

Lessons Learned

North Carolina Digital Learning Plan

June 2017 | Frances Bryant Bradburn

If your school or school system is contemplating a digital teaching and learning environment, you may wish to heed the following updated **Lessons Learned** document. It is important to note that the original **Lessons Learned** documentation began as a culminating set of recommendations for the districts who deployed 1:1 learning environments in the pilot program for the **North Carolina Learning Technology Initiative (2007)**. Since that time, digital and/or personalized/blended learning has grown across our state and merged into a larger initiative now known as the [North Carolina Digital Learning Plan](#).

First and foremost: Take Time to Plan!

- Six months to a year is a reasonable planning timeline.
- The most important discussion you will have with stakeholders is what you want your classrooms to look like in a digital environment. What do you want students and teachers to be able to do once everyone has a device 24/7? This determines the device(s) you purchase, the vendor you choose, and the professional development you plan. Involve as many people as possible in these discussions, especially the teachers in the school(s) in which you plan to deploy the project. It's not only about what you can afford; it's the vision for the future that is created through these discussions.
- Consider implementing a pilot program for a semester.
 - Pilot teachers should be innovative educators with command of a variety of pedagogical strategies and approaches, and comfortable with the content area(s) they teach, secure in their subject area(s) and craft.
 - Consider including a few teachers who are not already technology users. This helps you gauge how the initiative will move forward and often helps other less-tech-facile teachers approach this change in a positive manner.
 - These pilot teachers should also be risk-takers, comfortable trying new things, taking purposeful risk, and continually modeling ways in which they 'fail-forward.
 - Pilot with the device(s) planned for school-wide/system-wide rollout, but listen carefully to feedback. At this point it is not too late to change plans.
 - Provide these teachers with additional professional development and time for collaboration with the expectation that these teachers will help move the initiative throughout the school/district.
 - Beware keeping an initiative as a pilot too long. Learning to teach in a student-centered, technology-rich learning environment is hard work. If you wait too long, pilot teachers may become resentful of their more traditional colleagues who they may perceive are not working as hard as they are.
 - Students may also become frustrated, not knowing when/where/how to use devices.
 - Students and/or teachers may struggle with the shift to a more student-centered, independent learning environment.
 - Teachers (and students) may perceive that classes without devices are not as important as those that have them: never a message to convey.

- Make sure that sustainability is part of the overall plan at the beginning of the project.
 - Consider personnel, resources, and professional learning to sustain your initiative's momentum and ability to grow.
 - Be sure to consider the total cost of sustainability over several years' time – devices, infrastructure, repair, replacement, personnel, professional development for new as well as returning teachers.
- Think infrastructure first! Do not deploy computers school-wide until the building has reliable high-speed Internet access throughout the campus.
- Make sure technology personnel (building-level technology facilitator and technician) are hired and in place before any computers are ordered.
- Include curriculum specialists, media coordinators, and/or instructional technology facilitators in the overall planning conversations and decision making. This should be in addition to planning for yearlong professional development needs.
- Create a climate of buy-in at all levels of the project: central office, building-level teachers and administrators, parents and students, and the community. Involve all stakeholders in the planning process.
 - In large, spread-out school systems, consider conducting initial digital learning initiative information meetings in towns and/or geographical areas. Have these meetings at the elementary school or the community center, so that parents feel that you are reaching out to them and are aware of their time and resource constraints. Offer meetings at a variety of times. This will go a long way in building good will and support for the project.
 - Some principals conduct home visits rather than accept the inevitable excuse, "My parents can't come to a meeting." It works!
 - Survey students and their parents to ascertain the percentage of your student population who will have reasonably fast connectivity. Preface the survey with the statement that you are surveying in anticipation of going to a digital learning environment. Make sure to differentiate between mobile and hardline broadband connections and provide a definition of each.
 - Make sure families are aware of the federal Lifeline program that offers both cell phone and broadband services at reduced rates for low-income families. (<https://www.fcc.gov/consumers/guides/lifeline-support-affordable-communications>)
 - Watch for wi-fi hotspots to pop up across your community. Reward those merchants/ non-profits, etc. with special recognition for their support. Consider meeting with local business groups to ask for their support. Publish these locations for parents and students and keep it up to date.
 - Consider a mid-year or end-of-year celebration. Invite the community to see student work, demonstrations, teachers highlighting digitally enhanced lessons with student artifacts, etc. This sends a clear message that the initiative is really about student learning, thus expelling doubts and questions.
- Simultaneously, temper expectations.
 - While student attendance and discipline incidents should decrease early in the project, the effects will probably level off over time.
 - Student achievement may experience a slight negative growth at the beginning of implementation as teachers adjust instructional practices. Remember – both teachers and your students and their parents are experiencing a learning curve.
 - Student achievement may also gradually improve—or it may wait until state testing formats and content are revised to reflect the way students are learning in the 1:1 environment.

- Learning to teach in a digital environment takes time, energy, and commitment. Initially, not every teacher will be thrilled with this new way of doing business. Figure out their level of concern and needs – and meet them where they are to support and guide them. Empower your lead teachers and coaches as mentors.
- All teachers will need varying levels of support – newer, more “tech savvy” teachers may need help with integrating technology tools into instruction and/or support in their pedagogical strategies; experienced teachers may need assistance in changing to a digital teaching and learning environment.
- Consider how you will communicate to staff the importance of integrating Digital Citizenship skills and lessons into content curriculum.
- Remember a WNC superintendent’s reflection: “We won’t fully understand the value of 1:1 until our current elementary students graduate.”
- Put together a project evaluation plan *now*, and begin collecting baseline data.
- Plan to give every faculty member and administrator the same technology that their students will use. Modeling and consistency are important, and everyone needs the same device whether it is a laptop, PDA, cell phone, etc.
- Choose a learning management system early and begin training teachers how to use it to facilitate student-centered instruction.
 - Expect that all teachers will have a class/course page that students (and parents) can access by the time student devices are deployed. This sets the expectation that the culture has shifted to a 24/7 technology-rich teaching and learning environment. This site needs to be a living site that is continuously updated.
 - Have a plan to combat the tendency for teachers to move into online course mode rather than blended learning mode. Students need and want direct teacher contact, feedback, and instruction. Be sure that blended learning strategies are a key component to professional learning throughout the year.
 - Take time to receive direct feedback from students about their classroom instruction using technology. Their input is critical to many necessary classroom redirections.
- Focus on teacher professional development and empowerment.
 - Give teachers their laptops first, preferably early in the spring before whole-school roll-out at the beginning of the upcoming school year.
 - Emphasize that this is a whole-school transformation by including your support staff (secretaries, custodians, cafeteria, etc.) in the process and providing them with devices. They are part of the school community, have contact with students each day, and can help facilitate elements of your deployment and garner buy-in. Include them in professional learning opportunities.
 - Provide professional development opportunities from point of teacher device distribution and throughout the summer before whole-school roll-out.
 - Rely upon the school’s Media and Technology Advisory Committee (MTAC) and/or the school’s Leadership Team to help make logistical and professional development decisions. This improves teacher buy-in.
 - Emphasize and model classroom management in a digital environment in all PD sessions. Include discussions as to when it is better to use technology (or not) to implement an activity/assignment and when/how technology can be used productively.
 - Plan to implement learning walks to offer an opportunity for staff to see digital learning and teaching in action.

- Sometimes a gradual roll-out of a 24/7 digital initiative may be a prudent decision. Beginning with classroom carts in all classrooms so that a gradual expectation of constant use is acculturated could circumvent such issues as some teachers using the computers and others deciding not to. Creating an expectation of use before students are expected to be responsible, full-time users may tamp down the student inclination to “forget” or “deciding not to get” a device.
 - Likewise, consider allowing teachers to make the decision of when they each will begin to formally teach students in a digital environment. A statement such as “When you decide you are ready to ‘go,’ I will make sure you have every resource to be successful,” allows teachers to maintain control over their environment and lessens stress. Just don’t forget to add, “But at the beginning of next school year, all teachers in this school will be teaching in a student-centered, digital environment!”
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Please take time to consider these specific recommendations:

Infrastructure

- You will need more access points than you initially plan. Consider at least a wireless boost in every classroom.
- Make sure you have wireless access in classroom trailers, the gym and cafeteria, and even the school parking lot if possible. Deploy enough access points in these areas to account for their capacity.
- Students and teachers will use their devices constantly, everywhere. If your policies allow, attach cell phones and similar devices to the network. Plan for two devices per student. Be prepared!
- CIPA, E-Rate, and the federal government will be watching; viruses are opportunistic. Route all Internet traffic on campus, including personally owned devices, through your network. School-owned devices should be filtered off-campus.
- Provide cloud storage for student work rather than relying on individual student flash drives or school/district servers. Discourage the use of flash drives by teachers and students.
- Consider core classroom equipment (interactive whiteboards and projectors [in elementary school and special education classrooms], TVs with wireless streaming, digital camera, video camera, and digital science equipment) as a primary part of your initial infrastructure. Installing this equipment in classrooms as teachers are given, or better yet, before they are given their laptops gives them opportunity to learn how to use the tools effectively before adding student computers into the equation.
- Include electrical upgrades as part of the infrastructure investment. Ensure that all classrooms have adequate and sufficiently spaced outlets for individual charging of batteries—or invest in a charging station/cart for each classroom.
 - Consider creating “charging banks” in common areas and in computer labs.
 - Some schools buy extra batteries. Students simply visit the Help Desk to switch to a fully charged battery during the school day.

Hardware

- 1:1 does not have to be laptops or tablets. Consider other devices such as smartphones and eReaders, and the role of student-owned devices. Make your decision on your goals for the project and the

vision for instruction in the school. Is it access, cheaper textbooks, fostering creativity, differentiated instruction, personalized learning? Your decision here will determine the best device for your project.

- Receive input from students, teachers and parents. What does the instructional vision and focus of the school require students to do with their devices? Might not need the same device for all grade levels.
- Many systems will opt for smaller tablets or Chromebook, for obvious cost effectiveness. If this is your decision, plan to provide Creation Stations in the school library media center so that students can produce professional quality productions using the highest powered computers, editing software, etc. This also encourages students to consult the media specialist and technology facilitator in questions about resources, format, and authenticity and makes the broadest possible range of options available for their use.
 - Digital learning will unleash student and teacher creativity. Remodel your library media center to include maker areas/stations that allow students to build, sew, and create, as well as design, develop, and code. Imagine! Dream!
- Once a vendor is determined, prepare for delivery delays. With global distribution systems and individual school/LEA images, weeks' or even months' delivery delays are a reality. Prepare accordingly.
- Adoption seems to come more rapidly with tablets and apps that support hand writing, especially from the teaching community because a large portion of the teaching community still prefers to hand-write instead of type. This can facilitate an easier transition, especially for math and science teachers, because writing mathematical equations and scientific notation is much faster than typing.
 - There is a growing body of research that indicates that the process of hand writing notes fosters better memory and understanding of concepts/information. Devices that convert handwriting to text give students and teachers the best of both worlds.
- Include loaner computers, extra battery chargers, replacement batteries, electronic textbook fees, and laptop bags (if school-provided) in your initial budget—and make them a part of your TCO sustainability figures.
 - Consider purchasing at least 10% additional devices to use as loaners.
 - Many vendors offer what is referred to as a “white glove” service where they will asset tag, inventory, image, and prepare your computers for deployment. This usually adds \$30 to the cost of the device, but means that the devices come out of the box ready to give to students. This is a worthwhile investment, considering the time and labor costs saved by the district.
 - Purchase machines with different color covers, so everyone can spot a loaner or a day user—or even the freshman class.
 - If using computers rather than Chromebooks, configure loaners so that students cannot save their work on those machines. This strategy discourages planned loaner use to avoid paying fees/repair costs.
 - Create a system of reimaging that allows loaners and student devices to be reimaged quickly.
- Consider a cart of devices for day users.
 - These should have a different color cover from loaners and permanent student machines.
 - Carefully manage the check-out/check-in process each day. Best advice: make this a responsibility of the student tech team.
 - If applicable, configure these machines so that students cannot save their work on them.
- Laptop screens are fragile and expensive; consider mandating separate laptop and book bags if it is impossible to acquire electronic textbooks and resources in all courses.

- Consider allowing students to purchase their own bags from a list of acceptable bags. Mandate school/district luggage tags on the bags to aid identification.
- If the system purchases bags, don't have them turned in when you take up the equipment for the summer. Storage is a headache and the possibility of "varmints" and odors is even worse!
- Consider leasing computers, with each 9th grade class receiving the newly leased machines. At the end of the same students' senior year, the machines are sent back to the company and a new lease (for another class of 9th graders) begins.
 - It's also possible to provide the newest machine to the seniors, with them migrating down to the freshman class after graduation.
 - Some districts are considering allowing students to keep their devices upon graduation in order to encourage better care throughout the student's high school career. Some leases also have a buyout that will allow students to purchase the devices at a low cost.
- If you have to purchase machines, be aware that repairs will increase with the age of the device. Decide what you will fix and what you will just ignore (ex. dead batteries), based on functionality and safety.
- With every device refresh and/or OS upgrade come at least some compatibility problems and learning curve issues. Be prepared for this with PD and hand-holding, but don't let initial push-back deter you. We educators struggle with change. Understand this and plan accordingly.

Personnel

- Leadership, Leadership, Leadership! This project cannot be successful without strong leadership from the technology facilitator, the media coordinator, and *especially the principal*.
- Empower your staff as leaders too!
- Leadership does not stop at the school level. All central office personnel must be on board and vocal about their support of the initiative. Everyone should model use, beginning with the superintendent.
- Choose carefully the principal who will implement and support the digital learning environment. This applies to both the principal initiating the 1:1 project and those subsequent principals who will lead the school. Individuals who tend to be the most successful administrators of a technology-rich school share the following traits:
 - They are familiar and comfortable with the change process,
 - Have a vision of what digital learning in a school can do—and can inspire teachers to embrace that vision,
 - Are comfortable with taking risks, and encourage a culture of productive risk-taking,
 - Model technology use, and
 - Are at ease with shared decision-making.
- Both a technology facilitator and technician should be hired to partner with the school library media coordinator to collaborate with teachers to create an effective, efficient teaching and learning environment. In 2007 the *North Carolina Educational Technology Plan* published the personnel recommendations below. The 1:1 Laptop Pilot and subsequent digital learning implementations across the state have further validated this recommendation, even going so far as to recommend **one Instructional Technology Facilitator and one Media Coordinator per school regardless of size**:
 - One Instructional Technology Facilitator per school, per thousand students.
 - One media coordinator per school, per thousand students.
 - One Technology Assistant per school, per thousand students.

- One Technician I, II, or III for every 400 computers. At least one of the technicians should be a Technician III.

Even though the *North Carolina School Technology Plan 2011-2013* does not make specific recommendations, it does acknowledge that this model has an impact on successful school digital learning initiatives and is important to the implementation of a technology-rich teaching and learning environment. (NC State School Technology Plan, 2011-2013, p24)

- Consider forming a student technology team as soon as possible so that teachers and fellow students, as well as the media and technology team, have assistance quickly (and techie students have an opportunity to channel their expertise and experimental nature in positive directions). Consider giving students service learning credits or course credit hours for their service on the student technology team.
 - This is also an excellent opportunity for summer employment. Students can help repair and re-image while earning extra dollars for their work.
- Be prepared for turnover, especially in your technician team. Businesses will recruit good technicians who have had school experience. Succession planning is important for all positions, doubly so for technicians who support a digital learning infrastructure.

Professional Development

- **Professional development should be on-going, job-embedded, and just-in-time!** It should be planned carefully and continuously for both new teachers and those who have been part of the digital learning initiative since its inception. Teachers revert to their old ways of teaching—it's easier, if not as rewarding—unless principals, tech facilitators, and media coordinators insist on regular PD updates.
- Perhaps the best way to insure instructional use of devices is for teachers to collaborate with other teachers, the ITF, and media coordinator regularly. Teachers bring their lesson plans, ideas, and curriculum standards to a meeting where all have time to brainstorm ideas and resources that support their instruction.
 - In addition to individualized, just-in-time professional development and coaching, general and content-specific professional development (PD) should occasionally be provided for all participating teachers and administrators. Occasional general PD for all teachers should be required so that everyone can embrace and absorb a shared vision, understanding, and approach to learning related to the school's digital learning initiative.
 - Administrators should participate in PD sessions to create buy-in for the project. They should also look for and comment on teachers who use the tools in their classrooms to set expectations for the project.
 - Learning management system training is an effective early general professional development opportunity, with subsequent individual, just-in-time, and/or content area PD associated with LMS training.
 - Don't overwhelm your teachers during initial training. Consider offering PD in small doses, perhaps concentrating on a single application/website per PD session, giving participants planning and design time within the session, and then sending them off to use that one resource in their classrooms. This strategy seems to bring even resisters on board.
 - Most PD should be differentiated, based on individuals' abilities, needs, and content areas.
 - Ideally, collaborative project opportunities will arise during general, grade-level, PLC, and/or content-area PD that can be facilitated by the media and technology personnel team.

- Never underestimate the value of peer coaching! Teaching is richest when it is a collaborative experience, each teacher bringing his or her expertise to the planning—be it content, classroom management, technology (or all of the above).
- The technology facilitator and the media coordinator can provide the ideal 1:1, just-in-time PD and coaching environment necessary for this project’s success.
- Technology and media personnel should regularly survey staff for PD needs/requests and plan PD opportunities around the survey results.
- Technology and media personnel should ask staff to evaluate all PD sessions and use those evaluations to meet the needs of participants during future training.
- Learning to teach in a digital learning environment takes time. Provide as many opportunities as possible for teachers to carve out larger blocks of time for lesson planning and collaboration. *This time does not include teachers’ daily planning periods.*
 - Consider highlighting technology resources and applications regularly during staff meetings, common planning time, or during PLC meetings.
 - Consider having “failing forward” discussions in staff meetings.
 - Leadership can pair teachers based on strengths (one who uses tech resources creatively, one who has mesmerizing history or language arts lectures) and request they collaborate on a lesson plan/unit.
- Assessment in a digital learning environment is very different than in a traditional environment. Common rubrics, crafted by teachers together over time, help everyone move into this new strategy for evaluating student work. Consider adopting common rubrics for skills such as creativity, presentation skills, writing, etc.
- Copyright is difficult for teachers to conceptualize, understand, and teach their students. Find various, differentiated, and frequent opportunities for teachers to learn and articulate these concepts to their students.
- Use the digital technology to provide training and support for teachers, making sure that they have opportunities to learn from and enjoy each other virtually as well as face-to-face.
- Include parents, students, and even the community in your professional development plan.
 - Parents need initial information sessions so that they can join the school in supporting the educational focus of this digital learning initiative. Help them with understanding the opportunities and pitfalls of social media, especially as their children enter into this digital age. Offer strategies for at-home conversations/management.
 - As the project moves forward, the same parents (and community members) may benefit from learning how to use the technology for job skills and personal productivity.
 - Students need formal training on the use of the devices for educational purposes and the academic and social expectations that accompany this privilege. Constant reminders of the opportunities and pitfalls of social media will be a necessary challenge.
- Plan on teacher turnover. Provide opportunities for PD and support immediately before the school year starts and early in the school year.
 - It appears that an interesting phenomenon is at work: In a technology rich environment, students assume that only the classes that use technology are important; only teachers who use technology are “smart.” It’s important not to compromise new teachers’ reputations inadvertently by not acknowledging, even insisting upon if necessary, their need for training.

Project Evaluation

- Don't allow evaluation to be an afterthought! Make sure you collect baseline data before the project begins—or at least the first few weeks of implementation. It will be essential to show stakeholders how your project is moving forward and how you are adjusting to setbacks.
- Make sure the data you're collecting is useful to measuring the success of your project. Collect more than test scores – what are the outcomes you are hoping to see from your project, and what data will indicate success in these outcomes?
- Don't re-invent the wheel! The NCSU Friday Institute for Educational Innovation has a variety of evaluation instruments that you are free to use at their Educational Innovation Evaluation website: (<https://eval.fi.ncsu.edu/instruments-2/>)
- Consider tracking data points that are not necessarily obvious: paper and copier costs, online vs. print textbooks (or no textbooks!), communication strategies, even improved PR within and outside the community and subtle economic development indicators. While the overall project will not save you money, you may be able to prove you are at least breaking even by moving to technology.
- Think outside the data box! Track teen pregnancy rates, first-generation college goers, scholarship increases, computer-related fields chosen for professions, even parent/community GED and/or online courses or degrees completed. Have you moved from a Tier One to a Tier Two community in federal designations? Has the dropout “bump” between 9th and 10th grades decreased? These are long-term data tracking points, but impressive when documented.
- Don't forget about qualitative data – how does the experience of school change? A story or an experience is a great piece of data.

District and School Policies

- While many school and district policies will have to be clarified and/or augmented, computer policies should reflect general school policies (ex. Bullying and cyberbullying are both similar; both should have immediate, severe, and identical punishments).
 - Some schools report that discipline issues that are traditionally handled by the office have now become computer discipline issues. Everyone should seek consistent articulation regardless of situation or “venue.”
- One of the greatest challenges is the dual responsibility of keeping students safe and enabling the use of educationally appropriate, digital resources. Consider the following:
 - If possible, allow teachers the privilege of unblocking appropriate websites immediately from their desks so that instruction, especially the teachable moment, is not interrupted.
 - Insist that teachers learn how to monitor student use of computers.
 - Also encourage teachers to determine when it is appropriate to request that students close their laptops or keep them in their bags--and empower them to do so.
 - Make sure that district and school technology personnel understand and appreciate the educational uses of online resources and services as well as their technical characteristics.
- Have an understanding with educators, school board members, and the community that your district and school Acceptable Use/Responsible Use policies are perpetual works-in-progress. Revisit, and amend if necessary, at least once yearly.

- Make sure that everyone—students, teachers, administration, and parents—sign appropriate Responsible Use documents *after* being provided appropriate training as to meaning and necessity.
 - Re-emphasize at the beginning of every school year for all concerned.
- Provide district-managed insurance policies for all computers, but consider asking students/parents to contribute a nominal amount toward the cost of that policy. Provide an easy-payment opportunity or even special service-learning projects for families that cannot afford the fee.
 - Some districts are moving to self-insuring their technology. By making sure that technicians have proper repair certifications, systems can purchase parts much more cheaply and do most repairs in-house in a more timely manner.
 - Make payments easy for both the district and parents. Set up a PayPal or similar online accounting system for accepting and tracking payments for both initial fees and damages.
 - Provide paperwork for parents/guardians to request financial assistance. Best advice: ask no questions; if they request assistance, grant it and issue the device. Parents appreciate the respect and almost all will eventually pay the reduced amount.

District and School Procedures

- Begin early to plan for laptop imaging, maintenance, storage, and distribution and end-of-year collection. Re-visit these plans at least yearly.
- Consider the digital learning project an entirely new way of doing business. Involve teachers in brainstorming how this will change school culture as well as instruction. Think about such issues as:
 - How the school system's support for education can move to 24/7 since students and teachers will work 24/7.
 - Students (and parents) will expect teachers and technology personnel to be available 24/7 since they have access 24/7. This could create personnel issues, even salary and teacher working conditions issues. Begin to think through how to address these situations now and in the future.
 - Can school continue on snow days? Should those students and teachers get credit when others in the LEA do not have this advantage?
 - Can students keep their computers over the summer? After all, if we believe that learning is lifelong and continuous, shouldn't we model this by allowing students to continue their educations, both formal and informal, throughout vacations?
 - How to provide an up-to-date, Web 2.0/3.0 teaching and learning environment within the constraints of student safety and the district's technology and personnel capacity.
 - How to deal with social media powerhouses such as Facebook, Pinterest, and YouTube. These sites offer great educational benefits, but can pose potential opportunities for bullying and other forms of misuse both during and after school hours. Rather than blanket-banning these resources, find ways to address misuse using student, teacher, and parent feedback as to realistic policies/consequences.
 - Consider a less-restrictive filtering policy – filtering what's required by law and addressing everything else through school discipline policies.
 - Which student documents will be saved to the Cloud or, less ideally, school and/or district server(s).
 - Whether or not (or if) to provide portfolio software for all student work or just each student's Graduation Project.

- How to facilitate teacher and even student downloading of software and/or documents at point of need.
- How to deal with parents who opt out of their child's digital learning opportunity at school and/or at home, so that the student still has the possibility of a successful academic experience and teachers are not overwhelmed with duplicate materials planning.
- Similarly, how to deal with parents who want to load printer drivers, etc. on their child's computer to facilitate their own ease and efficiency.
- How to calculate the Total Cost of Ownership for the digital learning initiative so that the entire project can move forward, be maintained and upgraded, and sustained for future benefit of all students and teachers.
- Almost immediately you will confront the dilemma of students who want to bring their own devices to school. Make a plan. Consider the savings and convenience of BYOD (Bring Your Own Device) vs the reality of a possible return to inequity. Put in place policies and resources that protect your network and reputation.
 - Ideally, you will have 2 networks: an access-controlled teacher and student network and a guest network for individuals visiting the school for PD or monitoring.
- Fair warning! Students will quickly lose interest and stop bringing their devices to school/class if teachers do not prepare technology-rich lessons with the expectation that everyone in class will have and use them.
 - Avoid forcing teachers to provide paper/pencil replicas of their lessons. Nothing creates teacher technology burn-out more quickly than having to prepare duplicate lessons.
 - Principals can mandate that teachers NOT provide paper and pencil replicas, but that students without computers be expected to write all assignments, etc. from the board.
 - Avoid talking about "having backup lessons". Teachers may need to readjust if technology fails, but if "Plan B" is good-enough, it probably should be "Plan A" anyway.
 - Have carts of computers for day users.
- Reality check! Make a visit to your local pawn shop, even your DA and police/sheriff's departments.
 - Provide all organizations with the serial numbers of your devices.
 - Ensure all devices are clearly labeled; consider laser etching.
 - Talk with pawn shop owners about procedures for holding devices under the guise of pricing, polling the market, etc. (It is against the law for pawn shops to buy stolen equipment; without at least trying this strategy, the machine will disappear again.)
 - Involve your School Resource Officer in these conversations.
 - Emphasize to all concerned the importance of getting the equipment back rather than simply filing a stolen goods report.
- Reality check 2! Some parents will not want their student to have a computer 24/7; some students will not want to carry a device around from class to class, from home to school, etc. Find strategies to assure that this does not disrupt your program.
 - Find ways to appeal to the social side of students. Make voting for homecoming queen, prom location, and other high visibility events/competitions online only.
 - Encourage teachers to accept assignments only online, refuse to distribute paper copies of assignments, even add points to final grades for having their device up, running, and charged every day.
 - "Catch" students with devices being used appropriately and feature their photos on the school website or highlight on the video rolling in the school entryway.

- Find as many daily processes as possible to move to mobile devices: homeroom check-in, assignment submissions, library overdue notifications, cafeteria menus, daily announcements, club events/announcements, etc.

Resources

- Provide resources for teachers and students to blog and post videos. Consider protected digital resources such as Teacher Tube, Fakebook, and VoiceThread, in elementary and middle schools, so that younger students may work within a protected social media, educational environment.
 - Gradually open various social media resources as students become more responsible. Ideally high school student access should reflect the world they will enter upon graduation.
- Consider becoming a Google in Education school system. Google offers a Cloud platform that lets students and teachers access work anytime, anywhere and collaborate with each other, while creating a sustainable platform for the future.
- Learning management systems such as Google Classroom, Canvas, Moodle, Haiku, Open Class, and Blackboard provide platforms and an organization system for teachers.
- Choose a classroom monitoring system carefully, making sure it is compatible with your network configuration, equipment, and ways of doing business. You may even consider whether the expense and distraction of a monitoring system outweighs the reassurance of surveillance.
 - Note: In a dual BYOD/district-provided device environment, monitoring software will only be loaded on district devices, leaving BYOD devices unmonitored. The unintended consequences may make this decision easier—or harder!
- Set aside a graduated budget for resources. Teachers need time to become familiar with their machines before they can understand what additional tools might be useful. Likewise, technology changes rapidly. Allocate amounts over time rather than in a single budget largess.
- Provide e-mail accounts for all students as a part of doing business in a digital learning environment.
- Schools should review privacy policies of all applications they intend to use. Parents will ask about how their child’s data is being used. While schools can sign up students for web applications under COPPA, make sure that you’re following the law and the terms of use for all applications.

Public-Private Partnerships

- Schools and school systems cannot and should not do a digital learning initiative in isolation. Everyone in North Carolina can learn from each other and will benefit from your experiences and insights.
- While private partnerships can help fund hardware and software, only the state or local budgets can provide the technology personnel necessary for the success of this project.
- State-funded resources such as NCVPS, NC WiseOwl, NC Live, Z-Scaler, Canvas, Homebase, and other resources that will be provided as part of the Connectivity Project are invaluable to teachers, students, and tech staff. Every state-funded resource is an investment in equity and quality services and information for all students and teachers in the state.
- Conversations must begin immediately about how to sustain the digital learning initiative over the coming years. This should include refresh plans, ramped up personnel for schools and districts, moving the initiative into other grades/schools, and continued commitment to connectivity and state-funded resources.

Low-hanging Fruit (or Higher Test Scores May Not Be the Best Measure of Success)

- Laptops remove student excuses—work is always there even if a student or teacher is absent; assignments are posted for all to see, including parents; neither students nor teachers lose homework or papers; assignments can be tracked, even submitted, at all hours of the day or night.
- Students usually become more organized, but oftentimes teachers need to assist in early adoption of organizational habits. Many pilot school teachers and students recommend OneNote, and teach its finer points in AVID classes. Another option is Evernote, often used with the Apple products.
 - One option is for schools to have an advisory period multiple times weekly that provides support for students and teaches study skills.
 - Consider how to foster deep reading regardless of format. A criticism of online education and online reading in general is that we are losing the skill of deep reading. Make it a priority to give students practice in reading deeply for understanding and perseverance whether in print or online materials.
- Teachers, students, and parents often remark on the benefits of immediate feedback on assignments, quizzes, etc. Just don't ever forget that more complex questions, answers, and assignments should not be sacrificed for ease and speed!
- Being able to check grades, access assignments when absent, find extra resources when they are interested or need further explanation encourages students to become responsible for their own learning. The value of this one benefit cannot be overstated!
- A digital learning initiative offers important opportunities for individualized/personalized instruction. Students can work at their own ability levels and paces; oftentimes an assignment created on a computer rather than pen and paper conquers handwriting problems for all concerned.
- Consider the credibility factor. Many students have confessed that they have a new respect for their teachers and education in general since their teachers began teaching and communicating with them digitally. One student stated, "They seem to learn like we do. It makes me think they might have something to teach me."
- Another young man said that he and his fellow students feel like they are important because someone cared enough to invest in their educations.
- Equity cannot be overstated! Providing computers and access go a long way in addressing the very real digital divide in this state and nation. As one young woman said, "Lord knows it's been a blessing!"
- The web is replete with videos that explain complex concepts in a variety of ways. Students who struggle can replay a video or a teacher presentation as many times as needed for comprehension.
 - Some teachers find value in "flipping" their classrooms by recording mini-lectures to introduce a concept, assigning the viewing for homework, and then focusing class time on working individually or with small groups to ensure understanding.
 - With such tools as Swivel cameras, teachers can record their classroom presentations/lectures for student review or when absent from class.
- Never underestimate a motivated student's ability to complete supplemental online courses or explore additional information for her own knowledge. Classes are much more interesting for both teacher and student when new, rich content can be added to the discussion. Their futures are more positive when they can begin college with additional courses and/or content.

About the Author

Frances Bryant Bradburn, retired Director of Instructional Technology for the North Carolina Department of Public Instruction and author of *Output Measures for School Library Media Programs*, graduated with a BA from Wake Forest University and an MLS for the University of North Carolina at Greensboro. She has worked with schools and districts as they have implemented digital learning initiatives since the North Carolina legislature funded the original eight pilot schools in 2007. Under the auspices of The Golden LEAF Foundation, North Carolina New Schools, and the Friday Institute for Educational Innovation at North Carolina State University, her goal has been to learn with and from each school and district as it has deployed devices to every teacher and student within its designated schools. These *Lessons Learned* have been compiled yearly since 2007 in hopes that others will benefit from their colleagues' experiences. Each version has been considered a "draft" because in education we build on past knowledge and experience and continue to learn. This holds especially true as we seek to empower students to become lifelong learners by focusing our own teaching on student-centered instruction through blended learning. With this in mind, the 2017 draft of *Lessons Learned* is dedicated to all Golden LEAF Foundation grant schools and districts, their teachers and students, and their digital learning coaches. Thank you for your enthusiasm, transparency, and courage!