts in the state develop their digital learning strategies. North Carolina has a specific digital-age learning model that provides the foundation for all technology planning, and allows school systems to connect implementation steps with overall objectives in a clear and linear manner (Figure 1.7).[44] The state's model for digital learning in schools addresses factors such as pedagogy, student assessment, and content delivery, and allows districts to directly connect all digital learning initiatives to specific outcomes.

[41] Adapted from: Ibid., p.31.
[42] "Creating Anytime, Anywhere Learning for Students: Key Elements of a Comprehensive Digital Infrastructure." Alliance for Excellent Education. June 2014. p.6. http://all4ed.org/wp-content/uploads/2014/06/DigitalInfrastructure.pdf
[43] Bullet points taken verbatim from: "Learner at the Center of a Networked World," Op. cit., p.19.
[44] "North Carolina Digital Learning Plan: Summary September 2015," Op. cit., p.2.

Figure 1.7: Comparing Traditional and Digital-Age Education Models in North Carolina

Traditional Instructional Model		Digital Age Learning Model
One-size-fits-all instruction and instructional resources	→	**Personalized learning** and flexible resources optimized for each student
Advancement based primarily on time spent in class	→	Advancement based on demonstrated **mastery** of content and **competency** in applying what has been learned
Fixed places and times for learning within school buildings	→	**Anywhere and anytime learning**, inside and outside schools, 24/7, with most learning blending face-to-face and online activities
Teacher-centered instruction, with teachers as expert disseminators of content to classes of students	→	**Student-centered instruction**, combining large group, small group, and individualized learning with teachers serving as facilitators
Printed, static text, often out-of-date, as the dominant content medium for educational resources	→	**Digital content** providing interactive, flexible, and easily updated educational resources
End-of-course standardized assessments of learning, primarily for accountability	→	**Assessments integrated into learning activities** to provide ongoing information about students' achievement that can be used to improve teaching and learning
Academic addressed in isolation, with schooling separated from informal learning experiences outside of school	→	**Project-based** and **community-based** learning activities connecting to students' lives outside of school

Source: Friday Institute[45]

Beyond these broad guidelines to help direct school districts' objectives and action planning processes, the NCDPI provides six specific domains—along with detailed goals for achieving success in each domain—that offer a foundation for action planning (as presented in Figure 1.2). By developing clear recommendations and goals for each domain (e.g., technology, infrastructure, and devices; human capacity; content, instruction, and assessment) the NCDPI provides districts with actionable steps to take that reflect broader technology and digital learning missions, values, and goals.[46] Appendix A provides the full list of North Carolina's Digital Learning Plan goals.

Monitoring Implementation and Measuring Success

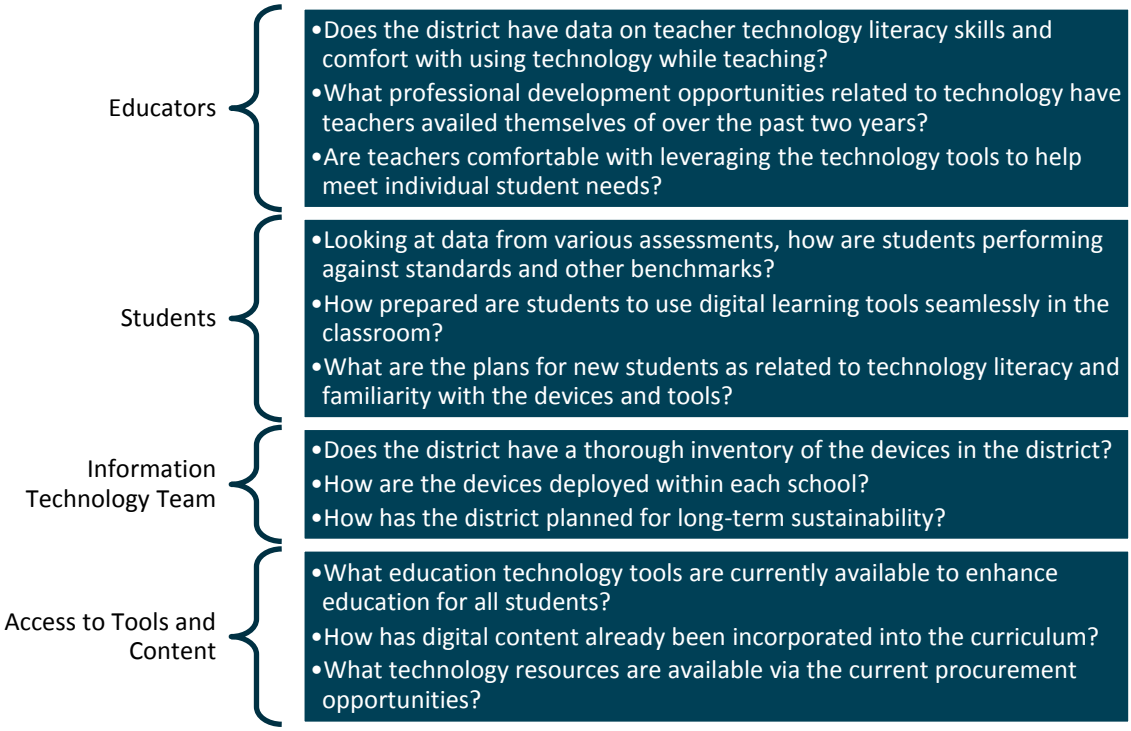
Outlining how the implementation of the strategic plan will be monitored as well as how key performance indicators or metrics of the effectiveness of the tools, programs, or supports in place will be measured is a critical aspect of strategic planning. District leaders must carefully consider the outcomes they will measure, the tools used to do so, which leaders will oversee

[45] Adapted from: Ibid.
[46] Ibid., p.4.

these efforts, and timelines for evaluation.[47] In many ways, the transition to digital learning makes these monitoring and assessment efforts easier, with schools and teachers having access to real-time student data. In turn, "assessment and data systems enable those involved in the total student learning process to create—and continually adjust—learning pathways that can be unique to each student."[48] **In these ways, monitoring efforts in school districts with digital learning plans need to consider both technology use and implementation, as well as how that technology affects student outcomes.**

SETDA recommends performing regular needs assessments to guide the implementation and monitoring of digital learning. These should occur during all phases of implementation, starting with the initial planning and development of a digital learning plan and progressing throughout the roll-out and follow-up processes. In the early stages, "this means conducting a needs assessment, environmental scan, or evaluation of conditions for success that will provide accurate data upon which to base a variety of planning decisions ranging from device purchases to tech support."[49] As shown in Figure 1.8, monitoring efforts should indeed consider stakeholder outcomes alongside technical/infrastructural effectiveness.

Figure 1.8: Key Questions to Ask When Forming Needs Assessments



Source: State Educational Technology Directors Association[50]

[47] "Building Your Roadmap to 21st Century Learning Environments," Op. cit.
[48] "Creating Anytime, Anywhere Learning for Students," Op. cit., p.10.
[49] "Technology Planning: Needs Assessment." State Educational Technology Directors Association. http://digitallearning.setda.org/planning/#!/needsassessment
[50] Adapted from: Ibid.

SECTION II: PLANNING FOR CORE ELEMENTS OF THE DIGITAL ENVIRONMENT

In this section, Hanover discusses key considerations for developing digital learning plans related to three specific digital learning plan options: a 1:1 device program; personalized learning; and the selection and use of digital learning platforms.

PLANNING FOR EFFECTIVE USE OF 1:1 DEVICES

In the months leading up to device roll-out, schools must consider myriad factors such as platform selection, deployment schedules, web use policies and restrictions, and various infrastructure issues. While all these elements are vital to the success of a 1:1 program, school districts must develop and plan strategies for digital learning that go beyond these initial, more technical considerations.[51]

ISTE posits that "implementation planning lays the foundation for technology deployment *throughout the system* […] **An effective implementation plan addresses every aspect of the program, from infrastructure to professional development,** and includes an ongoing process for measuring the program's effectiveness."[52] Thus, planning for effective 1:1 use relies on district leaders considering how the devices and associated digital learning strategies will permeate all school functions. In other words, "making a [1:1] computing program work calls for more than just placing a computer on everyone's desk. It takes a complete transformation of learning and teaching."[53] To do this, schools must:

- Provide leadership, training, and support;
- Adapt traditional tools and practices to support technology immersion; and
- Use technology to create 24/7 learning opportunities.[54]

Effective planning for and implementation of digital learning platforms is not only important for school and district strategic planning, **but it can also impact student outcomes.** When implemented correctly, digital learning experts claim that 1:1 programs can "deepen student learning, create more real-life experiences, and help students take greater responsibility for their education."[55] In one study of the Technology Immersion Project (TIP) in Texas public schools, for example, researchers measured the extent to which the implementation fidelity

[51] Nash, M. "Twelve Lessons Learned in Planning and Implementing a 1:1 Educational Technology Initiative." Berkshire Wireless Learning Initiative, June 2009. p.2. https://www.mcla.edu/Assets/uploads/MCLA/import/www.mcla.edu/BWLI/uploads/textWidget/2286.00004/documents/finalrpt2.pdf

[52] "Essential Conditions: Implementation Planning." International Society for Technology in Education. Emphasis added. https://www.iste.org/standards/tools-resources/essential-conditions/implementation-planning

[53] Mortensen, C. "Mission Possible: Keys to One-to-One Success." *Learning and Leading with Technology*, August 2011. p.1. http://files.eric.ed.gov/fulltext/EJ941905.pdf

[54] Bullet points taken verbatim from: Ibid., p.2.

[55] Ibid.

of the TIP program affected student achievement in Grades 6 through 8 in reading and math.[56] TIP offers a comprehensive 1:1 model that provides guidance for wireless Internet access, curricular and assessment resources, professional development, and ongoing technical support. In this way, it provides a holistic and fully-integrated technology program. Studying TIP implementation across 21 treatment schools, the researchers found that, while full TIP implementation is difficult, implementation strength was a consistent predictor of higher student achievement.[57] Specifically, "if districts and schools are committed to the model's specifications, especially students' personal access to laptops within and outside of school, the prospects for raising academic achievement are promising."[58]

EMPOWERED LEADERSHIP

ISTE promotes "empowered leaders" as an essential condition for effective 1:1 roll-out, in which "stakeholders at every level [are] empowered to be leaders in affecting consistent system-wide change."[59] Of course, this starts with district and school administrators taking a lead on technology integration, requiring that all system leaders are committed to the shared vision and 1:1 model. For example, administrators should be modeling the use of technology and digital learning in their daily practice to encourage teachers and students to do the same (e.g., sending e-newsletters or podcasts to teachers, rather than written memos).[60] This is important because "true system-wide change requires leaders who are empowered to experiment, make decisions, take risks, and adjust their course."[61]

However, successful 1:1 implementation requires that empowered leaders emerge at all levels, not just among district- and school-level administrators. Teachers and other school staff should also be encouraged to assume leadership roles during digital learning roll-out. School districts need to include stakeholders at all levels in decision making and problem solving strategy sessions.[62] Other ways to foster a culture that values diverse leadership in technology integration and digital learning include:

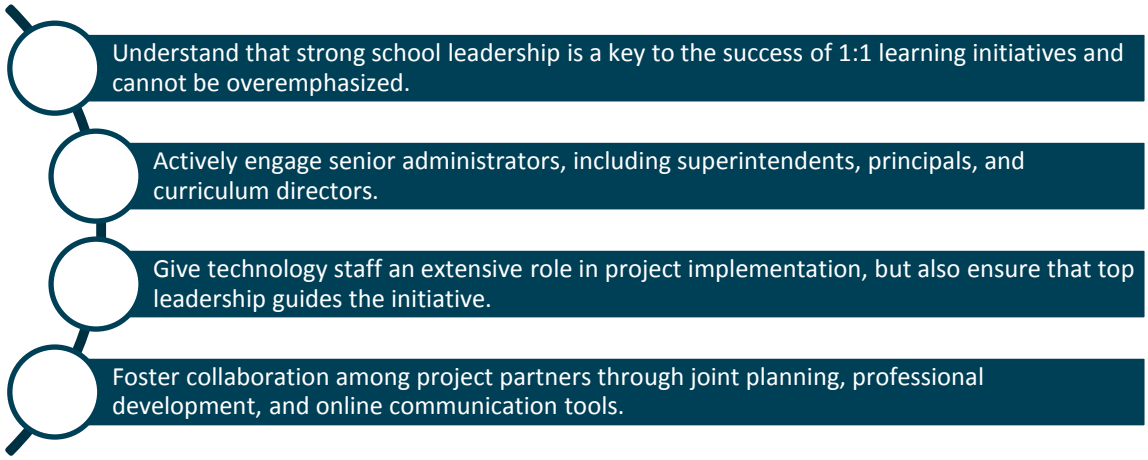
- Superintendents support administrators when they take up issues on behalf of teachers;
- Administrators empower teachers to take risks while providing support on critical issues; and

[56] Shapley, K.S. et al. "Evaluating the Implementation Fidelity of Technology Immersion and its Relationship with Student Achievement." *The Journal of Technology, Learning, and Assessment*, 9:4, January 2010. p.5. https://ejournals.bc.edu/ojs/index.php/jtla/article/viewFile/1609/1460
[57] Ibid., p.48.
[58] Ibid., p.50.
[59] "Essential Conditions: Empowered Leaders." International Society for Technology in Education. https://www.iste.org/standards/tools-resources/essential-conditions/empowered-leaders
[60] Mortensen, Op. cit., p.2.
[61] "Essential Conditions: Empowered Leaders," Op. cit.
[62] Ibid.

- Teachers and stakeholders have the opportunity to provide input on policies and are able to address issues in a supportive environment.[63]

The Berkshire Wireless Learning Initiative (BWLI), which researched 1:1 initiatives and learning environments across Maine and Massachusetts to guide the statewide roll-out of a laptop program in Massachusetts, found that leadership was a vital aspect of wider success. The implementation of BWLI involved superintendents, community representatives, and principals, teachers, and technology staff from each school district involved in the process.[64] As shown in Figure 2.1, BWLI researchers highly value the role that strong and diverse leadership played in the 1:1 implementation in the state.

Figure 2.1: Lessons Learned from BWLI's 1:1 Implementation Study: Leadership



Source: Berkshire Wireless Learning Initiative[65]

Ongoing Professional Development

For many teachers and administrators in 1:1 and other digital learning schools, it can be difficult to adapt to new changes in pedagogy and curricula that leverage technology. Without professional development before, during, and after implementation, schools risk not using the new technology to its full potential. Indeed, **high-quality training for teachers needs to include how to use the technology, generally, and more importantly, how to *teach* with the technology.**[66]

Even in districts where 1:1 programs are more established, teachers and other staff require constant training, both formal and informal. For instance, schools should explicitly include time for teachers to plan, create, and reflect on their professional development with their peers in any professional learning plans. Further, "educators need ongoing training to keep up-to-date with rapid changes in educational technology […] Educators also need to carve out

[63] Bullet points taken verbatim from: Ibid.
[64] Nash, Op. cit., p.4.
[65] Adapted from: Ibid., p.5.
[66] Mortensen, Op. cit., p.2.

time in their busy schedules to assimilate their new knowledge, practice new skills, learn from each other, and work together." [67] School systems are even encouraged to leverage technology to provide this professional development through online courses, virtual classroom coaching, and asynchronous collaborative teams. Regardless of the medium, districts can support professional learning for 1:1 roll-out and implementation by:

- Offering regular access to diverse professional learning opportunities;
- Providing opportunities based on educators' needs and realities;
- Developing incentive structures to encourage participation;
- Focusing on both learning to use technology and using technology to learn; and
- Helping educators implement new knowledge and skills.[68]

Experts recommend that schools begin professional development courses six months to a year ahead of program implementation. This provides enough time for teachers and staff to become familiar with the capabilities of the new devices, technology (i.e., software), and digital learning opportunities before students receive their own devices.[69] Districts can hire technology integration specialists to oversee this process, and BWLI researchers found that most districts create their own training opportunities. Together, integration specialists, technology staff, teachers, and coaches can lead on-site training at the most convenient times. For training that takes place outside of school hours, some sites offer stipends to increase attendance.[70]

COLLABORATION OPPORTUNITIES

Finally, as mentioned above, teacher collaboration can be an effective way to encourage more ubiquitous technology use across classrooms and content areas. For instance, in schools where digital learning was implemented successfully across grade levels—and where students could build on skills learned in previous grades (e.g., basic word processing to using special effects)—researchers found that teacher collaboration was common.[71] **To enable this collaboration, districts can facilitate Professional Learning Communities (PLC) between teachers.**

Indeed, "where a [1:1] initiative was successful at the district level, teachers met weekly as a grade-level team to share student data, reflect on student progress, and plan learning experiences. *Collaboration was part of the culture,* and that lead to laptop implementation

[67] "Essential Conditions: Ongoing Professional Learning." International Society for Technology in Education. https://www.iste.org/standards/tools-resources/essential-conditions/ongoing-professional-learning
[68] Bullet points taken verbatim from: Ibid.
[69] [1] Nash, Op. cit., p.14.
[2] Tenbusch, J.P. "A Practical Guide to Implementing 1:1." Scholastic. http://www.scholastic.com/browse/article.jsp?id=3755881
[70] Nash, Op. cit., p.15.
[71] Green, T., L. Donovan, and K. Bass. "Taking Laptops Schoolwide: A Professional Learning Community Approach." *Learning and Leading with Technology*, August 2010. p.12. http://files.eric.ed.gov/fulltext/EJ899155.pdf

throughout the curriculum following a district plan."[72] By meeting in these PLCs, teachers from different subject areas can share strategies and pedagogies that can be applied in other areas, as well as discuss any trends or areas of concern. For example, in one team meeting at an elementary school in Fullerton School District, teachers discovered that many Grade 2 students were struggling with math. The PLC reviewed the school's website, discussed alternative math sites that could be helpful, and worked together to discover why these students were struggling.[73] In these ways, the PLC team members were able to leverage technology to solve a communal issue. Figure 2.2 provides four factors that school districts can consider when starting a collaborative approach.

Figure 2.2: Factors to Consider in Developing a Collaborative Approach to Technology Integration

School Climate

- Does your school have a climate that encourages innovation? Does your school have a core group of teachers already using laptops?
- If not, start small and then expand once others see the relative advantage of innovation. Supportive administrators and enthusiastic teachers can present a unified front to promote the expansion of the initiative.

Communication

- Is there a misconception of what the laptop program is, how it operates, and what educational results can be achieved as a direct result of laptop use?
- If so, planned and ongoing communication can keep colleagues, administrators, parents, and the greater community informed. This will help others be engaged and supportive of your program.

Collaboration

- What type of collaboration is currently happening at your school? Is it informal, or is it more formal, such as a common preparation period?
- A defined collaborative approach is crucial for helping build an ethos of sharing that leads to successful laptop integration. If your collaboration is informal, start a wiki or use another Web-based tool to share ideas, websites, and electronic materials. Work toward a more formal collaborative approach.

Progression of Use

- Does your school have a plan that outlines how students will be using laptops throughout a school year and from grade to grade?
- This type of document can provide structure, serve as a communication tool, and support a shared vision of a laptop program. Many districts have a technology plan in place that can provide guidance in the development of such a document.

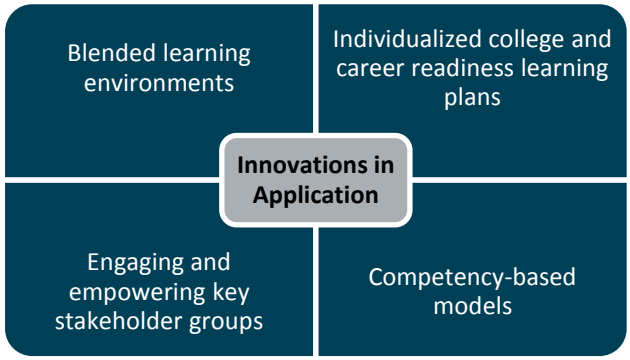
Source: International Society for Technology in Education[74]

[72] Ibid., p.13. Emphasis added.
[73] Ibid.
[74] Adapted from: Ibid., pp.14–15.

PLANNING FOR PERSONALIZED LEARNING

Personalized learning is a component of the broader concept of student-centered learning that is facilitated by 1:1 initiatives. This pedagogy "moves students from passive receivers of information to active participants in their own discovery process."[75] Digital learning offers teachers a way to personalize student learning, which has been shown to positively affect their performance and engagement. Indeed, "students are motivated by content that matches their interests, and they are more likely to keep moving through content that pushes them 'just enough' according to their abilities."[76]

Figure 2.3: Central Components of Personalized Learning



Source: American Institutes of Research[77]

Like 1:1 devices, strategies for personalized learning may be planned as a large part of a district's goal to support the student learning core component in a digital environment. When developing a strategic plan that includes specific goals and action steps for implementing personalized learning, districts should consider the extent to which personalized learning is structured around four main activities, which include blended environments, connected with individualized college and career readiness plans, supported by a competency-based model, and used to enhance engagement (Figure 2.3).[78] In particular, blended learning environments (e.g., instruction that combines face-to-face, online, and digital learning) do not limit learning to the classroom and **facilitate opportunities for students to engage in different ways according to their needs and unique learning styles.**

Several exemplary Race-to-the-Top districts studied by the American Institutes for Research (AIR) effectively leverage digital learning platforms to promote blended learning and, consequently, personalized learning opportunities. These districts planned "to adopt or expand their use of a digital learning platform or a distinct adaptive instructional software program to help personalize lessons and adapt content and instruction in response to real-time feedback and assessment results."[79] Future Ready Schools similarly promotes the benefits of personalized learning as a way to accelerate the smart integration of technology in schools. The organization identifies seven components that school districts should consider

[75] "Essential Conditions: Student-Centered Learning." International Society for Technology in Education. https://www.iste.org/standards/tools-resources/essential-conditions/student-centered-learning
[76] VanderArk and Schneider, Op. cit., p.14.
[77] Adapted from: Tanenbaum, C. et al. "Are Personalized Learning Environments the Next Wave of K–12 Education Reform?" American Institutes for Research. August 2013. p.1. http://www.air.org/sites/default/files/AIR_Personalized_Learning_Issue_Paper_2013.pdf
[78] Ibid.
[79] Ibid., p.3.

when implementing a holistic, integrated, and personalized instructional model that relies on digital learning (Figure 2.4).[80]

Note that many of these considerations, such as budget, infrastructure, and use of space and time are important elements in other areas of strategic planning as well. Indeed, many of the same strategies that districts can use to implement 1:1 programs or broader digital learning plans are applicable for transitioning to a personalized learning model. For instance, Future Ready Schools asserts that "district leaders must develop and communicate a clear vision and plan of action […] clearly communicating articulated goals and a rationale for significant change early and often will engage communities and build buy-in among staff members, students, families, and the community."[81]

Figure 2.4: Important Components of Implementing a Personalized Instructional Model

CATEGORY	DESCRIPTION
Curriculum, Instruction, and Assessment	Teachers customize instruction, content, and assessment on a student-to-student basis to ensure mastery.
Personalized Professional Learning	Through technology and digital learning, educators access professional resources and learning opportunities that can lead to improvements in their students' academic success.
Budget and Resources	Districts align their budgets with personalized learning priorities including ongoing support for quality technology and infrastructure.
Community Partnerships	Schools and districts partners with local businesses and industries to advance the school's learning goals.
Data and Privacy	Districts and schools establish policies and procedures for collecting, analyzing, storing, and reporting student data that ensure student privacy and data security.
Robust Infrastructure	Teachers embrace technology and online platforms to access tools, resources, data, and systems necessary to tailor student learning.
Use of Space and Time	Through technology and a new approach to classroom structure, teachers and schools leverage in-school and out-of-school time to meet the needs of individual learners.

Source: Future Ready Schools[82]

[80] "A Guidebook for Success: Strategies for Implementing Personalized Learning in Rural Schools." Future Ready Schools, April 2017. p.4. http://1gu04j2l2i9n1b0wor2zmgua.wpengine.netdna-cdn.com/wp-content/uploads/2017/04/FRS_Rural-District_Guidebook_04102017.pdf

[81] Ibid., p.5.

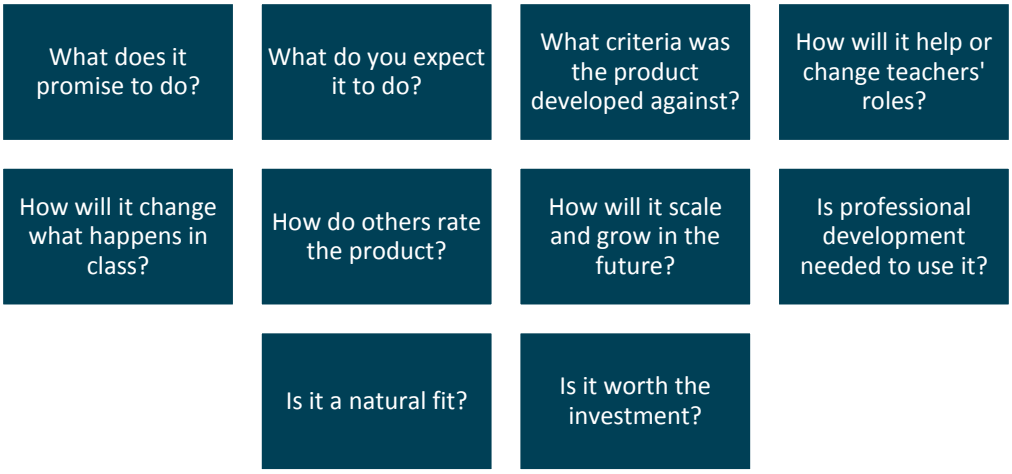
[82] Adapted from: Ibid., pp.4–5.

PLANNING FOR THE USE OF DIGITAL LEARNING PLATFORMS

Finally, it is essential that schools select and implement effective digital learning platforms that support 1:1 implementation and personalized learning objectives. As stated in the North Carolina Digital Learning Plan, "an effective digital learning transition requires that students and teachers have reliable and consistent access to digital resources – providing equity of access across all LEAs and charter schools, small and large, rural and urban, economically sound and economically distressed."[83]

In this way, when planning for new digital learning platforms, school districts must consider their overall goals for technology and digital learning. One expert posited that "if all we [are] doing is valuing test scores, then we [are] just using technology to deliver the same traditional curriculum. We have to be thinking about what [is] the goal of using technology."[84] At a recent ISTE conference, the U.S. Department of Education's Technology Director reviewed several key questions to ask when considering digital purchases (Figure 2.5). Along with taking into account a district's ultimate digital learning goals, it is important to consider how new platforms will be used by students and teachers and how they will facilitate learning.

Figure 2.5: Key Questions to Ask When Considering New Digital Platforms



Source: Barseghian; "What's Worth Investing In?"[85]

Indeed, as with planning considerations for other aspects of digital learning, planning for the use of digital learning platforms requires clear vision-setting and strategic planning. The NCDPI finds, for instance, that "in districts with successful digital learning initiatives, decisions about devices followed the development of a clear vision and plan for digital teaching and learning, so that the appropriate devices could be selected to implement a well-defined educational plan."[86] **This planning can help school districts proactively address many of the**

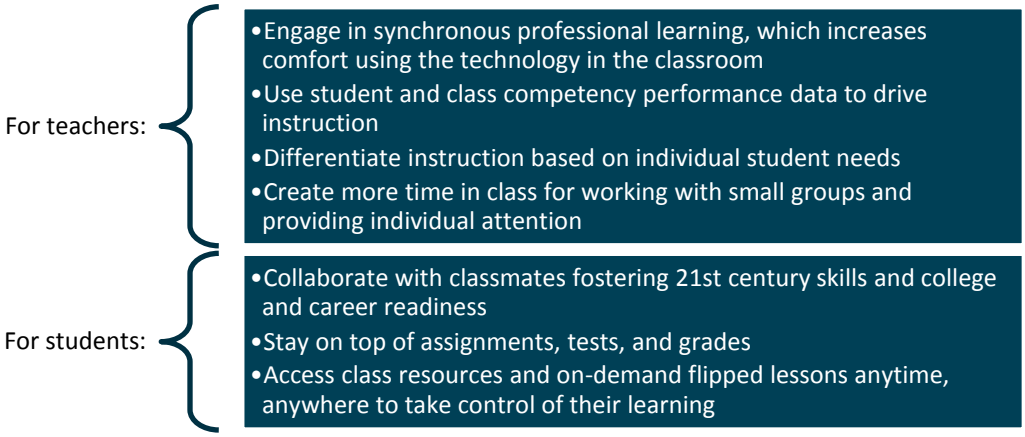
[83] "North Carolina Digital Learning Plan: Detailed Plan." Friday Institute, September 2015. p.18. http://dlplan.fincsu.wpengine.com/wp-content/uploads/sites/11/2015/09/NC-Digital-Learning-Detailed-Plan-9-14-15.pdf
[84] Barseghian, Op. cit.
[85] Adapted from: Ibid.
[86] "North Carolina Digital Learning Plan: Detailed Plan," Op. cit., p.18.

challenges commonly associated with using and purchasing new digital education resources. Some of these challenges include:

- Vetting the content quality;
- Mapping it to the districts' curriculum standards;
- Ensuring that it effectively uses the interactive, multimedia potential of the technology;
- Making sure copyrights are respected and student data is secured; and
- Preparing teachers to make effective use of the digital resources with their students.[87]

Because digital content is often mixed-and-matched with both other digital content and existing curricular materials, it can be difficult for school districts to navigate the shift from print to digital platforms. Therefore, it is important for schools to not only consider how digital learning will be implemented, but also how digital learning platforms can complement existing resources and pedagogies.[88] Digital platforms in today's schools need to fulfill a variety of purposes for both teachers and students (Figure 2.6), **and thus should be selected based on their applicability for a broad range of stakeholders.** Indeed, these systems "must also be able to meet the needs of teachers and students over time, as pedagogy in the classroom changes, not just when [they] are getting started and simply focused on digitizing learning."[89]

Figure 2.6: Ways Digital Learning Platforms and Learning Management Systems Can Support Teachers and Students



Source: Blackboard[90]

[87] Bullet points adapted from: "North Carolina Digital Learning Plan: Selecting Digital Education Content: A Guide for North Carolina Schools and Districts." Friday Institute, 2016. p.2. http://ncdlplan.fi.ncsu.edu/wp-content/uploads/sites/11/2016/09/Selection-and-Evaluation-of-Digital-Content.pdf

[88] Ash, K. "Picking and Choosing Digital Content." *EdWeek*, February 2012. http://www.edweek.org/dd/articles/2012/02/08/02digital.h05.html

[89] "The Essential Guide to K-12 LMS Evaluation: Choosing the Optimal Digital Learning Environment For Your District." Blackboard, 2015. p.2. http://www.blackboard.com/resources/pdf/evaluation-guide-k-12-lms.pdf

[90] Adapted from: Ibid.

Experts generally classify digital learning platforms across three categories: (1) **commercial**, in which content is purchased from a vendor; (2) **open educational resources (OER),** which uses content freely available on the Internet; and (3) **teacher-created materials**, which is content developed by teachers to use in their own classrooms (Figure 2.7).[91] Importantly, materials from these categories can be, and often are, mixed-and-matched in a way that supplements materials derived from other digital learning platforms or traditional curricula. Many teachers in 1:1 districts, in fact, use a combination of their own materials, OER, and commercial content. This mixed-and-matched vision is espoused as the ideal, yet many districts struggle to implement it in practice (e.g., from the prohibitive costs of some technology to teacher discomfort with using technology).[92]

Figure 2.7: Types of Digital Learning Content

Digital Learning Platforms	Description
Commercial	Commercial digital resources are generally aligned to standards and undergo review to ensure content accuracy and quality of alignment. Additionally, some commercial products wrap their content within applications that provide additional functionality and data reporting, which may be desirable. However, careful review of commercial resources is also required to ensure the quality of the content, effective use of the technology, alignment with current standards, and fit to the approach of the district, school, and teachers. Cost considerations favor the other types of content when quality materials are available or can be created locally
OER Content	OER content provides educators with the most flexibility, choice, and diversity in content. OER generally allows educators to mix-and-match content from multiple sources and, in many cases, to adapt content to local needs. While there is not a cost to purchase OER, significant initial work is often required to curate, vet, and assemble freely available content into a usable curriculum. While OER content has gained widespread use at the college level, it is at an earlier stage of adoption in K-12. However, the K-12 content marketplace has been shifting towards OER for the past several years, with federal agencies and major foundations funding the development of new OER materials, so more high-quality OER materials can be expected to become available in the next few years.
Teacher-Created	Teacher created materials are often prepared by individual teachers and by teams of lead teachers recruited by their districts to participant in curriculum development efforts during the summer. Often, these teachers select, organize, and adapt OER resources, as well as develop their own. This approach provides resources well adapted to the local context and students, and the process often provides valuable professional learning opportunities for the teachers involved. However, as with all curriculum materials, quality of content, flexibility of the resources, coherence of the curriculum, and other factors need to be considered when these materials are implemented school- or district-wide.

Source: Friday Institute[93]

Specifically, school systems must plan for a variety of considerations in the planning and selection of digital platforms and resources. For example, these include costs, steps for

[91] "North Carolina Digital Learning Plan: Selecting Digital Education Content," Op. cit., p.2.
[92] Ash, Op. cit.
[93] Adapted from: "North Carolina Digital Learning Plan: Selecting Digital Education Content," Op. cit., p.5.

submitting requests for information (RFIs), the evaluation of OER and copywriting, technical needs and infrastructure, student privacy, and integration with a learning management systems (LMS).[94] Under a strategic plan for supporting the digital learning environment, these practices may be more broadly connected to objectives for deepening learning, supporting personalized instruction, creating more comprehensive data systems, and improving curricular content.[95]

Because most school districts utilize some commercial platforms in their digital learning initiatives, **it is important to understand the RFI process.** These proposals can help districts initiate and manage any large-scale purchases of new digital content, and ask potential vendors to provide information about their products. RFIs also help districts consider their requirements for content, which can further support the strategic planning process.[96] Items to think about when developing RFIs that can also support strategic plans include:

- School/district size, location, demographics, and student performance;
- Subject areas or topics in which content is needed;
- Use cases (i.e., who will be using the content, and for what purposes – remediation, daily classroom use, credit recovery, etc.);
- Instructional focus (i.e., the vision for teaching and learning);
- Technical environments including devices, LMS, WiFi coverage, and bandwidth;
- Preferences on licensing models, managed services, or professional learning programs;
- Any contract term that vendors will need to abide by;
- Implementation timeline;
- Information about other district initiatives that may intersect with the use of this content; and
- Requirements to inter-operate with other systems, such as a Student Information System.[97]

The answers to these questions can allow school districts to better plan for digital learning and select the platforms and materials that will best allow them to fulfill their goals. As one education consultant stated, "the old curriculum model was one-size-fits-all. The new model is open, shared, and mobile across multiple devices. A single-platform focus may be tempting for curriculum, but ultimately that [is] a limiting mindset."[98]

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[94] Ibid.

[95] "Expanding Evidence Approaches for Learning in a Digital World." U.S. Department of Education, Office of Educational Technology, 2013. https://tech.ed.gov/wp-content/uploads/2014/11/Expanding-Evidence.pdf

[96] North Carolina Digital Learning Plan: Selecting Digital Education Content," Op. cit., p.6.

[97] Bullet points taken almost verbatim from: Ibid., pp.6–7.

[98] Ash, Op. cit.

SECTION III: DISTRICT PROFILES

In this section, Hanover presents several examples of digital learning plans and initiatives at school districts from across the United States. These exemplary models provide districts with anecdotal evidence of how other school systems organize, implement, support, and measure the success of their digital learning environments.

ALBEMARLE COUNTY PUBLIC SCHOOLS

Albemarle County Public Schools (ACPS) in Virginia currently serves approximately 13,790 students from preschool to Grade 12. ACPS enrolls a diverse student population, with 28.7 percent identified as disadvantaged, as well as sizable populations of limited English proficiency (10.1 percent) and disabled (11.4 percent) students. The District operates 26 schools in total, including several STEM academies (e.g., Environmental Studies, Health and Medical Sciences), an Engineering Lab School in partnership with the nearby University of Virginia, and a vocational-technical center.[99]

TECHNOLOGY IN ACPS

At ACPS, digital learning programs are mainly overseen by the Department of Accountability, Research, and Technology (DART), the District's Chief Information Officer, and several learning technology integrators. DART comprises several dedicated offices, including: Assessment; Enterprise Applications; Educational Technology; Infrastructure and Support Services; and Client Services.[100] The Office of Education Technology, specifically, helps ensure that the department's goals and strategic planning aligns with the broader school district's priorities. Overall, its mission and goals aim to provide:

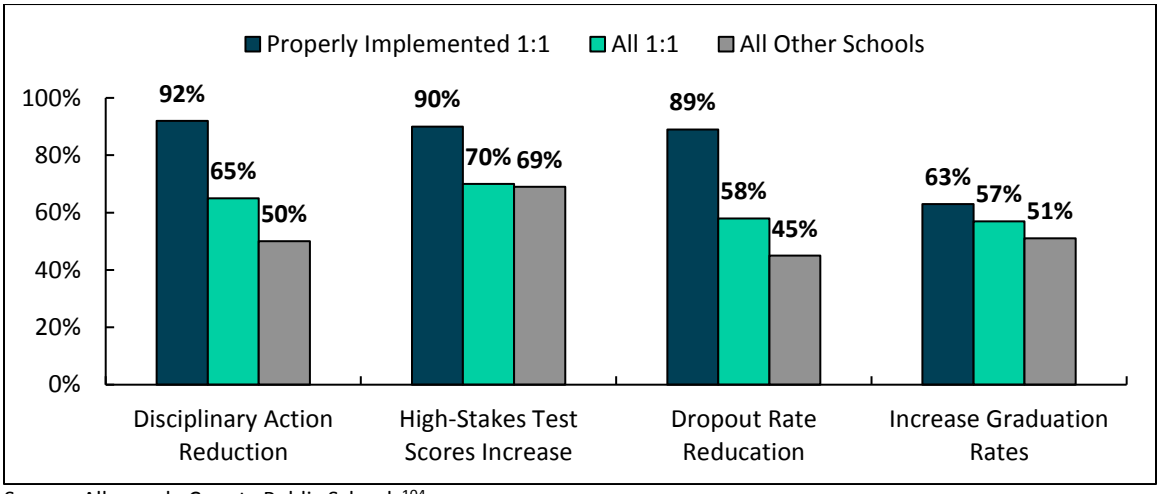
- Professional learning opportunities to support purposeful and effective use of technology;
- Exceptional client service to ACPS community;
- Support for learners to develop life-long learning competencies through a variety of meaningful educational technology experiences;
- Personalized support for division systems and technologies;
- Efficient and effective technology solutions;
- Ready access to data that informs instructional and operational practices;
- Accurate technical information to assist instructional and operational decisions; and
- Services to ensure successful implementation of division-level technical projects.[101]

[99] "About Us." Albemarle County Public Schools. https://www2.k12albemarle.org/acps/division/Pages/default.aspx
[100] "DART." Albemarle County Public Schools. https://www2.k12albemarle.org/dept/dart/Pages/default.aspx
[101] Bullet points taken almost verbatim from: "DART: Mission and Goals." Albemarle County Public Schools. https://www2.k12albemarle.org/dept/dart/Pages/mission.aspx

Currently, ACPS boasts a 1:1 student-to-computer ratio for most of its students. Indeed, all students in Grades 6 through 12 have personal devices, as well as students across most elementary schools (e.g., all students in Grades 3 through 5 in 13 of ACPS's 16 elementary schools). All other students enjoy a 2:1 student-to-computer ratio as the District continues to work toward full 1:1 participation.[102]

ACPS's digital learning initiatives are centered around the belief that "digital learning empowers young people to develop personal responsibility for learning by providing options to select from a range of digital content that support curricula [and] choose technologies that best match learning tasks, accessing learning resources instantaneously."[103] The District found that student outcomes are more positive when digital learning initiatives are properly implemented (Figure 3.1), and so devoted time before device roll-out to ensure that the school system—and broader ACPS community—were prepared.

Figure 3.1: Student Outcomes Based on 1:1 Implementation Status, ACPS



Source: Albemarle County Public Schools[104]

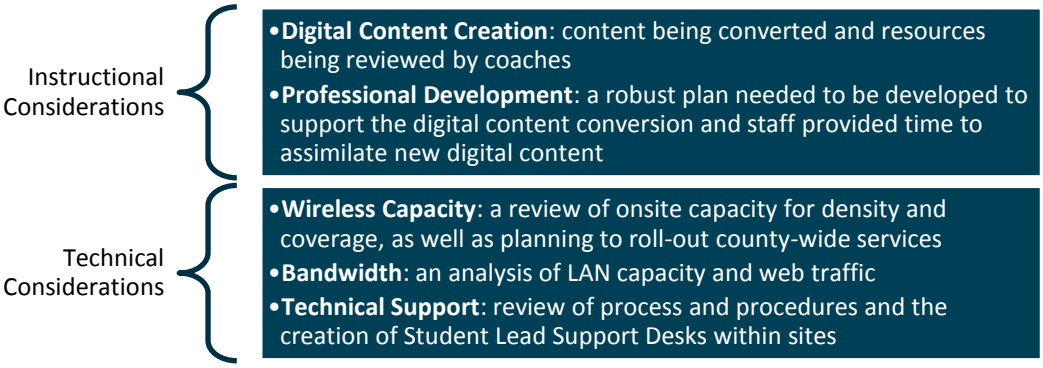
Overview of Strategic Planning

ACPS devoted several years to strategic planning before rolling out new digital learning initiatives, including presentations and implementation plans to garner school board support (2010-2014) and the development of long-term educational technology plans (2015-2018).[105] The District's initial School Division Readiness Plan, which DART presented to the school board in 2013, outlined the initial instructional and technical considerations that would be key to effectively implementing a digital learning program (Figure 3.2). These considerations show

[102] "About Us," Albemarle County Public Schools, Op. cit.
[103] "Digital Learning Initiative: Building the Future Today." Albemarle County Public Schools. p.10. http://esb.k12albemarle.org/attachments/1474592e-87da-4614-af7c-fec7b1fda3cf.pdf
[104] Adapted from: Ibid., p.4.
[105] [1] "Digital Learning Initiative: Building the Future Today," Op. cit.
[2] "Educational Technology Plan for Albemarle County Public Schools 2015-2018." Albemarle County Public Schools. https://www2.k12albemarle.org/dept/dart/edtech/Educational%20Technology%20Documents/ACPS%20Ed%20Tech%20Plan_15-18_FINAL.pdf

the preliminary concerns for ACPS, which primarily focused on getting educators familiar with the upcoming transition and the District's infrastructure up to speed. Once approved, ACPS's next phase involved "coordinated provision of comprehensive training, student access to technology devices inside and outside of school, and digital learning resources."[106]

Figure 3.2: Key Considerations during School Division Readiness Planning



Source: Albemarle County Public Schools[107]

The District developed an Educational Technology Plan (the Plan) to support the continued roll-out and operation of the digital learning program. The Plan is regularly updated to reflect changes and accomplishments regarding digital learning, and currently covers the period from 2015 to 2018. Of note, ACPS states that **the Plan "is not a plan for computers and networks, it is a plan for learning in this century, a plan for students in this century,** and a plan to support all of the Division's Seven Pathways to [the District's] Life-Long Learning Competencies."[108] As seen in Figure 3.3, technology and connectivity are important elements of the District's larger priorities, and the Plan works to further integrate digital learning.

Figure 3.3: Seven Pathways to Life-Long Learning Competencies at ACPS

PATHWAY	DESCRIPTION
Choice and Comfort	It is our responsibility to provide every learner with real learning space choices based on task-based and physical comfort-based needs, which not only allow their cognitive energy to be focused on learning but helps students to develop the contemporary skills needed to alter and use spaces to initiate and accomplish collaborative and individual work. This includes the availability of multiple communication tools and contemporary technologies as well as assisting students in understanding and creating a variety of learning products which demonstrate student choices in curriculum, task, technologies, and media.
Instructional Tolerance	We will all support student learning environments where active, engaged learners routinely choose from a variety of learning spaces, collaborative and individual activities, and technology tools, including their own personal devices. Our environments will create student opportunities to learn best practices essential to entering contemporary learning and work environments and which enable students to sustain an open mindset and skillset in the use of evolving technology tools.

[106] "Digital Learning Initiative: Building the Future Today," Op. cit., p.14.
[107] Adapted from: Ibid., p.12.
[108] "Educational Technology Plan for Albemarle County Public Schools 2015-2018," Op. cit., p.4. Emphasis added.

PATHWAY	DESCRIPTION
Universal Design for Learning/ Individualization of Learning	Within the constraints of other laws (in particular, copyright) we will offer alternative representations of information, multiple tools, and a variety of instructional strategies to provide access for all learners to acquire lifelong learning competencies and the knowledge and skills specified in curricular standards. We will create classroom cultures that fully embrace differentiation of instruction, student work, and assessment based upon individual learners' needs and capabilities. We will apply contemporary learning science to create accessible entry points for all students in our learning environments; and which support students in learning how to make technology choices to overcome disabilities and inabilities, and to leverage preferences and capabilities.
Maker-Infused Curriculum	Across our School Division we are committed to student construction of knowledge and skills through the processes of imagining, creating, designing, building, engineering, evaluating and communicating learning. We believe that it is essential that our students learn how to be "Makers" in all phases of their lives, rather than just consumers.
Project/Problem/ Passion-Based Learning	All Albemarle County Public School students will have consistent learning opportunities across the curriculum to construct knowledge and understanding through responses to authentic problems; to create projects that demonstrate higher order thinking and knowledge acquisition, and to pursue personal interests by making real choices in project forms and media, even when those choices might lie beyond pre-determined expectations.
Interactive Technologies	In every classroom, every day, we strive to create open learning environments in which students make individual choices as they use technologies to develop classroom work and assignments, and to provide opportunities for our students to actively make tech-based product investigation and choice as part of their study of curriculum. Our students will, regularly during instructional time, use those contemporary technologies (both school provided and individually owned) interact with external experts and students in other communities in order to build learner competencies in the use of the technologies of this century for information access and communication.
Connectivity	We will continuously develop and use activities that engage students in learning networks, including asynchronous and synchronous communication with external experts, access to digital content including primary sources, and interaction with other learners locally and globally who represent a variety of demographically diverse communities. We will, every day, promote and value collaborative projects and knowledge development representative of principles of global and digital literacy and effective, and which demonstrate appropriate global, national, community, and digital citizenship.

Source: Albemarle County Public Schools[109]

DART developed the Plan to ensure that technology and digital learning in ACPS is aligned with broader District priorities and can support other initiatives (Figure 3.4). Indeed, "the Albemarle County Public Schools' 2015-2018 Educational Technology Plan is established to be in concert with the federal, state, and division school board strategic goals, as well as to achieve locally the goals of Virginia's educational technology plan."[110] The U.S. Department

[109] Adapted from: "Seven Pathways to Ensuring Life Long Learning Competencies for Every Child." Albemarle County Public Schools. https://sites.google.com/site/acpsdesign2015/home/seven-pathways

[110] "Educational Technology Plan for Albemarle County Public Schools 2015-2018," Op. cit., p.5.

of Education's Office of Educational Technology cites ACPS's strategic planning as an exemplary model of district-wide alignment.[111] Overall, ACPS, and specifically DART, conclude that "the specific goals expressed in our action plans aim to do exactly what our Strategic Plan says is our goal: to unleash the potential of every students – not just the potential of every student as defined in 2015 or in 2018, but the potential of every student in the moving target of our global future."[112]

Figure 3.4: Development Plan for Drafting the Educational Technology Plan for ACPS

Activity	Responsible Entity	Timeline
Develop a strategy for technology planning and review the previous plan	DART Leadership Team	Fall 2014
Ensure alignment of the technology plan components to the vision for technology planning	DART Advisory Committee	Spring 2015
Craft new local strategies	DART Advisory Committee	2014-2015
Final review of strategies	DART Advisory Committee	April 2015
Present draft technology plan to the school board for first reading	DART Leadership Team	May 2015
Receive technology plan for approval	School Board	June 2015
Submit school board approved technology plan to Virginia Department of Education for approval	Chief Information Office	June 2015

Source: Albemarle County Public Schools[113]

Strategic Planning Goals and Action Steps

ACPS strives to connect its overarching mission, vision, and learning standards across all departments and learning initiatives. This dedication to a uniform message drives strategic planning within DART, and helps the Office of Educational Technology at ACPS to identify key learning and programmatic goals. Beyond the District's strategic goals, **DART's Plan is "built on the premise that technology is not an add-on but rather an essential tool for our students in school, and an essential tool for their lifetime.**"[114]

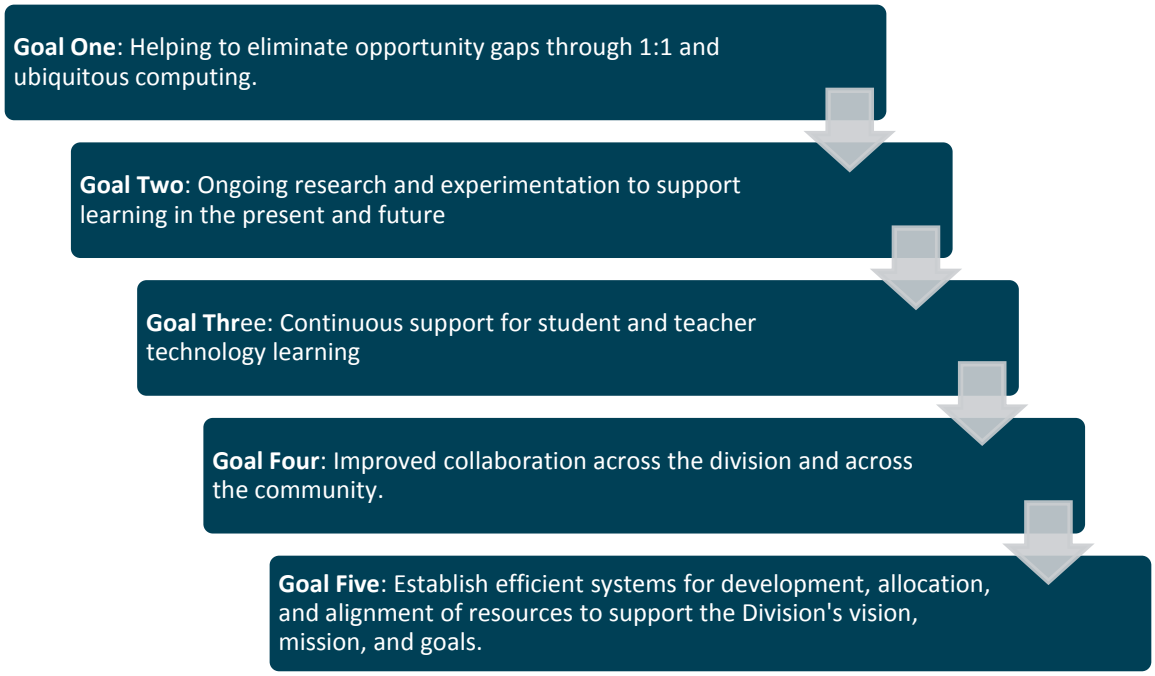
In this way, the core mission of the department's strategic planning stems from a belief that digital learning is not only an important component of the District's more general success, but also a central factor in students' longer-term outcomes. The strategic plan is further connected to the District's goals by three considerations:

[111] "Seven Pathways of Educational Environments." Office of Educational Technology, U.S. Department of Education. https://tech.ed.gov/stories/seven-pathways-of-educational-environments/
[112] Educational Technology Plan for Albemarle County Public Schools 2015-2018," Op. cit., p.6.
[113] Adapted from: Ibid., p.7.
[114] Ibid., p.8. Emphasis added.

- What do we want our classrooms to look like? (Framework for Quality Learning)
- How will we know? (Teacher Performance Appraisal)
- How will we cause this to happen? (Professional Learning Communities and Professional Development working with the Seven Pathways)[115]

A core component of the development of the Educational Technology Plan was continuous, multipath needs assessments. DART conducted three years of active needs assessments, relying on various sources of student and classroom data derived from administrators, teachers, students, and community members. For example, the Instructional Technology team reached out to every stakeholder group within ACPS, while the DART Advisory Committee provided regular feedback.[116] Administrators and DART personnel conducted walk-throughs in digital learning classrooms, and surveys were administered in all classes throughout the spring of 2014. Using these data, DART developed five technology targets that further helped to define the strategic priorities in the coming years:

Figure 3.5: DART Technology Targets for Strategic Planning



Source: Albemarle County Public Schools[117]

MINNETONKA PUBLIC SCHOOLS

Minnetonka Public Schools (MPS) is located outside of Minneapolis, Minnesota and comprises one preschool, six elementary schools, two middle schools, and one high school.

[115] Bullet points taken verbatim from: Ibid.
[116] Ibid., p.9.
[117] Adapted from: Ibid., p.10.

The district serves 10,567 total students and is largely homogeneous with 84.3 percent of the student population identifying as white. The high-performing school district creates an individualized learning environment by offering specialized programs for special needs and gifted students. Online course options and a vocational project-based program are available at Minnetonka High School.[118]

TECHNOLOGY IN MPS

Every MPS student in Grades 5 through 12 receives a school-issued iPad for curriculum, collaboration, and "individualized instruction." The district does not have any plans to extend the program into earlier elementary years. The iPads serve as a classroom tool and assignment platform, as well as a substitute for print textbooks. While MPS purchases the iPads, students are ultimately responsible for the safety of the hardware. However, the District does offer an insurance program for the iPad costing roughly $40 per month.[119]

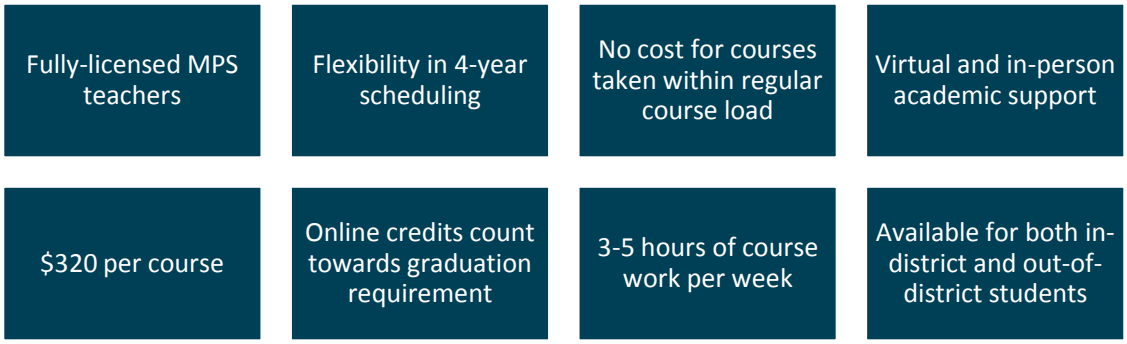
The 1:1 iPad Program at MPS emphasizes developing "21st Century Skills of problem solving, critical thinking, communication, and technological literacy." [120] Through successful technology implementation, the District intends to equip students with skills necessary for participation in a global community. Employment of iPads throughout the school system frequently raises parental concerns regarding safety, cheating, and distraction. Several steps have been taken to counter the concerns:

- Installed filtering software to block access to inappropriate websites;
- Pen-and-paper formal assessment;
- Honor Code for distraction in the classroom;
- Password protection and bar code security; and
- District-operated device insurance program.[121]

In addition to the iPads, Tonka Online is the District's digital learning platform where students can complete required courses for high school graduation during the summer to allow more flexibility in scheduling and electives during the school year. Courses can be completed on either a computer or iPad.[122]

[118] "Schools." Minnetonka Public Schools. https://www.minnetonkaschools.org/schools
[119] Ibid.
[120] "1:1 iPad Program." Minnetonka Public Schools. https://www.minnetonkaschools.org/district/programs/ipad
[121] Bullet points adapted from: "Frequently Asked Questions – 1:1 iPad Program." Minnetonka Public Schools. https://www.minnetonkaschools.org/district/programs/ipad/faq
[122] "Frequently Asked Questions – Tonka Online." Minnetonka Public Schools. https://www.minnetonkaschools.org/schools/high-school/tonka-online/faqs

Figure 3.6: Key Features of Tonka Online at MPS



Source: Minnetonka Public Schools[123]

Finally, Tonka<codes> is a unique example of digital learning at the elementary school level. Tonka<codes> is a computer coding curriculum implemented in Grades K through 5 in response to the workforce demand for programmers. The curriculum teaches basic computer skills in addition to utilizing "hands-on, graphic-based tools" to learn coding fundamentals. The program is the initial phase of a district-wide initiative to streamline more students into computer science careers. While K-4 students do not have 1:1 iPads, devices are distributed and shared across classrooms.[124]

Overview of Strategic Planning

Following a decrease in funding from state and federal government sources, MPS Superintendent Dr. Dennis Peterson championed an organizational change movement to encourage a culture of innovation. In 2012, the "Big Idea Hunt" encouraged faculty input via crowdsourcing on innovative solutions to pedagogical challenges. Many proposed solutions surrounded the use of technology in classroom.[125]

Led by then-Executive Director of Technology Julie Carter, the Technology Department within MPS developed a strategic plan for the implementation and maintenance of educational technology initiatives identified through the Big Idea Hunt.[126] In conjunction with the culture of innovation, the priorities (Figure 3.7) were cooperatively established through communication with several stakeholders and field experts, including:

- Media Specialists,
- Technology Department staff,

[123] Adapted from: Ibid.
[124] "Tonka Codes." Minnetonka Public Schools. https://www.minnetonkaschools.org/academics/specialty-programs/tonka-codes
[125] "Creating a Culture of Innovation: Minnetonka Innovates Campaign." National School Public Relations Association. https://www.nspra.org/files/Minnetonka%20PS%20-%20Cultureof%20Innovation%20Gold%20Medallion%20Entry.pdf
[126] "Technology Planning and Strategic Priorities." Minnetonka Public Schools. https://www.minnetonkaschools.org/schools

- Teaching and Learning Department staff,
- Technology industry professionals, and
- Technology Directors from similar high performing school districts.[127]

Minnetonka Public School Board budgets for educational technology program growth with approximately 15 percent of the MPS technology budget allocated to professional development.[128] To align faculty training with the needs of the technology initiative, curriculum and technology specialists work in collaboration with the Office of Teaching and Learning, the staff development team, and Technology Department. Professional development sessions are grounded in the district vision of fostering 21st Century skills in the context of the strategic priorities.[129] In 2015, over 350 teachers logged 3,600 hours of professional development on how to integrate technology into the classroom.[130]

Figure 3.7: Technology Priorities in Minnetonka Public Schools

PRIORITIES	EXECUTION
Priority #1: Infrastructure	
Bandwidth	Expand bandwidth competencies and mature WiFi capabilities to ensure networks have the maximal capacity to operate
Data systems	Develop operational and instructional data sources to inform future decision making in "finance, HR, student systems, communication systems, Skyward family Access, Schoology, and many other infrastructure services"
Priority #2: IT Service Management (ITSM)	
IT Service Management	Employ best management practices to foster district goals and mission
Security, identity, and policy	Security measurements to maintain security and identity protection including the usage of alert systems and security aids
Student, parent, staff, and community access	Enable access to technology across the community (hardware, software, infrastructure, support and training) and budget for infrastructural replacement

[127] "Technology Plan." Minnesota Department of Education. p.1.
[128] "Technology Planning and Strategic Priorities," Op. cit.
[129] "Focused on World-Class Child-Centered Excellence." Minnetonka Public Schools. p.17. https://www.minnetonkaschools.org/uploaded/Documents/District-Publications/Vision.pdf
[130] Peterson, D. "Technology Immersion." *School Administrator*, 62:7, 2005. Accessed via ProQuest.

PRIORITIES	EXECUTION
Priority #3: Professional Development	
Professional development	Train faculty appropriately for technologies to be most effective in the classroom
Priority #4: Learning Technologies	
Educational technology	Integrate technologies into instructional practice
Minnetonka Technology Belief Statements	Driven by established statements regarding the mission and goals of educational technology usage

Source: Minnetonka Public Schools[131]

Several technology programs such as the 1:1 iPad Program and Tonka Online are successfully incorporated into the school district due to the collaborative effort.[132] Through effective community-wide campaigning, MPS could accumulate stakeholder buy-in; consequently, in 2015, the District residents voted to renew the $5.3 million Technology Referendum Levy, the local tax allocation for educational technology funding in Minnetonka, through 2025.[133]

According to the Technology Plan submitted to the Minnesota Department of Education, the school district plans to invite third party auditors, BLEgroup, to systematically assess the technology program implementation on a multi-year cycle.[134] Informed by comprehensive measurement, BLEgroup aids the revision process of the strategic technology plan every five years to adapt to the changing technological advances. The evaluators assist the district in "contracting vendors and overseeing changes and implementation."[135]

REEDS SPRING SCHOOL DISTRICT

Reeds Spring School District (RSSD) is a small, rural school district in southwest Missouri. The District serves approximately 2,000 students, two-thirds of which are eligible for free or reduced-priced lunch.[136] RSSD oversees a primary school, an elementary school, an intermediate school, a middle school, and one high school. The District additionally offers an "alternative school" for students at-risk of dropping out. The high school provides students

[131] Adapted from: "Technology Planning and Strategic Priorities," Op. cit.
[132] "Creating a Culture of Innovation: Minnetonka Innovates Campaign," Op. cit.
[133] "Frequently Asked Questions – 1:1 iPad Program," Op. cit.
[134] "Technology Plan," Op. cit., p.8
[135] "Technology Planning and Management for Smaller School Districts." BLEgroup. p. 3. http://blegroup.com/wp-content/uploads/2011/04/small-district-brochure.pdf
[136] Retrieved from Missouri Comprehensive Data System. https://mcds.dese.mo.gov/guidedinquiry/School%20Report%20Card/School%20Report%20Card.aspx

with the option of a two-year technical secondary education program through the Gibson Technical Center in various fields such as automotive technology, computer technology, construction, culinary arts, and others.[137]

TECHNOLOGY IN RSSD

In the 2012-2013 school year, every high school student received a district-owned laptop after nine months of intensive faculty training. Year after year, students in all earlier grades received their laptop device with the final phase of device rollout occurring in August 2016 for Kindergarten and Grade 1.[138] Headed by the Director of Instruction, the 1:1 Learning Initiative adapts to 21st Century needs while "meeting the needs of [the district's] students in a student-centered, engaging learning environment."[139]

Students and families are responsible for the safety and security of the district-owned device, and RSSD does not offer any hardware insurance programs. Families have the option to bring their own device ("BYOD"). The District requires a modest yearly maintenance fee. Most the students pay a lower fee of $20 due to their qualifications for free or reduced lunches.[140]

Further, available through the Gibson Technical Center, the online education program (Ed2go) began as an extension of the 1:1 Learning Initiative. High school students can obtain credit for required courses through completion of online courses taught by RSSD teachers.[141] Ed2go also assists the community in continuing education. The Gibson Technical Center offers online adult education courses led by out-of-district "expert instructors."[142] The courses range from self-paced to instructor-led. Ed2go's specialty is online technical career training parallel to Gibson Technical Center's secondary education technical programs. Users can study a variety of technical fields online, including:

- Accounting,
- Design,
- Computer applications,
- Teaching,
- Publishing, and

[137] "Director's Corner." Gibson Technical Center. http://gt.rs-wolves.com/apps/pages/index.jsp?uREC_ID=187268&type=d&pREC_ID=396028
[138] "Reeds Spring High School 1:1 Learning Initiative." Reeds Spring School District. http://hs.rs-wolves.com/apps/pages/index.jsp?uREC_ID=325370&type=u&pREC_ID=397364
[139] Ibid.
[140] "Student/Parent Laptop Handbook." Reeds Spring School District. https://1.cdn.edl.io/Wvd67aqbAvgJYryU83gyrZ1f1u3zWEX0Z41XHt6ei7bF7jOb.pdf
[141] Watson, J. and Murin, A. "K-12 Digital Learning in Missouri: Creating Virtual Pathways to Success." Missouri Chamber of Commerce and Industry Education Foundation. p. 37. http://www.komu.com/files/K-12%20Digital%20Learning%20in%20Missouri%20(Final%20e-version).pdf
[142] "Gibson Technical Center." Ed2go. https://www.ed2go.com/gibson/

- Law.[143]

Ed2go supplies courses for personal development and college readiness (ACT, LSAT, etc.). The courses range in cost from $99 to $300 depending on the instructor and popularity.[144]

OVERVIEW OF STRATEGIC PLANNING

With small budget margins, funding a comprehensive initiative such as 1:1 that requires updating infrastructure and investing in hardware can be expensive. In 2009, RSSD Superintendent Michael Mason began amassing money in the district's capital fund. The fund was designed to account for unforeseen major renovations and upgrades. When the superintendent originally began the fund, he did not intend for it to fund the 1:1 Learning Initiative due to the number of students on free and reduced lunches.[145]

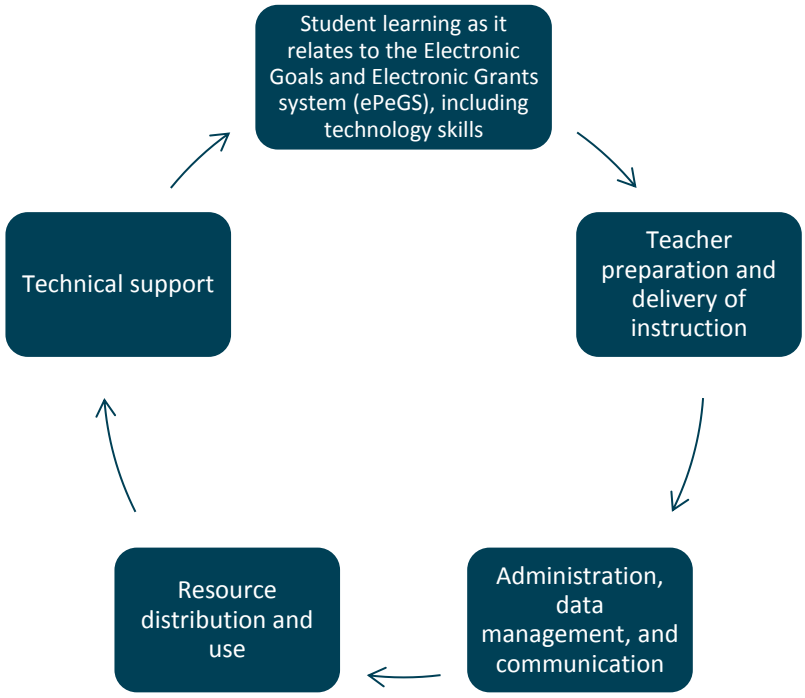
However, the district school board concluded that technology implementation was necessary to keep up with the modern-day workforce demands. To cut costs and use the capital fund efficiently, the district leased their used Lenovo ThinkPad 230T tablets and discontinued purchasing print textbooks, opting for cheaper online versions instead. The superintendent reports that the approach allowed for a 10 percent cost savings.[146]

During the 2011-2012 research and planning phase of the 1:1 Learning Initiative, the RSSD school board's Technology Planning Committee, composed of teachers, librarians, administrators, technical support, and parents, compiled a technology plan outlining goals and focus areas for successful technology implementation. The committee's goal was to design a document to guide all technology usage in the district, both present and future, requiring the plan to remain somewhat fluid.

RSSD identified five Technology Focus Areas (TFAs) (Figure 3.8) that echo the District's technology mission statement, "to provide an environment which focuses on academic achievement and technology literacy to prepare students for college and career readiness."[147]

[143] Bullet points adapted from: Ibid.
[144] Ibid.
[145] Ullman, E. "Funding Your 1:1." *Tech & Learning*, 33:11, 2013. p.25. http://www.techlearning.com/news/0002/funding-your-11/68382
[146] Ibid.
[147] "District Technology Plan." Reeds Spring R-IV Schools. p.4. http://www.rs-wolves.com/ourpages/auto/2013/7/24/46348352/DTP%20FINAL%20Copy%2003_20_12-1.docx

Figure 3.8: Five Technology Focus Areas (TFAs) by RSSD School Board, 2012-2015



Source: Reeds Spring School District[148]

During the 2011-2012 academic year, the committee split into subcommittees for each TFA. Using data and personal experience, the members identified strengths and weaknesses of the focus areas (Figure 3.9). The organizational strategy helped recognize the shortcomings of the then-existing technology plan and formulate actionable items for improvement. The committee then drafted a data-driven needs assessment report detailing goals, objectives, strategies, and action steps (Figure 3.10).[149]

Figure 3.9: Example of Committee Identification of Focus Area Strengths and Weaknesses

Strengths and Weaknesses of Administration, Data Management, and Communication	
Strengths	**Weaknesses**
1. Availability of technology tools to provide parents/community access to school information	**1.** Inconsistent use of parent contact resource
2. Annual Technology Fair	**2.** Inconsistent use of posting homework
3. On-line Art display	**3.** District web page not updated regularly
4. Strong district level support for technology integration: board, administration, buildings, and classrooms	**4.** District technology budget is not outlined to address the Total Cost of Ownership
5. District uses a variety of needs assessments to identify technology needs	--

Source: Reeds Spring School District[150]

[148] Taken verbatim from: Ibid.
[149] "District Technology Plan." Op. Cit., p. 8
[150] Taken verbatim from: Ibid., p. 20

Figure 3.10: Sample of Committee Identification of Strategies and Action Steps

GOAL #2: TEACHER PERFORMANCE				
Objective: 100% of teachers will receive professional development				
Strategy	**Action Step**	**Person Responsible**	**Funding Source**	**Completion Date**
Implement district technology vision	Teachers will design a building plan for implementation of District standards aligned to 21st century skills	Teachers, Vanguard Tech Team (VTT), Instructional Technology Specialist (ITS), 1:1 Lead Team and Teachers	Local funds	May 2015

Source: Reeds Spring School District[151]

Since technologies evolve quickly, the District plans to continue updating internal and external data sources to inform decisions regarding digital learning. Subcommittees and task forces of relevant jurisdiction are to meet on an *ad hoc* basis for re-evaluation of the technology plan. Careful measurements will be employed to evaluate the plan's impact. Metrics used are as follows:

- Staff needs assessment,
- Missouri Assessment Program (MAP) scores,
- District assessments,
- Dropout rates, and
- Graduation and completion rates.[152]

The finalized 2012-2015 technology plan was distributed to the RSSD Board of Education, school principals, and relevant program coordinators and posted on the district website. Surveys are administered and evaluated yearly.[153]

[151] Taken verbatim from: Ibid., p.26
[152] Bullet points taken verbatim from: Ibid., p.34
[153] Ibid. pp.33-35

APPENDIX A: NCDPI DIGITAL LEARNING PLAN RECOMMENDATIONS AND GOALS

This appendix presents the recommendations and goals established by the North Carolina Department of Public Instruction for the state's Digital Learning Plan. These goals provide action steps for school districts across the state. Districts are likewise encouraged to develop action steps that reflect broader learning (both traditional and digital) goals.

Figure A.1: NCDPI Digital Learning Plan Recommendations and Action Steps

RECOMMENDATIONS	GOALS
Technology Infrastructure and Devices	
Expand the School Connectivity Initiative to provide and support broadband access, internal networks, and related services to all schools, while planning for increased bandwidth demands, replacement of outdated equipment, increased network engineering support, and ongoing funding.	▪ All schools have sufficient network capacity to fully support digital learning in all classrooms and workspaces by 2018. ▪ Sustainable funding and processes are available to maintain well-functioning networks in all schools thereafter.
Provide guidance to inform local decision makers about purchasing networks, supporting infrastructure, and devices.	▪ Ongoing increases are found in (a) teachers' and students' ratings about their access to technologies, and (b) the number of schools that provide devices to every student.
Establish a statewide cooperative procurement service for networks, devices, and digital content.	▪ Cost savings are obtained through economies of scale purchasing for both equipment and digital content
Participate in multi-agency efforts to provide broadband access for all homes.	▪ All Districts are able to address community and home access to ensure digital resources are available to all students.
Human Capacity	
Develop and implement digital learning competencies for teachers and administrators as required by SL 2013-11.	▪ All teachers and administrators demonstrate understanding and application of the digital learning competencies.
Provide professional development for school and district leaders, instructional support staff, and technical staff, in order to prepare local leadership teams to plan and implement successful digital learning initiatives.	▪ All teachers and students report effective leadership and support for digital learning in their districts and schools.
Develop a network of professional development facilitators to prepare teachers for digital learning. Provide resources to support them in delivering face-to-face, online, and blended professional learning programs for teachers of all content areas and levels.	▪ All teachers report that they are prepared to effectively use digital learning to increase their students' engagement and achievement. ▪ All students report that their teachers use technology effectively to enhance learning.

RECOMMENDATIONS	GOALS
Guide teacher and administrator preparation programs to ensure that their graduates are ready for digital-age schools.	▪ Superintendents, principals, experienced teachers and students report that new teachers and administrators are well prepared for their roles as digital-age educators.
Content, Assessment, and Instruction	
Establish standards, review processes, and collaborative procurement for digital learning resources. Standards address curriculum content, personalized learning approaches, effective uses of technology, and technical requirements.	▪ High-quality, personalized, interactive digital learning resources are available to all students. ▪ Effective systems are in place for teachers to select, create, organize, share, review, and use digital learning resources and curricula.
Support the use and sharing of high-quality open educational resources and teacher-created resources	▪ The cost of educational resources is reduced while maintaining quality and alignment with the North Carolina curriculum standards.
Provide digital tools that enable educators to use student data to improve teaching and learning.	▪ All teachers use assessment data that enables them to personalize instruction and increase student achievement.
Update Home Base tools and support systems to further meet the needs of educators, students, and parents	▪ Home Base use increases significantly. ▪ Teachers, students, and parents rate highly the value of Home Base.
Local Digital Learning Initiatives	
Guide and support local leadership teams in planning and implementing digital learning initiatives through face-to-face, online, and blended activities, as well as a toolkit of resources.	▪ All districts and schools advance on each dimension of the Digital Learning Progress Rubric.
Provide grants to support the development and dissemination of local innovative digital learning models.	▪ Effective digital learning practices are spread across all North Carolina schools.
Policy and Funding	
Update State policies to provide support and flexibility for local digital learning innovations—including policies that support strategic staffing, mastery-based advancement, revised scheduling, and other innovations.	▪ School and district leaders report that State legislation and policies support innovation and that barriers have been removed. ▪ North Carolina is frequently cited as a national leader in digital learning innovations.
Provide guidance to help educators address privacy, security, copyright, and responsible use issues.	▪ Schools have minimal problems with the misuse of digital technologies; structures and systems are in place to effectively address any issues that do occur.
Develop new State and local funding models to support and sustain digital-age learning.	▪ Sustainable funding exists and allows for long-term planning.
Provide additional supports to ensure equity of digital learning opportunities for all students.	▪ Access to digital learning is addressed as part of the State's responsibility to provide a sound basic education to all students.

RECOMMENDATIONS	GOALS
Regional and State Support	
Establish the North Carolina Digital Learning Collaborative to manage the recommended State programs, with Executive Committee representation from NCDPI; the Friday Institute; the Golden LEAF Foundation; and the Principals, Superintendents, and School Boards Associations; and Advisory Board representation from all stakeholder groups.	▪ Local education leaders report that statewide systems provide effective support for digital learning initiatives. ▪ All districts and schools advance on each dimension of the Digital Learning Progress Rubric.
Establish regional digital learning networks to support digital learning initiatives and foster collaborations.	▪ Local education leaders report that regional systems provide effective support for digital learning initiatives.
Implement a digital learning progress dashboard and data-informed continuous improvement processes.	▪ Multiple measures demonstrate ongoing increases in statewide progress in digital learning and student achievement.

Source: Friday Institute[154]

[154] Adapted from: "North Carolina Digital Learning Plan: Summary September 2015," Op. cit., pp.5–10.

PROJECT EVALUATION FORM

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