Roadmap for Competency-based Systems:
Leveraging Next Generation Technologies

[District & School Leader Pathway]

Where are you, and how do you move toward transformation?

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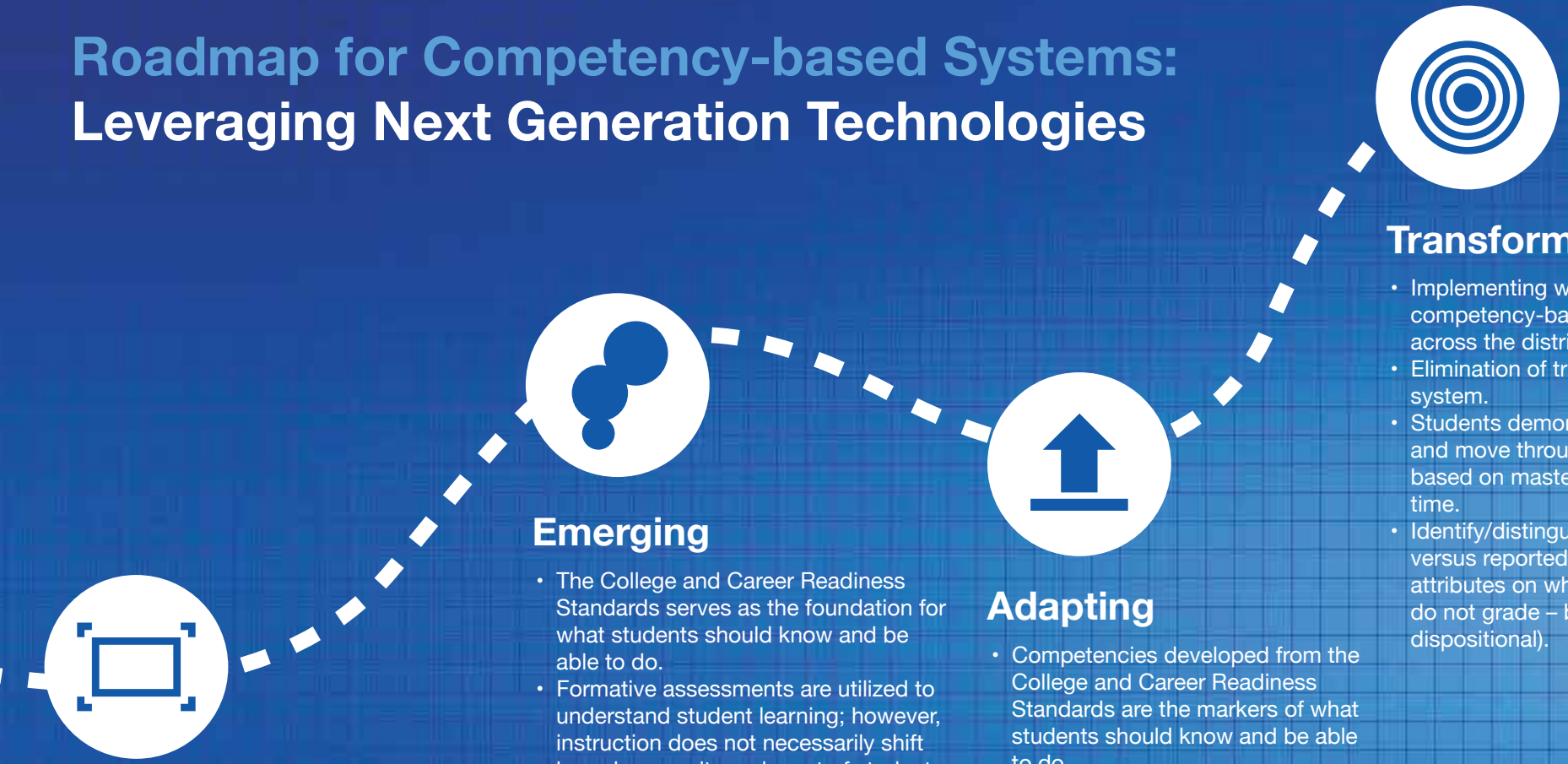
Roadmap for Competency-based Systems:
Leveraging Next Generation Technologies



Entry

- The College and Career Readiness Standards are referred to, but not yet used to design and evaluate student learning.
- Grading and instruction follows a traditional structure based on the Carnegie Unit in which students receive credit for learning based on time, not mastery.
- Assessment is often summative and high stakes and grades are based on average points over time.
- Students move on to the next level of learning based on time spent in the classroom, as opposed to mastery of learning.

Emerging

- The College and Career Readiness Standards serves as the foundation for what students should know and be able to do.
- Formative assessments are utilized to understand student learning; however, instruction does not necessarily shift based on results and most of student learning is decided and documented through summative assessments.

Adapting

- Competencies developed from the College and Career Readiness Standards are the markers of what students should know and be able to do.
- Rather than highlighting student progress through letter or number grades, the grading system is based on mastery of competencies demonstrated through performance tasks, and provides students multiple opportunities to relearn and demonstrate learning.
- Begin replacing grades with descriptive feedback and status of student progress.

Transforming

- Implementing with fidelity competency-based learning across the district.
- Elimination of traditional grading system.
- Students demonstrate evidence and move through the system based on mastery versus seat time.
- Identify/distinguish what is graded versus reported (i.e., there may be attributes on which you report but do not grade – behavioral or dispositional).

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Introduction

The education model used in many classrooms across our country can find its roots in the 20th century—in which cohorts of students, organized by age, move at the same time and pace through their learning experience. After decades of research and experiences in the K-12 classroom, however, coupled with a world where technologies have transformed the opportunities available to us, this model is shifting to ensure that all of our students are learning and able to demonstrate the knowledge, skills and dispositions requisite with that learning. Competency-based education is the abandonment of the old model. Instead, the focus, according to CompetencyWorks, a leader in the field, is to ensure students advance upon mastery of learning—not based on time. It allows for flexibility in the system, providing opportunities to learn and relearn content. Assessments are formative in nature (never punitive) and are personalized and differentiated based on student needs. Students move through pathways at their own pace, where learning fits the needs of the individual student, not just a cohort. For more on competency-based learning, explore this white paper by iNACOL or any of these resources.

As states and districts across the nation move toward competency-based education, there is a growing realization of the complexity of this work. One of the areas that holds tremendous promise is the **role of next generation technologies** to support the implementation and scale of competency-based education. While technology is not the answer in and of itself, it has emerged as an important enabler to support the work as it scales in concert with the right policies and other enabling conditions. Therefore, the Council of Chief State School Officers (CCSSO) has partnered with 2Revolutions, a national education design lab, to create the *Roadmap for Next Generation Technologies: A Move Toward Competency-Based Systems*, a tool providing support to leaders as they transform their systems of learning.

By looking across a readiness progression in the key areas of Technology, Technology Policy, and Conditions for Implementation, it is our hope this resource helps state and district leadership better pinpoint where they are and what is necessary to strengthen efforts to progress toward competency-based transformation. We have also included a few examples of the work from the field, which provide helpful illustrations of how next generation technologies are supporting the work within school models.

This tool has been created with three audiences in mind—district leadership (Superintendent, Chief Academic Officer, School Principal, Lead Teacher), state leadership (State Chief, Deputy Chief, Innovation Chief), and technology leadership at both district and state levels (Chief Technology Officer, Chief Information Officer). It is our intent that this resource provides the answers to key questions for each specific type of user and serves as a helpful resource as you navigate this transition.

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Contents

Technology to REALIZE Next Generation Systems

Learn about the technology specifications, tools, and tool combinations that support a move toward a competency-based system. These high quality tools can be leveraged in different configurations at various levels of this progression.

What jobs do we need to do that technology can help make more efficient? How does it work or integrate with our current grading and/or assessment system? How will this help us implement College and Career Readiness Standards? How will it align with state reporting? What will make things more efficient for our teachers?

Entry

I am just starting.

Emerging

I have started, but am still developing.

Adapting

I am making good progress, but would like to push further.

Transforming

I am implementing with fidelity at scale.

Specifications

The technology specifications needed to support the systemic shift to a competency-based education system is substantial. Explore the following questions within each column to track where your school or district is on the continuum and ideas to move you further toward the transformation you seek.

Are you using your technology systems in the following ways?

- As electronic gradebooks (for end of year tests and grade point averages), and to track demographic data, attendance, and credits.
- Systems are linear and time-based; unable to track mastery and competencies.
- Systems are adult-managed as opposed to student-directed.

These items typically define your technology system choices:

- The need to develop competencies has been identified but not acted on.

Are you using your technology systems in the following ways?

- Educators use systems to create personalized learning plans for each student based on student data profiles.
- Educators use systems to create and track formative and summative assessments and access student performance data.
- Systems provide some choice of curriculum resources for both students and teachers.
- Systems track daily progress of student mastery.

These items typically define your technology system choices:

- To facilitate the flexibility needed for implementing a competency-based learning model at scale.
- To begin to connect the multiple technology systems used across the learning environment to glean data from an array of sources.

Are you using your technology systems in the following ways?

- Systems facilitate data-driven decisions in the classroom level daily. Access to data leads to continuous improvement of instruction and daily progress in learning.
- Systems focus on student profiles of content standards, competencies, skills, and proficiency levels.
- Systems allow students develop and track their personalized learning plans in partnership with educators.
- Systems provide access to formative and summative performance data.
- Systems help teachers quickly identify students who are not meeting competencies, and schools can identify teachers who need help.

Are you using your technology systems in the following ways?

- Systems are fully integrated and driven by student mastery of competencies with multiple pathways for learning and tracking.
- Educators use systems to track continuous and live data, which facilitate all decisions at the student, educator, and administrative level and allow for differentiation and personalization of learning.
- Educators use systems to design and develop competency and/or standards-based personalized learning plans, which chart learning pathways for all students.
- Systems allow for options on how students can demonstrate learning.
- Teachers use systems to create streamlined assessment plans that utilize standards or competency-based, proficiency-level student data over

Technology to REALIZE Next Generation Systems

Specifications (continued)

- To create student-level data about progress in reaching proficiency on specific competencies and standards with consistency and reliability.
- Infrastructure testing might be conducted through The EducationSuperHighway, a non-profit made up of 50 businesses, associations, and organizations working to ensure students and teachers have the 100 Mbps of Internet infrastructure needed for digital learning. The organization offers free broadband testing and technical assistance, through its free School Speed Test: www.schoolspeedtest.org

Types of systems used include:

- Content Management System (CMS)
- Learning Management System (LMS)
- E-Portfolio System
- Competency-based Gradebook Program

These items typically define your technology system choices:

- Promotion of strategies driven by the interoperability of systems in use across your school or district.
- Adoption of technology systems that chart levels of proficiency, compile portfolios of student work, offer pathways to competency, and capture performance assessments for each standard or competency.
- Adoption of the National Broadband Plan to expand broadband connectivity.
- Utilization of 100 Mbps of bandwidth for every 1,000 students/faculty.

Types of systems used include:

- Content Management System (CMS)
- Learning Management System (LMS)
- Student Information System (SIS)
- E-Portfolio System
- Competency-based Gradebook Program

time, instead of wiping the student competency database clean at the end of the year.

These items typically define your technology system choices:

- Cohesive strategy to support and implement new and emerging systems that allow for interoperability, accessibility, and integrated interfaces.
- Fully aligned system for competency-based learning data collection that maps student progress and is ready for federal, state, district, school, teacher, parent, and student consumption.
- Fully supported accountability systems by state that examine student-level proficiency data, collect productivity of amount of learning per unit of time, and analyze patterns of individual student growth over time.
- Use 1 Gbps of bandwidth for every 1,000 students/faculty.

Types of systems used include:

- Content Management System (CMS)
- Learning Management System (LMS)
- Student Information System (SIS)
- E-Portfolio System
- Competency-based Gradebook
- Open-source Platform
- Cloud-based Solution

Technology to REALIZE Next Generation Systems

Sample Tools and Tool Combinations

*In this section, we are outlining the key jobs that need to get done that **technology tools** can support. Within these jobs, we reference tool types that can address those jobs. The use of those tools will expand at each level until districts use the tools to their full competency-based education capacity.*

Systems in this stage include, but are not limited to, the following:

- Combinations of open source tools are utilized to personalize learning and enhance curriculum.
- Tools are teacher/adult-centric and used for grading, management, and resource sharing.

Core jobs that technology can enable in this stage include, but are not limited to, the following:

Systems in this stage take competency based learning to scale across the district. Systems are more complex and more features are used than in the Emerging level. Core jobs that technology can enable in this stage include, but are not limited to, the following:

Systems in this stage are capable of transforming districts and the entire state. Data at this level is massive and requires systems for support. Systems include but are not limited to the following:

Integrate Data

Assess Students

Produce Data Analysis

Showcase Authentic Work

Manage Learning and Assessment Resources

Manage Student Data

Adapt Content

Read how the next generation systems at Summit Public Schools work to support students' learning goals.

Technology to REALIZE Next Generation Systems

Sample Tools and Tool Combinations (continued)




Integrate Data

Data managers and technology specialists need to find an efficient way to connect student data to technology applications. They also need to be able to protect student data. **Data integration software** does this by doing the following:

- Make it easier to use third-party applications because it's easier for those applications to connect to data integration software than to a student information system.
- Allow schools to choose what student data is shared with 3rd party applications.
- Make à la carte adoption of services easier by making it unnecessary to enter student data each time into new applications.
- Facilitate interoperability by allowing different systems to share data.
- By enabling data on mobile devices.
- Allow education application configurations across multiple vendors and products.
- Allow for staff to mine for data at the "big data level" and to make data "small" at the visualization level for understanding by consumers/users.

Assess Students

To run a successful competency-based learning program, classroom teachers need to be able to assess students in all course competencies. **Assessments applications** digitize both formative and summative assessments and help teachers score authentic, project-based learning assessments. This software helps the classroom teachers by doing the following:

- Assess students with automatic scoring
- Randomize test questions
- Allow for re-testing
- Provide rubrics for essay-type questions
- Provide data and analyze test data
- Align assessments with standards and competencies
- Score for mastery of standards and competencies

Technology to REALIZE Next Generation Systems

Sample Tools and Tool Combinations (continued)

Produce Data Analysis

Teachers and leaders need to produce data reports to track and analyze student progress in competency-based systems. **Reporting systems** are essential in those efforts. Reporting features can be found in many different applications, including a **student information system (SIS), report card system, learning management system (LMS), content management system (CMS)**, and even a **portfolio system**. Reporting systems help educators by doing the following:

- Track daily student progress
- Establish learning pathways
- Build student profiles
- Alert teachers to students who are not mastering concepts
- Indicate areas of weakness in course design
- Align assessments with standards and competencies

Showcase Authentic Work

Teachers need to be able to showcase authentic work from students and their mastery of standards project-based learning. **Portfolio systems** facilitate these processes. Portfolio systems can be stand-alone apps, or they might be part of a **LMS**. These systems help teachers by doing the following:

- Assess authentic work
- Provide data analysis of work
- Manage project based learning
- Help develop a student profile
- Interact with student work via feedback

Manage Learning and Assessment Resources

To take competency-based education to scale, classroom teachers need to be able to manage content and assessment resources and align them all to standards and competencies. A **LMS** helps with that. Schools use a LMS to deliver online or blended courses. Most LMSs also function as content management system. A LMS helps teachers by doing the following:

- Align content to standards and competencies
- Help develop standards or competency-based learning plans
- Help manage content
- Allow users to create multiple pathways for learning
- Provide student access to content 24/7
- Create an environment to share content and assessments district-wide
- Offer a choice of resources for both the instructor and learner
- Support intervention strategies
- Provide progress bars, activity logs, and page views of content and evidence routes

Technology to REALIZE Next Generation Systems

Sample Tools and Tool Combinations (continued)




Integrate Data
Assess Students
Produce Data Analysis
Showcase Authentic Work
Manage Learning and Assessment Resources

Manage Student Data

Competency-based learning programs will generate large amounts of data that will drive daily decisions. A **Student information system (SIS)** will do much of this work. Schools use these systems to manage student information for state and local governance, but a modern SIS can help with competency based learning by doing the following:

- Align assessments to standards and competencies
- Use gradebooks that show mastery of competencies
- Report student mastery of competencies to district and state levels
- Produce competency report cards and traditional report cards
- Allow for flexible scheduling
- Sort students into bands or cohorts instead of time or grade level rostering

Adapt Content

Competency-based learning programs might have 30 students in a classroom on 30 different learning pathways, all working at a different rate and different pace with differentiated instruction. **Adaptive learning systems** are essential in this process to take personalized learning to scale. These systems help classroom teachers personalize learning at scale for students by doing the following:

- Make academic choices based on analysis student behaviors and current progress
- Analyze all student data to make learning pathways
- Continue to adapt content as students progress and not have just one early assessment where the course of study is adapted
- Adapt to the skills and abilities of each student
- Grow smarter (understand the student better) the longer the student uses the application

Produce Data Analysis

- Analyze all student data for complete competency assessment
- Find strengths and weaknesses in systems, students, teachers, schools, and districts
- Indicate areas of weakness in course design

Technology to REALIZE Next Generation Systems

Sample Tools and Tool Combinations (continued)

Integrate Data
Assess Students
Produce Data Analysis
Showcase Authentic Work
Manage Learning and Assessment Resources

Manage Student Data
Adapt Content
Produce Data Analysis

Manage Student Data

- Allow for standards-based, proficiency-level student data to continue over time, instead of wiping the database clean at the end of the year
- Analyze patterns of individual student growth over time by tracking mastery of standards and competencies

Manage Learning and Assessment Resources

- Allow for multiple pathways to mastery
- Allow teachers to align content to standards and competencies
- Offer teachers and students a choice of resources
- Support intervention strategies
- Allow teachers to make standards or competency-based learning plans

Technology Policy to ENABLE Next Generation Systems

Review a range of technology-focused policies and practices that enable a move toward next generation systems.
***Click here** for information on federal funds, programs, and policies supporting broadband.*

Entry	Emerging	Adapting	Transforming
I am just starting.	I have started, but am still developing.	I am making good progress, but would like to push further.	I am implementing with fidelity at scale.

Tech Use Standards

Policies and guidelines that support the use of technology in districts/schools

Are we aligned with national best practice?

- Identify the technology policies for appropriate content and technology use for students, staff, and families, as well as policies around broadband security, support, and needs.
- Consider visiting other schools or districts that have implemented a balance of security and innovation protocols for students, families, and teachers.

- Draft the policies and strategies stating acceptable content and technology use to ensure responsible digital citizenship with opportunities for relearning and stewardship.
- Begin drafting protocols for families around online learning expectations based on research and visits to other districts engaged in similar work. Protocols might include: parent training; pledges; and insurance policies for technology hardware in and out of school.

- Implement the technology policies needed to respond to violations or perceived network management issues, along with the policies for acceptable content and technology use.
- Implement comprehensive protocols for families around online learning expectations.

Read how Anson New Technology High School in North Carolina approaches its acceptable technology use policies for students.

- The policies and strategies stating acceptable content and use of technology in schools are thoroughly and effectively implemented at scale. Process is in place for violators, and security protocols exist for network management.
- Positive feedback and response from families in regard to technology protocols and family expectations and training.

Technology Policy to ENABLE Next Generation Systems

Use of Open Education Resources

Unlike proprietary content, which is privately owned, open education resources (OERs) are free, open-source materials that can be accessed and utilized to enhance learning experiences. Using OERs to enrich and personalize learning based on students' needs is an important component of next generation learning systems.

- Early and unstructured use of OERs to support instruction, student learning, and/or professional development.
- Stakeholders in the school and district are often exploring OERs on an individual or class-basis without a systematic effort or plan.
- No school or district-wide portal exists for accessing OERs across the learning system.

- Initial planning to create an educator portal for sharing and accessing OERs.
- OERs are used, although not yet routinely or consistently across learning environments.

Read about Anson New Technology High School's continuing work around access & policies pertaining to OERs.

- Frequent use of OERs to support instruction and student learning and/or professional development.
- Early development of an educator portal for sharing and accessing OERs.
- OERs are integrated into learning management systems to create customized learning pathways for students.

- Full engagement of OERs to support instruction and student learning and/or professional development.
- Robust use of an educator portal for sharing and accessing OERs.
- OER strategies exist for integration with multiple software instances across the district and at multiple grade levels.

Privacy and Security

Protecting the privacy of individuals in schools and ensuring all material is appropriate and educational is critical to implementing a competency-based learning system. Here's what you should keep in mind at each point in the continuum.

- Initial conversations amongst stakeholders about local (state/district) formal polices for privacy and security.
- Consider the use of various filtering systems that block content and its purpose and impact.

- Development of school-wide policies to address innovation, data collection through the lens of privacy, and security.
- Based on feedback from stakeholders, begin to eliminate filters for teachers that impact data use and instruction.

- Knowledge of and full compliance with federal laws affecting privacy and security.
- Policy framework and consistent strategy for continual revision of privacy and security policies that arise in data systems.
- Knowledge of better filters and tiers of data use for educators versus students.
- Consistent communication with key stakeholders about the privacy and security policies.

- Fully aligned policy framework and cohesive and integrated strategy to continually revise policies to address the privacy and security of data systems, while being conscious of better filters and tiers of use for educators versus students.
- Fully normalized around terms and standards for data use.
- Robust plan to educate students, families, and educators around appropriate use of technology.

Technology Policy to ENABLE Next Generation Systems

Privacy and Security (continued)

- Strategy to normalize around terms and standards for data use.
- Satisfactory protocols and prototypes developed to address innovation and use of data collection.
- Multiple social media sites are open and accessible, and student/parent use protocols are common including discipline language for cyber-bullying.

- Fully developed and utilized protocols and prototypes developed to address innovation and use-of-data collection.
- Integrated and secure single-portal log-in systems (closed-fence systems) for all student data.
- Social media sites are encouraged and frequently used for connection and collaboration around student learning.

Broadband Access

Having high speed Internet in place is critical for the success of next generation systems. Find your school, district, or state on the continuum and determine what the next steps should be.

- Identified the need to raise awareness of broadband access across district and other community centers.
- Begin conversations around broadband cost assumptions and implications on budget.

- Initial strategy developed with local providers to assess broadband access within district, schools, community centers, and neighborhoods.
- Broadband access is set as a clear priority and broadband cost assumptions are deemed as high priorities within the budget process.
- Middle mile broadband is starting to emerge as a priority for the town or community. Several locations are testing use.
- Dynamic goals are set for the expansion of broadband access to homes.

- Active promotion of full broadband access within all district schools is implemented.
- Broadband costs are assumed within budget process (and supplemented with federal and state dollars for support).
- Integrated initiative with community, business, and Internet providers to develop strategy for broadband access in all community spaces such as libraries, afterschool centers, and community centers.

- Mandated broadband access as the enabling innovation to support transformation of all schools.
- Early testing has begun and funding allocation for last mile connectivity to the home.
- Multiple middle mile hubs exists on schools buses, at laundromats, and/or community centers as a part of school/district planning and supports.

See example from DSST Public Schools in Denver, Colorado, on how they approach broadband access.

Capacity to IMPLEMENT Next Generation Systems

Explore the conditions—including leadership, professional development, infrastructure, public will, and resources/resource planning—necessary for successful technology systems' implementation across this progression.

Entry

I am just starting.

Emerging

I have started, but am still developing.

Adapting

I am making good progress, but would like to push further.

Transforming

I am implementing with fidelity at scale.

Leadership

Readiness for leveraging technology as a critical enabler of driving systemic change.

How do I get started?

Decision Making Structure

- Technology acquisition is centralized – schools take the lead on technology implementation/ acquisition from central office.

Usage/Priorities

- Current leadership skill set around technology is focused around basic functions—email, word processing, etc.
- Leadership plans for technology deployment are limited to remediation or targeted interventions.
- There are few active goals for technology usage.

Diffusion of Innovation

- Schools heavily rely on internal personnel to manage systems/tools, and train and support staff in use.
- Limited culture of prototyping or rapid experimentation; identified need to cultivate innovation culture.

Decision Making Structure

- Schools encouraged by central office to explore different technologies independently.

Usage/Priorities

- Opportunities for modeling best practices and technology use created at district- and school-level events in and outside of school, such as at community events, meetings, etc.
- Initial district-level initiatives begin to train school leaders in new technologies and technology integration skills.

Diffusion of Innovation

- Blend of technology management by the school with outside services.
- A shift in focus from exclusively hardware to the impact of hardware on teaching.
- Initial questions of assessment systems by schools and identified need to explore other technology-enabled options.

Decision Making Structure

- School leaders independently and actively begin to embed new technologies into schools for instructional and curricular needs.

Usage/Priorities

- Consistent plan and implementation of school-wide cloud service or learning management systems for instructional/operational practices.

Diffusion of Innovation

- "Train-the-trainer" models developed by districts for school technology leaders.
- Implemented district-developed web-based support to drive professional training and relevant reference materials.
- Strategic school plans developed within districts to address technology integration and tools needed for student achievement.

Decision Making Structure

- School leaders have fully implemented model of learning technologies and have a set of tools and platforms they use and support, as well as a process for deciding on new tools.

Usage/Priorities

- Priorities are clearly based on data and what leaders are learning from the use of learning management systems and cloud-based solutions.
- Leadership meets regularly to determine technology use efficacy and adjusts based on the data around student outcomes and teacher impact.

Diffusion of Innovation

- Leadership has designed a variety of plans for users at all levels—parents, teachers, students, etc.—to implement their work by leveraging technology with clearly defined objectives and measurable outcomes.

Capacity to IMPLEMENT Next Generation Systems

Leadership (continued)

- Dedicated technology personnel focus on hardware, not instructional integration.

Policies

- Leaders identify the need to learn from best practices in other districts and schools.
- Resources allocated for student content are focused on textbook acquisition/replacement rather than an array of student-facing materials (print, online, etc.).

- Initial teacher trainings on technology and web-based tools and initial and sporadic implementation.

Policies

- Initial shift in grading policies to include growth and reflect outcome-based plans.
- School leaders begin to examine device policies.
- While the majority of resources still focus on textbook acquisition, initial district policy changes allow for an array of student-facing resources.

Policies

- Consistent professional development plan reflects critical integration of technology in competency-based education implementation.
- District/school leaders actively develop policies for measurement standards of effective use of technology in the classroom.
- District policies actively promote technology as a viable option for textbook replacement.

- Fully transparent plan for assessment of teachers as it relates to technology and use of short-cycle innovation processes.

Policies

- An innovation policy is added at the district and school levels to encourage experimentation. Innovation and failing forward are expected.
- Results are reviewed quarterly, and cohesive policy enables pilot and test projects to scale based on successful student/teacher outcomes.
- Regular business planning seminars are conducted to expand technology footprint.
- External experts are consulted to increase student access as technologies change and adapt.

Professional Development (PD) Needs

Supporting technology adoption to drive instructional change.

How should I be thinking about the professional development needed for it? How do I ensure my staff is ready?

- Identified need to have PD address individual teacher needs.

- PD is still system-wide, targeting broad objectives, however, it's beginning to address individual teacher needs.
- District/ school leaders begin to explore technology, including exposure to competency-based learning tools.

- PD strategy often includes blended professional learning options including webinar, and synchronous and asynchronous online solutions.
- PD is integrated, targeting broad objectives while also addressing individual teacher needs.

- PD strategy is comprehensive with in-house specialist(s) focused on a tiered PD plan for users at district or school levels to help fill gaps in technical knowledge.
- PD is tied to individual teacher plans; PD can be completed anytime, anywhere, and requires evidences of shifted practice.

Capacity to IMPLEMENT Next Generation Systems

Professional Development (PD) Needs (continued)

	• Initial system-wide training on technology tools, such as mobile devices and their attributes to support instruction.	• Robust system-wide training on technology tools. • PD is often also socially enabled by using professional learning networks to communicate and collaborate.	• PD shifts include communications agenda on student contracts and parent engagement around competency-based learning. • Clear requirements for school leaders to be trained/exposed to technology tools. • Multiple, focused professional learning communities exist across the district to communicate and collaborate across multiple topics and strands.

Information Technology (IT) Planning

Building the right organizational and physical structures to support your next generation system.

Do we have a five year plan for technology implementation?

• IT planning focuses on managing existing hardware requirements for the district.	• Perform a fit-gap analysis and determine the gap between the current desired states for the following:
	  • Classroom hardware decisions (i.e., student and teacher laptops or tablets, and other hardware and accessories).
	  • Wireless infrastructure: access points, routers, cabling, and cabling systems.
	  • Internet access: capacity, filtering, redundancy, growth plan, home access, and student 4G wireless.
	  • Servers: determine in-building server strategy (servers versus cloud, or combination of both).
		• Perform a fit-gap analysis and determine the gap between the current desired states for the following:
		  • Determine insurance needs.
		  • Develop five-year bandwidth growth assumptions.
			• Refresh cycles are done along with annual audits.
			• A learning agenda is created along with results from prototyping; school boards and the community are invited in as designers for identified gaps.
			• Leadership receives training on running a 24/7-access district/school.
			• Leadership learns how to flex supports to enable technology on buses and in community centers to support anytime, anywhere learning. There is a focus on cached materials and software when no access is available.
			• Social and mobile help desks are established for technology support; students are a part of peer-review help desks.

Capacity to IMPLEMENT Next Generation Systems

IT Infrastructure

Here's what to consider around development and management of the right physical structure to support your next generation system.

How should I think about the infrastructure needs associated with this?

- Identified the need to expand broadband access.
- Identified the need to build wireless hubs.

- Infrastructure is set up for support devices – two to five connected multimedia student computers available per classroom.
- At least one connected multimedia student lab or mobile cart is available.
- Students have scheduled access to competency-based education technologies.
- Broadband connection for one computer in the classroom.

- Infrastructure is set up for support devices – six or more connected multimedia student computers available per classroom.
- Students have scheduled access to a broader range of competency-based education technologies.

- Infrastructure is set up to support all devices within the classrooms and throughout the school building.
- Multiple multimedia student labs or mobile carts are available within each school.
- Students have unlimited site-based access to a broader range of competency-based education technologies.
- School has bring your own device (BYOD) or leased technology options.
- Active engagement around financial planning based on BYOD assessments and configurations of leased devices.
- General technology hardware support is offered across multiple devices.
- Students and parents are given a minimum specifications list along with expectations for how content is delivered and accessed.
- Routine systems tests and technology audits are held.

Capacity to IMPLEMENT Next Generation Systems

Public Will

Meaningful engagement with families and other external stakeholders to support the move to a next generation system.

How do I prepare to educate my board and community? How do I begin to engage families about this shift?

- Early stage engagement with families and the community as it relates to technology to support personalized learning.

- Initial articulation by schools and/or districts about the role of technology in a competency-based learning system.
- Occasional outreach to families and community in the form of website notices or emails.
- Some engagement with unions as partners in the process with some key expectations for the work outlined.

- Regular stakeholder outreach done through the web, community meetings and forums with families, union partners, and other key stakeholders addressing the purpose of competency-based education, and the implications of the shift.
- Frequent engagement with unions as partners in the process with expectations for the work designed together.

See how DSST Public Schools in Denver, Colorado, engages families in next generation learning.

- Comprehensive articulation by districts/schools about the role of technology in the teaching and learning agenda.
- Frequent outreach via numerous means – social media, digital and print materials, mobile texting, emails, newsletters, and regularly scheduled forums and community events.
- Annually update documents on district technology policy and the role of technology to support teaching and learning in a competency-based system.
- Active, regular engagement with families and district and state partners, as well as higher education communities, to outline the goals and logistics of competency-based education, with a focus on understanding and embracing a new kind of transcript.
- Active promotion of a new competency-based education transcript with clear analysis of how it translates from a traditional transcript.
- Union or boards serving on work teams regarding technology planning.

Capacity to IMPLEMENT Next Generation Systems

Resources/Sustainability

Proactively planning for how to implement and scale the work from a resource perspective.

How can I plan for the budget implications of this shift?

- Knowledge of an array of funding streams to support technology implementation (state, district, and school-based for longitudinal data systems, hardware, software, professional development, etc.).

- Begin to leverage outside funding (different state, federal, private corporate, and philanthropic resources) to support technology implementation.
- Knowledge of alternative funding structures not based on seat time.

- Consistent plan to leverage outside funding to support technology implementation.
- Plans to structure funding not based on student seat time.
- Initial strategy around funding flexibility to fund technology as an enabling teaching and learning resource, as opposed to a supplemental line item to support online content, e-books, and open educational resources, in addition to textbooks exclusively.

- Implementation of plans to structure funding not based on student seat time; begin to shift from average daily attendance to a cohesive strategy to consider anytime, anywhere student learning as the driver for funding (i.e., online or field-based learning).
- Active use of funding flexibility for resources to support an array of student content—online content, e-books, and open educational resources.
- Integrative strategy to structure base funding on students rather than organizations, which allows dollars to follow individual students.
- Develop partnerships with local tech and Internet providers to receive discounted rates and bulk purchasing power at the state or district level.
- Establish return on investment (ROI) model for identifying tangible learning objectives for each state/district initiative, and a cohesive strategy to track and manage success; actively calculate ROI on educational seed investment as a driver for future allocation based on success.

Lessons to LEARN from the Field

When engaging in this work it's extremely helpful to see what others are doing. In this section we have profiled four high-quality schools that are at different places in driving toward transformation with technology.

What results have competency based technology systems produced? Where is it working now? Where can I see or visit it?

Entry	Emerging	Adapting	Transforming
I am just starting.	I have started, but am still developing.	I am making good progress, but would like to push further.	I am implementing with fidelity at scale.

Anson New Technology High School
North Carolina

RSU2
Maine

DSST Public Schools
Colorado

Summit Public Schools
California

Anson New Technology High School, NC

Model Overview

Anson New Technology High School, serving the students of Wadesboro, North Carolina, a small, rural town in the southwest corner of the state, might be small in size, but it's mighty in ensuring its students are 21st century citizens, ready for college and career. In 2006, Anson partnered with New Tech Network, a national organization that helps districts redesign schools with project-based learning, culture, and technology as core model elements. The program has completely transformed Anson; now the 160 students (grades 9-12) carry an air of excitement and readiness for academic success. On the curriculum side, the school uses the North Carolina Essential Standards and the Common Core State Standards. Teachers use these standards to create projects in *Echo* (learning management system) and upload resources to support their curriculum.

Blended learning is a critical part of Anson's mission, considering itself an online system living in a brick and mortar environment interwoven with face-to-face teacher time to support, curate, and guide the learning experience. Students have a broad range of ability from EC (Educationally Challenged) to AIG (Academically and Intellectually Gifted) and all are supported in the school. At Anson, "grades are different," according to Chris Stinson, school principal. All assignments receive letter grades and written feedback so students can gauge where they are strong

and where they need more work. Students' grades are 30% content and 20%critical thinking—illustrative of Anson's philosophy that content and critical thinking are two of the most important parts of learning. Making up the other 50% of students' grades are the six learning outcomes that all student work, regardless of subject area, is evaluated on: Tech Literacy, Global Awareness, Written Communication, Oral Communication, Collaboration, and Work Ethic. The faculty at Anson New Technology High School developed these outcomes and they individually tailor rubrics for each assignment.

Technology Integration

To realize its model, Anson leverages technology to better support student learning.

Hardware. The school provides a *Mac* laptop to every student to use during the school day. However, students who have an overall grade average of 77% or higher are allowed to keep the laptops 24/7. "We want them to see it as a tool rather than a toy," Stinson shares. In terms of the longer breaks, students don't take the laptops home over the summer since that's when they are "retooled and refreshed," nor do they keep them after graduation.

Software. All staff, students, and family members use Anson's learning management system, *Echo* (Figure 1), to support and manage student learning. Students submit their classwork to the platform for review; access their grades; collaborate with their classmates and teachers; and use *Google Apps*, which integrates with *Echo*. On the educator front, teachers share resources across subject areas and grades; assess student work and projects; organize and manage curriculum; and give feedback on behavior and other performance standards. All student data is tracked in *Echo*. *Echo* also has a host of other resources, such as the Teacher Library where "teachers across the nation can upload resources that have been pre-screened and are rigorous and relevant," says Stinson.

Since *Echo* utilizes a single portal log-in for students, teachers, and parents, there are no privacy issues or conflicts with the Family Educational Rights and Privacy Act (FERPA). In addition to *Echo*, Anson also uses *PowerSchool* to track attendance and grades (since it's a state requirement to use the tool). *PowerSchool* does not integrate with *Echo*, so teachers enter attendance and grades into *PowerSchool* in addition to *Echo*.

Anson has been paper-free for seven years, and with laptops and other portable devices in tow, students are constantly experimenting with various tech tools to support their learning. "It's amazing to watch students collaborate and use technology to solve problems," says Stinson. One favorite tool is *Google SketchUp*, which is a cloud-based 3D modeling software that integrates with *Google Maps* and *Earth*. (Students can even post their models to *Google Earth*.) Students also use *iMovie*, *GarageBand,* and other resources to supplement the teacher-uploaded resources they access from *Echo*, and can access the school's iMac desktop lab for the Adobe Creative suite.

Conditions for Success

Moving to a blended environment carries certain challenges, shares Stinson, and creating a culture of proper technology use, especially among freshmen, is critical. Students are placed into groups to build online behavior

contracts and then monitor each other's use—and students are responsible for reporting back if something is amiss. (Students can even remove another student's privileges in extreme cases of misuse.)

Looking beyond the students, Anson's staff worked hard to gather support at the local level to create community buy-in around technology. Lessons learned? Get the right players involved who can think outside the box from the start, says Stinson, and then once you do launch a plan, stay consistent, but be flexible. The school also opened its doors longer—staying open late for students, families, and community members to use the technology since broadband access is still a challenge for most of the town. Lastly, Stinson is engaged in a constant stream of communications—whether by email or in-person workshops—to share the exciting work happening at Anson. "The more we educate, the less pushback we get."

Policy Challenges

So far, Anson's greatest policy challenge has come from the district's interpretation of the project based learning and the acceptable educational resources required to support student learning. Despite his work lobbying for a broader acceptable use policy, the policy "blocks access [to many tech tools] and is a hindrance to many learning opportunities for students," says Stinson. For instance, to support a project, students might want to watch a *YouTube* video on building rollercoasters, but because of the existing policy, they only use *YouTube* for select videos. The Anson school community is working hard to educate policymakers about the benefits of having access to as many appropriate learning tools as possible, but for now Anson has to work within the current policy limitations.

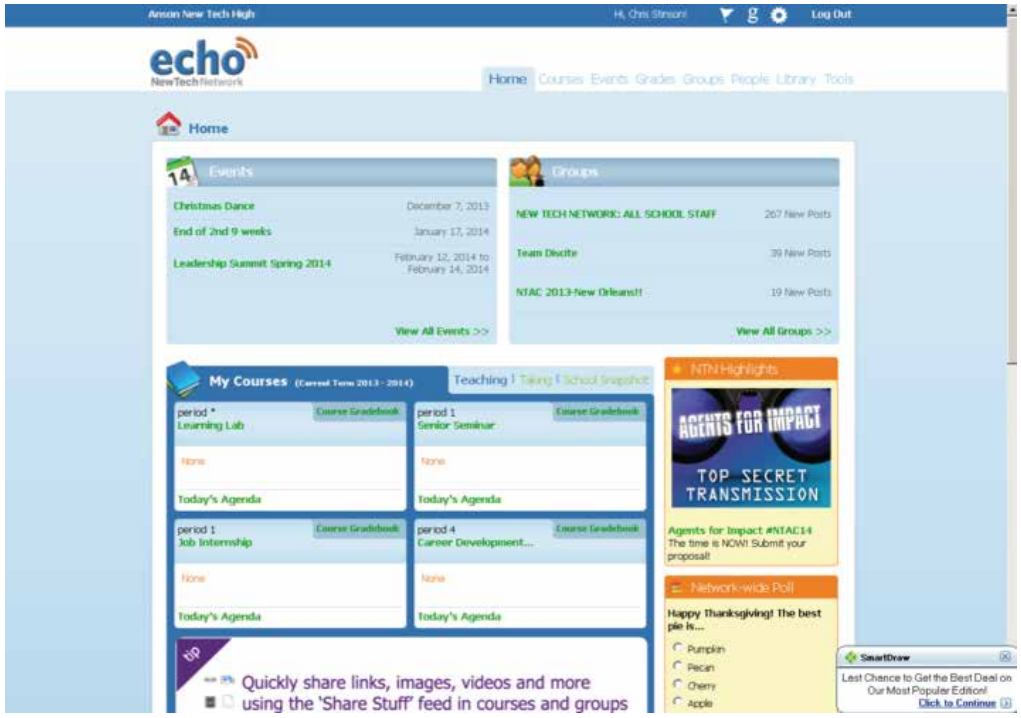

Figure 1: Echo

RSU2, ME

Kennebec Intra-District Schools (KIDS) regional school unit, called RSU2, includes 10 schools stretching across five towns in central Maine with an emphasis on student-centered learning. The K-12 district is designed around proficiency-based learning communities with a continuum to guide what students should know and be able to do.

Technology's Role

Technology plays a critical role in learning at RSU2, starting with every student and teacher at the middle and high schools having laptops. "Maine is a 1-1 state for middle school," says Superintendent Virgel Hammonds, but the district made the commitment to extend 1:1 through 12th grade, as well, because they see it as an essential tool to support student learning and co-ownership of their learning process.

Educate serves as the learning management system at RSU2, and is used to house the learning standards and proficiencies, explains Hammonds. The platform is accessible to students, teachers, and families, and is used for educators to collaborate on evidence of learning and student need. Although, *Educate* gives administrators and educators a sense of areas of student need through its data reports, the school still looks to the teachers for details. "At this stage we rely on our teams to let us know the specific [needs of the] students," he says.

The learning management system is home to the district's curriculum, as well, coupled with *Discovery Education* for digital media and as a research tool for students. For collaboration, *Google Docs* is used extensively, says Hammonds, and for communication the schools use *First Class*.

In the community, there is support for the direction of the district. "Our parents are thankfully highly involved," says Hammonds. "The real focus on our strategic design is complete transparency. *Educate* allows parents to access what students are learning and how they are learning it." Hammonds shares that the transparency of standards, and the fact the parents have access to all the technology systems the school uses, makes the process of innovation possible. Open educational resources and district transparency allow community members to be fully aware of change and to help drive it by supporting both the system and their children. This openness has enabled growth to happen organically.

Artifacts: How can I learn more?
RSU2's standard-based, learner-centered framework

DSST Public Schools, CO

DSST Public Schools, formerly known as Denver School of Science and Technology, is a network of STEM schools located in the heart of Denver, Colorado. Serving more than 2,800 students across seven schools, it's a fast growing network focused on transforming learning and closing the achievement gap with an emphasis on 21st century skills. The network has risen to be one of the most successful and highest performing in the city and technology has been critical to support the standards-based learning environment.

Hardware Details. Technology at DSST is utilized to support the comprehensive standards that guide instruction and student learning, shares Chief of Staff Christine Nelson. The school is a 1:1 environment with all students using laptops and high-speed wireless. After agreeing to the technology use policy, students check a computer out at the beginning of the year (most are Dells). By assigning a student one laptop for the whole year, DSST believes it instills a sense of ownership. Results have backed it up—with less damage to devices. In terms of hardware, DSST uses the *Microsoft* suite, with a *Microsoft Exchange* account to power email addresses for all students and staff.

Technology Supports Data Use. DSST is data driven, according to Jake Firman, senior manager of education technology at DSST schools—everyone from district administration to students is encouraged to actively consult data. Teachers look at data in real time to inform core instruction, and students take ownership of their data, using it to understand their learning needs. "They can tell you which standards they are excelling at and which they need to work on," says Nelson.

To support some of this data collection, DSST uses *Infinite Campus* as their student information system. "We use it not by choice, but because of logical necessity," says Firman. Over the last year and a half, DSST partnered with Double Line Partners to build a connective solution for the network's data sources, which resulted in an operational data store and warehouse, called *Polaris*, which is organized on the Ed-Fi data scheme (a national data model built for education), explains Nelson. Data in the warehouse is then "revealed through a visual and dynamic visualization tool called *Tableau*, in which DSST creates its own custom reports to meet the needs of our teachers, school leaders, and network leaders," continues Nelson. "A tool like this coupled with other data we have is very instrumental in how we evaluate teachers and take the work to the next level," says Firman.

Following are a few screenshots of *Polaris* reports:

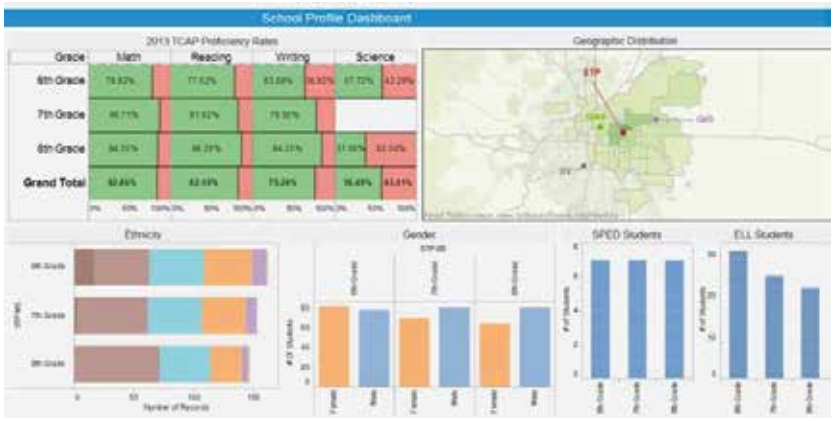

Figure 2: Polaris *Report screenshots*

On the assessment side, DSST uses *ActivProgress*—a program the school co-designed with Promethean. "It's a powerful platform," shares Firman. *ActivProgress* facilitates the creation of assessments, and aligns the assessment to standards. Most teachers use it to digitally upload or build an assessment and then share it with students either in real-time or asynchronously. Educators are trained and equipped to act on data created through the assessment results. For instance, if a student is struggling with a particular competency, the teacher will shift context to meet his or her needs. This circular relationship between learner, data, and teacher is a constant area of exploration for the staff at DSST.

According to Nelson and Firman, what truly makes *ActivProgress* effective is its ability to deploy the carefully designed standards built by DSST teachers, which guide teaching and learning, to the assessments in a given classroom. The platform also enables DSST to do network-wide benchwork assessments, which helps identify trends and areas of need and growth across all schools.

Source DSST Public Schools

Instructional Tools. Most of the instructional tools DSST uses are cloud-based. The "aim is to ensure all students and teachers can manage learning from the cloud," says Firman. He highlights the need for a process to evaluate instructional tools, identify trusted providers, and standardize the process for choosing tools teachers can rely on. As of now, DSST uses classroom-level pilots to test cloud-based tools, letting educator and student evaluations and perceptions of a tool drive use. "We haven't gotten to a place where we have standardized this process," says Firman. "Our teachers do an amazing job using a wide variety of instructional tools despite not having standards."

Powering Assessment. *Compass*, a program that collects cultural data, was built in-house and is maintained in-house. "We're a very values-driven school, so this tool allows teachers to give core value points, like a 'curiosity point,' when a student raises their hand to answer a challenging question," says Firman. *Compass* allows teachers to diagnosis students and assign after-school intervention when needed.

Continue to Grow Parent and Family Connections. DSST connects to parents and families through the technology platforms it uses—parents can log in to check attendance, grades, and missing homework. Parents also receive *Compass* character reports. But beyond that "parents are an area for growth in terms of leveraging technology," says Nelson. (Check out a video tutorial for one of DSST's technology trainings for parents.)

DSST's budgetary flexibility has allowed the school to make changes in leaps and bounds, especially when it comes to hiring. "The people we hire is the biggest thing that makes technology not just little black boxes on the desk," says Firman. "Excellent hiring strategy is critical here."

Nelson and Firman also cite Colorado as a unique state for innovation. "There are not inherent barriers to getting things done—not a cohort of leaders trying to thwart efforts of innovation," says Nelson. "The extraordinary flexibility and the super collaborative relationship with the district" paves the way for schools' achievements, says Nelson. "It's not just us doing great work, we are part of a community of schools doing great work."

Summit Public Schools, CA

Summit Public Schools, located in northern California, is composed of six charter schools serving nearly 1,600 students. The heart of Summit's mission is to ensure all students graduate from high school eligible and ready to attend college. In order to do that, the model has focused on providing all students with a rigorous, engaging high school experience. The results so far are impressive—with 96 percent of students accepted to a four-year college or university. Learn more about the model by visiting www.summitps.org.

Technology's Role

At Summit, to ensure all students are college ready, the pedagogy focuses on assessing skills and content in an integrated fashion through both project-based and online learning. We made a point of "building the product and the school at the same time," says Jon Deane, chief information officer. Technology is essential because personalizing a student's trajectory was core to the school's learning model, shares Deane.

Since technology is so integral in supporting students and their growth, Summit took an active role in the development of the tools they needed. Through the use of learning maps of content and skills, Summit tracks and manages a student's learning acquisition. "Sixty percent of students' time and 70 percent of students' grades are based on learning projects that are on their computers and aligned with the Common Core," says Deane. Summit uses one common rubric to grade all projects. "The idea is that with a single rubric we can really track longitudinal data." The network assesses skills and content separately to maximize the personalized learning process. "We wanted to take project-based learning a step further," Deane shares. Content is further broken down into *Power Focus* and *Additional Focus* areas. Power Focus areas are the bare minimum a student needs to pass in order to meet the competency assessment and progress to the next level of his or her learning progression (see Figure 3).

Within a course, for example 10th grade history, the resources a student needs are seamlessly integrated into a "playlist" of content resources he or she can access. To test herself, a student can take a diagnostic on the *Illuminate* diagnostic assessment site. This "opens up the notion of students being assessed on demand when they are ready," says Deane.

The central platform for students is a single sign-on personalized learning plan (PLP), developed by integrating three main tools, all of which sit on a Google Authentication site. These three tools include:

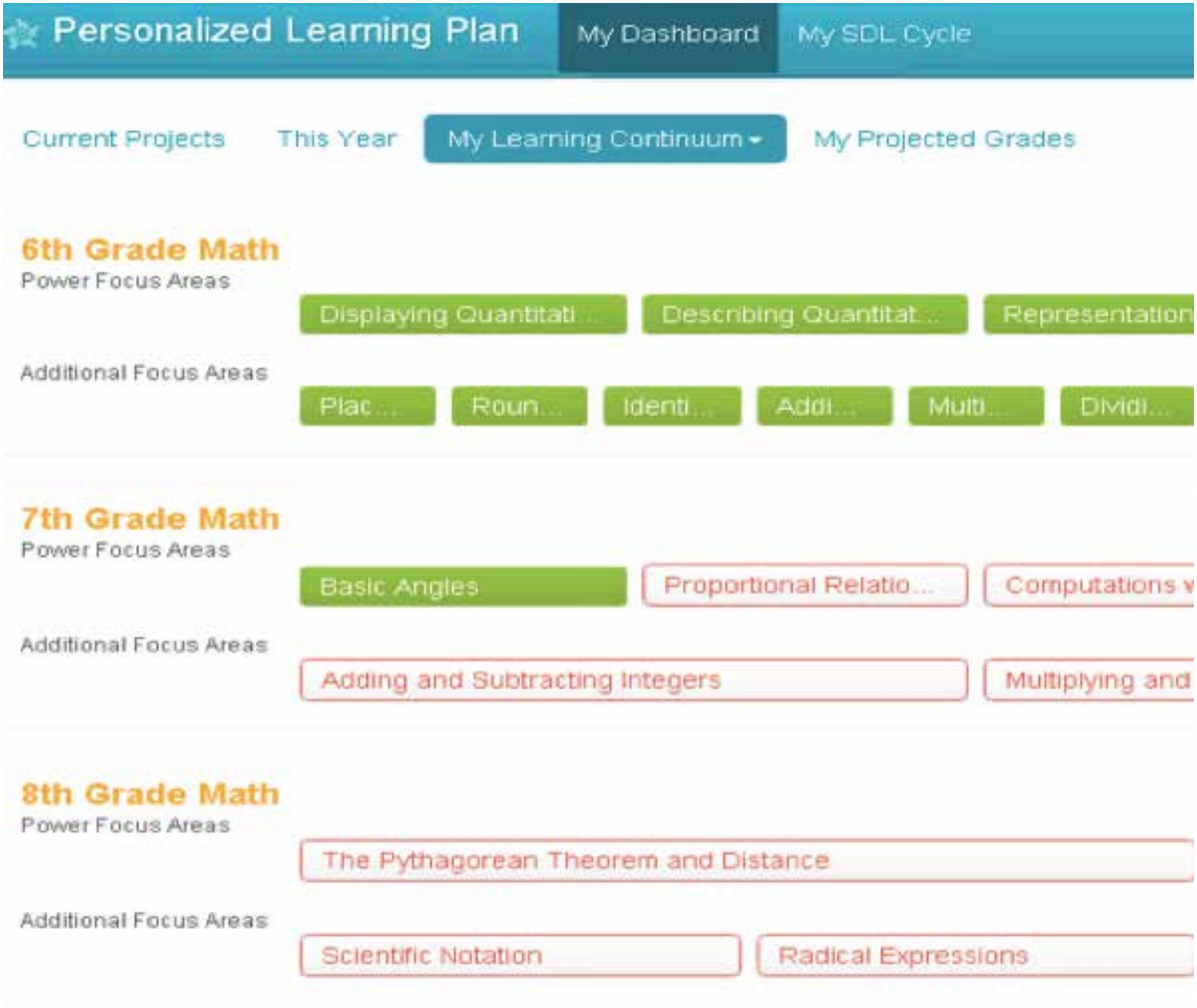

Figure 3: Personalized Learning Path

- **Show Evidence** for project-based learning. Rubrics allow students to track and manage competencies on projects across skills and content.
- **Illuminate & Activate (as a third party application)** serve as the data management solution, integrated through APIs. As a diagnostic assessment solution integrating with all other content and curriculum providers the school uses, it provides the ability to track and manage student performance to allow a customized view of each student based on their unique learning trajectory—what they are learning at what pace.

Students use their PLP to set goals, access resources and assessments, track their progress and grades, and plan ahead for the next step in their learning. There is also a predictive algorithm under development that tracks a student's trajectory based on GPA, test scores, and NWEA MAP assessments. As this gets implemented, there will be the ability for a student to understand the impact of various assessments on their trajectory toward completion. Summit uses a range of online content such as *Khan Academy* for math instruction, *Gobstopper* for reading (not yet integrated), and *Middlebury Interactive* for language acquisition.

One of the key decisions that Summit has made was not to try to integrate all assessments. "We are not trying to pull all data—just key formative assessments. All other products are resources for our students," says Deane.

Summit's staff has learned many lessons throughout their work integrating a solution that personalizes learning through projects and blended delivery—here are the top lessons:

1. **Expect a learning curve.** When the school transitioned all students onto the home-built PLP software, students adjusted at different rates. According to Deane, "It's a different arc for students who were working in *Khan Academy*. It has been a significantly harder arc for students who were not working in *Khan* before." Nonetheless, Summit has "1,600 kids all of whom log in everyday" and the learning is evident from the data the schools pull each night.
2. **Don't be afraid to take leaps in integration.** "When we get a new tool we integrate it right into the model, we don't prototype it bit by bit. For better or for worse," says Deane. Although sometimes challenging, it often works out for the better. For instance, as mentioned earlier, students are now using *Middlebury Interactive* for language acquisition and *Gobstopper* for reading, and although these tools don't integrate with *Illuminate* (the central system the school uses to track data) yet, they were adopted quickly and have been hugely successful.
3. **Provide seamless access to tools and wireless.** Summit is open an extra two hours in the morning before school and two hours after school to ensure students have the access to technology they need to succeed. Students do not bring school laptops home with them at night.

4. **If at first you don't succeed, keep improving.** Currently, Summit finds itself at another moment of transition where the existing platform combinations are good but insufficient. Now, there is a desire to see and track the formative elements of a student's work product, not just summative submissions. Summit has grown to recognize the limitations, and they are looking toward the next round of improvements.

Artifacts: How can I learn more?
Summit founder Diane Tavenner shares an overview of the philosophy and mission of Summit Public Schools. Hear some teacher and student voices here.

View this EdSurge article (June 2014) about Summit Public Schools:
A Peek Inside Summit's Personalized Learning Software: Making competency-based learning a reality