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Next Generation Learning – Defining the Opportunity

Paper 1 of 2

Carnegie Corporation of New York

THE OPPORTUNITY EQUATION

Excellence and Equity in Mathematics and Science to Transform Education

The Parthenon Group

Stupski Foundation

Introduction

It is a challenge classroom teachers understand all too well: how can a single teacher deliver engaging yet challenging lessons for all students, each with unique learning styles, levels of knowledge, interests, and degrees of engagement? The short answer is that this is a virtually impossible task. With twenty-plus students in a class and 24 hours in a day, even the most dedicated, talented teachers are structurally limited in their ability to provide personalized instruction to every student.

Today a handful of innovative thinkers are proposing a new solution to this challenge. If Pandora can predict and serve our individual musical preferences, or if medicine can be tailored to our genetic make-up, similar practices and tools can provide personalized learning experiences for all students. Personalized learning enables each student to take a customized path toward meeting high level standards. Flexible uses of time and space allow differentiated approaches to content, assessment, pacing, and learning style. This level of personalization, when combined with world-class standards, performance-based assessment, anytime/anywhere learning, deep student engagement and agency, and a comprehensive system of supports, is referred to as next generation learning (NGL). *(For more information, see CCSSO's "Next Generation Learners: A Framework for Action.")*

Entrepreneurs who are coming from across the field — school districts, charter schools, private sector vendors, nonprofits, and academia — are positioned to make this vision a reality, in large part due to a confluence of two enabling conditions: the recent adoption of Common Core standards by a significant majority of states and the ongoing rise of information technology. Common standards and assessments provide a starting point for increased rigor by ensuring identical, post-secondary-ready expectations for all students. A common definition of rigor also enables innovation: every new school model, no matter how distinctive, can be evaluated (and ultimately shown to succeed or fail) using the same standards. Similarly, advances in information technology allow for the capture and use of vast quantities of student-level data, which can then be used to personalize instruction and differentiate professional practice.

In collaboration with the Stupski Foundation, Carnegie Corporation of New York, and The Opportunity Equation, The Parthenon Group compiled a comprehensive market fact base through secondary research and analysis, and interviewed more than 100 district/state-level practitioners, entrepreneurs, policy experts, vendors, and funders. In this paper, we describe the vision and the building blocks for next generation learning. In the accompanying second paper in the series, we highlight the barriers to scaling the models and offer recommendations for how to address those challenges.

The Vision for Next Generation Learning

As long as there have been schools, great teachers have combined information about the learner with deep pedagogical knowledge to continuously adapt instruction to the needs of individual students. The challenge today is to provide this level of personalized learning to each and every student, so that all can achieve mastery of at least Common Core standards. Increasingly, the challenge is also to develop even more robust definitions of deeper learning that — as the Hewlett Foundation has outlined — integrate rigorous core academic content with critical thinking and complex problem solving skills, the capacity to work collaboratively and communicate effectively, and the ability to learn how to learn and be self-directed.

Next generation learning pushes the age-old concept of personalization even further. In schools that have embraced NGL, individual students receive instruction tailored to their needs and interests in new and different ways. Students can learn anytime, anywhere, and receive instruction through a variety of modalities, facilitated by a diverse corps of learning professionals. When combined with Common Core standards and definitions of deeper learning, next generation models provide students with flexible, individualized, and ultimately more effective paths toward post-secondary, career, and citizenship readiness.

NGL innovators are beginning to create new, potentially scalable learning models that drive improved results by leveraging effective practice and information technology and by using time and place flexibly to personalize the learning experience within a context of consistently high, post-secondary and career-ready expectations. Ultimately, these models will need to be judged according to two fundamental criteria:

1. Do they facilitate sustained breakthrough learning gains by all students, and particularly those who chronically underperform?

2. Do they create efficiencies that make them at least cost neutral to deliver compared to traditional models?

Next Generation Learning Models

What does next generation learning look like in practice? The short answer is that no single school model, district, or classroom has yet fully realized the concept, but several early exemplars have begun to develop various components of NGL. The models outlined below represent a handful of emerging NGL examples rather than a comprehensive list of organizations in this space. These models currently fall into one of the following two categories:

- **Discrete Elements in Existing Models.** Several existing models have adopted individual next generation learning components.

- **Early Stage Ventures.** A small number of innovative thinkers are currently experimenting with combining several next generation learning building blocks into a single experience.

Discrete Elements in Existing Models. A number of existing models have adopted individual next generation learning elements. Many high-performing classrooms and schools are already making differentiated learning a reality in small settings. High-performing schools are using student-level data in new and exciting ways as they begin to focus on personalized learning. For these schools, the challenges lie in figuring out how to improve their use of human capital and in making models more easily scalable through automation, information technology, and cost-effectiveness.

- *Adams 50: individualized, competency-based student progressions.* Faced with declining enrollment and falling test scores, Colorado's Adams County School District 50, a district of about 10,000 students, chose to adopt a district-wide, standards-based learning model. The district eliminated grade levels, instead grouping students by ability, regardless of age. Students progress through a series of 16 levels, moving forward at their own pace after demonstrating mastery. The district piloted the program at a single elementary school in 2008-09 and began implementing district-wide for K-8 in 2009-2010. The district is currently rolling out its standards-based system for ninth graders at the high school level, with full K-12 district-wide implementation planned for the 2013-14 school year.

- *New Tech Network: technology-enhanced project-based learning.* NTN, a school network with 62 schools nationwide, has built a system of schools that feature extensive use of technology, project-based learning, and inquiry. In New Tech classrooms, students use technology to complete standards-aligned projects, typically working in teams. Students are expected to take responsibility for their own learning; teachers adopt the role of facilitator, assisting self-directed students. All NTN classrooms have a one-to-one ratio of computers to students. A proprietary online learning management system helps create a network where students, teachers, and parents can connect with each other.

Early-Stage Ventures. A few pilot programs have begun to integrate NGL "building blocks" into a single experience, using automated information technology to personalize instruction. Although in very early stages, they have begun to address some of the challenges that have limited other models.

- *School of One.* School of One is a math program that uses technology to personalize instruction, providing students with individualized lessons according to their unique needs and learning styles. At the end of each math period, students take a brief assessment that evaluates mastery of the lesson they have just completed and a cutting-edge computer algorithm analyzes daily assessment results, weighs students' individual learning needs, and delivers a unique schedule for each student for the following day. Students receive personalized instruction daily through multiple modalities including large group instruction, small group collaboration, virtual tutoring, and high-quality software.

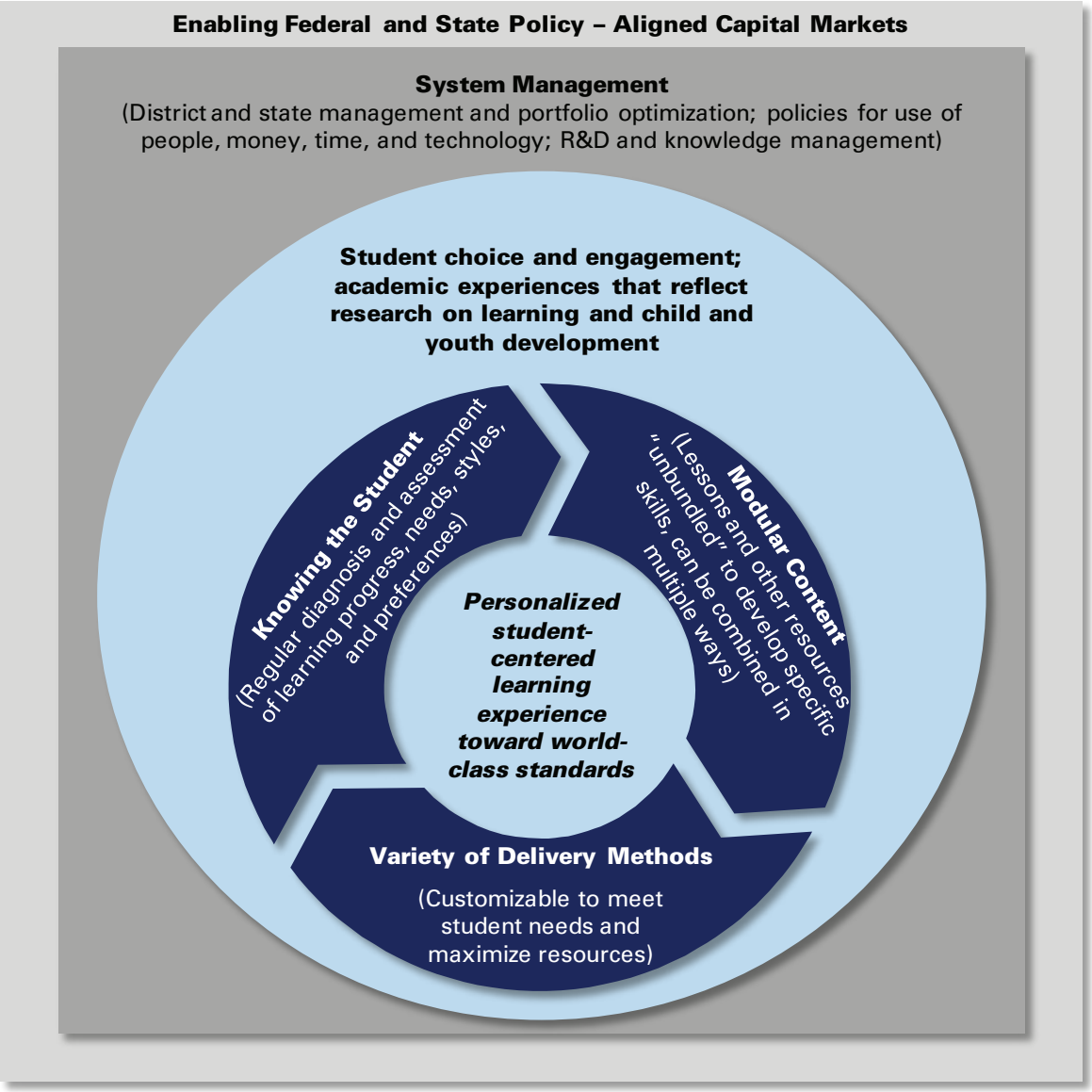
- *Florida Virtual School.* FLVS is the nation's first statewide, online, public high school and currently serves K-12 students. Instruction takes place online; students select their courses and then complete assignments, quizzes, and tests at their own pace. Blended learning is also becoming a focus for FLVS. Their partnerships with many Florida school districts have created local-school based virtual learning labs with instruction provided by FLVS. FLVS has the potential to turn a wide variety of activities or projects — a job, an internship, a field trip — into meaningful learning experiences. A student anywhere in the country can log onto a computer to discuss a project with an expert, participate in student activities and clubs, attend an online event about Shakespeare, or take an assessment that measures mastery.

While no models have fully integrated all of the attributes of next-generation learning or demonstrated sustained, cost-effective breakthrough outcomes for all students at scale, these examples provide useful starting points for developing proof points of more fully realized next generation learning.

Next Generation Learning Myths

Our research also identified myths and misconceptions about next generation learning. One common misunderstanding is that all instruction in a next generation classroom takes place online. In reality, in some next generation classrooms, students rarely or never sit in front of a computer. NGL models predominantly use technology as an enabler, not an end in itself. Technology is the main driver behind personalizing instruction in next generation classrooms, but is typically not the primary method of instructional delivery. Most models will also employ traditional instruction, such as whole-class or small-group instruction, individualized tutoring, and independent study. Students will develop projects, carry out research, and showcase their final products via computers, but they will also read books, conduct

Figure 1: Next Generation Learning Building Blocks



experiments, assemble models, and present their work in person to teachers, classmates, and others. Technology-based delivery will be critical insofar as it loosens the resource constraints of traditional models — human capital, time, and space.

Second, the most important use of technology will be on the "back-end" of an instructional model. It is information technology, with an emphasis on "information," that will drive effective NGL models. While some of the promise of NGL is in ***how*** instruction is delivered to the student, much more of the benefit is likely to be derived from ***what*** is being taught, ***when,*** and ***to whom***? NGL models will leverage information technology to assist educators in making the thousands of micro decisions that result in differentiated teaching and learning. "The technological advancements that get the headlines — iPads, online textbooks, etc.," offered one interviewee, "are not next generation learning. Most of the technology in a next generation classroom happens behind the scenes."

Third, interviewees overwhelmingly challenged the idea that next generation learning necessarily minimizes teacher-student interaction. "People think we're trying to create a world where students are taught by computers," explained one entrepreneur. "It is actually the opposite. If we can use technology to assist teachers with assessment and grading, then teachers will have more time to interact with their students."

Next Generation Learning Building Blocks

Next generation learning has generated considerable enthusiasm among education leaders, many of whom agree on a general vision of what the future might hold. There is less agreement, however, regarding the details of what needs to be done. There will ultimately be many flavors of NGL, but to ensure that emerging models go beyond pilot stage to influence student learning gains at scale, there are some essential elements that funders, school developers, practitioners, entrepreneurs, administrators, and policymakers should consider.

To achieve the vision outlined above, interviewees identified common design features that will be required across a diverse set of approaches. Despite the wide variety of individual school models, next generation models will necessarily rest on three building blocks: 1) knowing the student through frequent diagnosis and assessment facilitated by data platforms and learning algorithms, 2) modular, unbundled content and learning activities pegged to world-class standards, and 3) a variety of delivery methods. In combination, these components can potentially bring high levels of personalization to student learning.

Building Block #1: Knowing the Student
Next generation models keep track of students' learning progress with periodic (often daily) assessments. These might take the form of a brief quiz at the end of the day or, as models develop, diagnostics that are fully integrated into core learning activities. For example, some students at Rocketship Education, a California-based charter management organization, receive an extra 100 minutes of online instruction daily to reinforce their regular classroom learning and address specific skill gaps in literacy or math.

For many NGL models, *knowing the student* will be about far more than assessing student skill. Some schools spend time surveying students, parents, and teachers on student interests and learning styles to further improve personalization. Daily student assessment results also provide valuable data on learning preferences. "A student may say she learns best through online programs," said one entrepreneur. "But if her assessment results are better after receiving large group instruction, then that's what she'll receive."

Building Block #2: Modular Content
The goal of *knowing the student*, of course, is to provide students with unique, personalized instruction. Consequently, next generation content is necessarily informed by ongoing student assessment. If an assessment determines, for instance, that a seventh grade baseball enthusiast doesn't understand adding fractions with unlike denominators, that student may benefit from a baseball-focused fraction lesson. NGL schools establish precise alignment between content and assessment so that students receive instruction tailored to their individual needs.

Next generation content must also be modular, capable of being "unbundled" at the level of specific skills. Modular content is necessary to provide the proper instruction to each student at the appropriate time. Very few next generation schools will use a single textbook; instead, schools collect individual lessons from a variety of content providers. As a result, the typical next generation school model will require a tremendous volume of modular content.

Modular content enables next generation schools to advance students through a sequence of skills, commonly called a learning progression. Students progress at their own pace, moving on to a new lesson or learning activity as soon as they master the one preceding it. Advanced students can move quickly through standards they already understand, while struggling students receive targeted instruction focused on the exact skills they have not yet mastered. Ultimately, modular content creates opportunity to accelerate successful learning for all students.

Building Block #3: Variety of Delivery Methods
Next generation schools will offer students a wide variety of learning experiences, not only in terms of content but in the delivery methods used to match students' learning styles. Some classrooms are already integrating multiple delivery methods, including teacher-led instruction, online instruction, one-on-one tutoring, collaborative learning, and more. A handful of schools even offer anytime/anywhere learning over the internet, a benefit for students with part-time jobs, for example, or students who want to take courses not currently offered by their schools.

Some next generation schools also offer project-based learning, providing students with internships, post-secondary courses, volunteer activities, and other opportunities. "Our robust assessment system provides us the flexibility to let students experiment with new learning experiences," said one entrepreneur. "If they're not learning, we'll know soon enough, and we'll make adjustments." The ultimate goal is student engagement, finding a way to deepen the learning experience and allow students to pursue activities that interest and motivate them.

Flexible and creative uses of time and human resources allow schools to maximize the variety of delivery methods offered to students. Many NGL models seek to deploy teachers in new, more efficient ways. "Why should it always be one teacher in front of 30 students?" asked one district official. "If students are taking a test or reinforcing material they've already learned, you

only need a ratio of 1 to 50. On the other hand, if you're trying to help a student learn a lesson for a third or fourth time, you'll want a ratio of 1 to 3. Next generation learning provides that flexibility."

Next generation models have found other innovative ways to utilize and support teachers. Some models emphasize the role of the teacher as content expert, encouraging them to focus deeply on specific topics and lessons. Other models foster teachers' own professional growth, giving novice teachers easier assignments (for instance, one-on-one tutoring) and gradually promoting them to more difficult ones (such as instruction in front of a large group.) As expectations for teaching and learning deepen with the growth of next generation models, it becomes necessary to re-envision the role of the teacher and the required supports.

Data Platforms and Algorithms

In a single day, a next generation classroom might produce thousands of valuable pieces of data through its assessment program. Each assessment offers information on student learning gains, student learning style and interest, lesson quality, and other variables. Many next generation schools have established robust systems for data capture that provide a variety of benefits, including fine-grained information on students' interests and learning need, a sophisticated understanding of the impact of specific curricula, and critical data on teacher skill.

Some learning models are developing *learning algorithms* that continually refine and personalize individual student instruction. For instance, if the majority of students pass the fractions assessment after taking a specific lesson, the algorithm prioritizes that lesson for use by future students. If an individual student's assessment results improve after working collaboratively with peers, that student will be assigned a higher percentage of collaborative lessons. If assessment results reveal that students perform best on decimals after receiving a lesson from a specific teacher, that teacher can provide professional development to the entire teaching staff.

At the school level, integrated learning management systems link content to assessment and inform decisions about how content will be delivered. By comparison, a district-level student management system should integrate content, assessment, and technology, but it may also include human capital strategies, professional learning, school design, and student supports. Currently, players from multiple markets (including publishers, technology vendors, and non-profit organizations) are trying to position themselves as "integrators" and gain share of this relatively new market.

System Management, Research, and Policy Considerations

If these emerging models of learning are not to remain boutique experiences for a very few students, "beautiful exceptions" that do not become the norm, we must view these new models not as ends unto themselves, but as sources of design specifications around which education systems must be redesigned in order to facilitate next generation learning at scale. If we are to provide personalized, performance-based, world-class learning experiences to all children, what are the implications for how schools, districts, states and community agencies use their time, money, people, buildings, and technology?

Federal, state, and district policies, management structures, and research and development capacity are all potential barriers to scaling next generation learning. A critical question moving forward is: what system-level supports will enable large-scale adoption of next generation learning?

Next generation learning continues to generate significant enthusiasm. Advocacy organizations like Digital Learning Now! and the International Association for K-12 Online Learning (iNACOL) continue to promote the advancement of personalized learning. Despite this progress, next generation learning is still very much in an early phase, with only a small number of nascent models operating across the country. In spite of their differences, these models share common elements and building blocks. With these common elements of NGL identified, leaders in the field can now focus on enabling education entrepreneurs, working in the public and nonprofit sectors as well as in for-profit ventures, to continue to innovate, develop even more diverse and complete models, and begin to scale the early successes. The critical challenges for the immediate future include breaking down system-level barriers that currently prevent growth and bringing the movement to scale. Our second paper, *Next Generation Learning – Scaling the Opportunity*, addresses those issues.

Carnegie Corporation of New York

Carnegie Corporation of New York is a philanthropic foundation created by Andrew Carnegie in 1911 to do "real and permanent good in this world." The Corporation makes grants to promote international peace and to advance education and knowledge—primary concerns to which Mr. Carnegie devoted the foundation. Through its urban and higher education programming, the foundation strives to enable all students, including historically underserved populations and immigrants, to achieve academic success and perform with high levels of creative, scientific, and technological knowledge and skill. Current priorities include upgrading the standards and assessments that guide student learning, improving teaching and ensuring that effective teachers are well deployed in our nation's schools, and promoting innovative new school and system designs.

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The Opportunity Equation

The Opportunity Equation promotes equity and excellence in mathematics and science education for all students. A partnership between the Institute for Advanced Study and Carnegie Corporation of New York, Opportunity Equation engages national and local decision makers and thought leaders to establish common mathematics and science standards that are fewer, clearer, and higher, coupled with high-quality assessments; improve math and science teaching, along with methods to recruit, prepare, support, and manage the nation's teaching talent; and redesign schools and systems to deliver math and science learning more effectively. The initiative was created to carry out the recommendations of the Carnegie-IAS Commission on Mathematics and Science Education in its 2009 report, *The Opportunity Equation: Transforming Mathematics and Science Education for Citizenship and the Global Economy.*

The Parthenon Group

The Parthenon Group is a leading advisory firm focused on strategy consulting, with offices in Boston, London, Mumbai, and San Francisco. Since its inception in 1991, the firm has embraced a unique approach to strategic advisory services built on long-term client relationships, a willingness to share risk, an entrepreneurial spirit, and customized insights. Parthenon's education practice—the Education Center of Excellence (ECE)—is the first of its kind across management consulting firms, and operates under the explicit mission and vision to be the leading strategy advisor to the global education industry. Parthenon invests significantly in dedicated ECE management and team resources to ensure that its global expertise extends across public sector and non-profit education providers, foundations, for-profit companies and service providers, and investors.

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Stupski Foundation

The Stupski Foundation works to improve life options for children of color and poverty by contributing to the transformation of the K-12 public education system. We seek to catalyze a new student-centered system for public education rooted in personalization and to develop a new learning paradigm that take advantage of recent research and technology advances. The foundation works with students, parents, teachers, and education and community leaders. We are partnering with the Council of Chief State School Officers (CCSSO) to form the Partnership for Next Generation Learning Innovation Lab Network. This Network will incubate new models both inside and outside of the public education system and support innovation in practice, policy, and structure at the state, district, school, and student levels.

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