The Future of Learning:
Personalized, Adaptive, and Competency-Based

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WHITE PAPER

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INTRODUCTION

We are in the midst of a revolution in K–12 education, represented by the shift to digital, highly personalized learning. Students, educators, parents, and policymakers are finding compelling ways to use multiple modalities and technologies to enrich learning and personalize instruction.

The use of technology-powered blended learning holds great promise as a cost-effective and egalitarian means to help greater numbers of young people accelerate their learning, graduate, and meet challenges in a competitive world.

The key to making personalized learning work for the greatest number of students is adaptive digital environments and experiences, particularly Intelligent Adaptive Learning™ with its ability to precisely adjust to the individual learner. By recalibrating with every interaction to maintain appropriate challenges, learners stay in their optimal learning zone and are enabled to meet their full learning potential. This exciting advance in education has the potential to be the "equalizer" that provides greater access and opportunity for students in our society, regardless of their backgrounds or zip codes.

WHAT'S HAPPENING?

About two-thirds of American students leave school unprepared for college or a career. With rising expectations and increasing numbers of students living in poverty, American K–12 education is faced with greater challenges than ever before.

A few school districts and school networks have optimized the existing age-based, time-bound cohort model of education, but their results fall short of preparing all students, and the models can prove difficult to replicate under typical circumstances.

While the level of challenge has never been higher, there has also never been a better opportunity to help more students succeed. We are living through the most important change in how human beings gain access to information and educational opportunities—it may be more significant than the printing press, and it's certainly happening faster. For two decades, Internet learning resources have grown exponentially. It's now possible for anyone (with an Internet connection and the interest) to find information, experts, or courses on virtually any topic. In the last two years we've seen the best professors in the world begin offering their classes for free via the Internet. Engaging and adaptive content is replacing flat and sequential instructional materials in K–12 classrooms as well—often due to bottom-up adoption from forward-leaning teachers. Investment in new tools and schools is exploding and new models from preschool to graduate school are demonstrating encouraging results.

The three greatest benefits of the shift to personal digital learning include:

1. Engagement that boosts persistence;
2. Calibrated content providing lessons at the right level boosts learning progress; and
3. Access to the Internet, additional devices, and the expanded availability of great teachers and smart content extends learning and opportunity.

These benefits of digital learning—motivation, customization, and equalization—create the potential to develop new learning environments that help more students succeed.[1]

Funded by the Bill & Melinda Gates Foundation, the *Next Generation Learning Challenge* (NGLC) grantees provide examples of schools that are creating the path forward with technology-powered and engaging student-centered models. Learning isn't limited to a school site or school day, and students progress based on demonstrated mastery. Jobs for the Future provides a similar synthesis of the positive trends and developments in *Students at the Center*.

Similarly, *Opportunity by Design* from Carnegie Corporation is an initiative based on the emerging opportunity set:

The implementation of the Common Core is an unprecedented chance to "do school differently" for greater impact. While progress at the state level has been significant, we must also seize this opportunity to redesign schools to enable personalized learning. This means fundamentally reshaping the use of human capacity, technology, time, and money, to provide both recuperative and accelerative opportunities for all students. This will open pathways for more young people to graduate.

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We live in challenging times but as these initiatives and papers suggest, there has never been a better chance to create schools that work better for students and teachers.

WHAT IS BLENDED LEARNING?

Great teachers have long used multiple modalities to enrich learning and personalize instruction. Broadly defined, blended learning is multimodal—it blends different methods of instruction to improve student learning.

By harnessing the power of technology, blended learning empowers teachers with new multimodal strategies and allows teachers to personalize learning more efficiently.

Blended learning environments incorporate a regular shift to an online or digital environment for a portion of the day to boost student and teacher productivity.

Blended learning may include but is not limited to technology-enhanced traditional practices such as presenting on an interactive whiteboard, sharing digital content, or asking students to conduct online research. The *Christensen Institute* adds that blended learning also gives students some element of "control over time, place, path, and/or pace."[2]

Because blended learning reorients the system around individual learners, the shift to blended learning changes how schools operate, how students experience learning and progress and how teachers interact with students and each other. Individual teachers can blend classrooms, but it requires systemic leadership to blend schools, because doing so impacts every aspect of operation.

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WHY BLENDED LEARNING?

Combining multiple modes of instruction may not be easy but it can be transformative for both students and teachers. There are 10 potential benefits of a blended learning environment:

1. More lessons at the right level
2. Improved student engagement, motivation, and persistence[3]
3. Better diagnosis of learning difficulties and gaps[4]
4. More time for teachers to provide informed small group instruction
5. The opportunity to extend the day and year—without a bigger budget[5]
6. The opportunity for teachers to work together in a more professional, collaborative, data-driven environment[6]
7. A competency-based environment where students progress as they demonstrate mastery—and get the time to achieve it[7]
8. Improved progress tracking and, in a growing number of schools, a broad dashboard of success metrics[8]
9. Improved parent communication and involvement[9]
10. Improved sustainability for schools struggling with budget pressures[10]
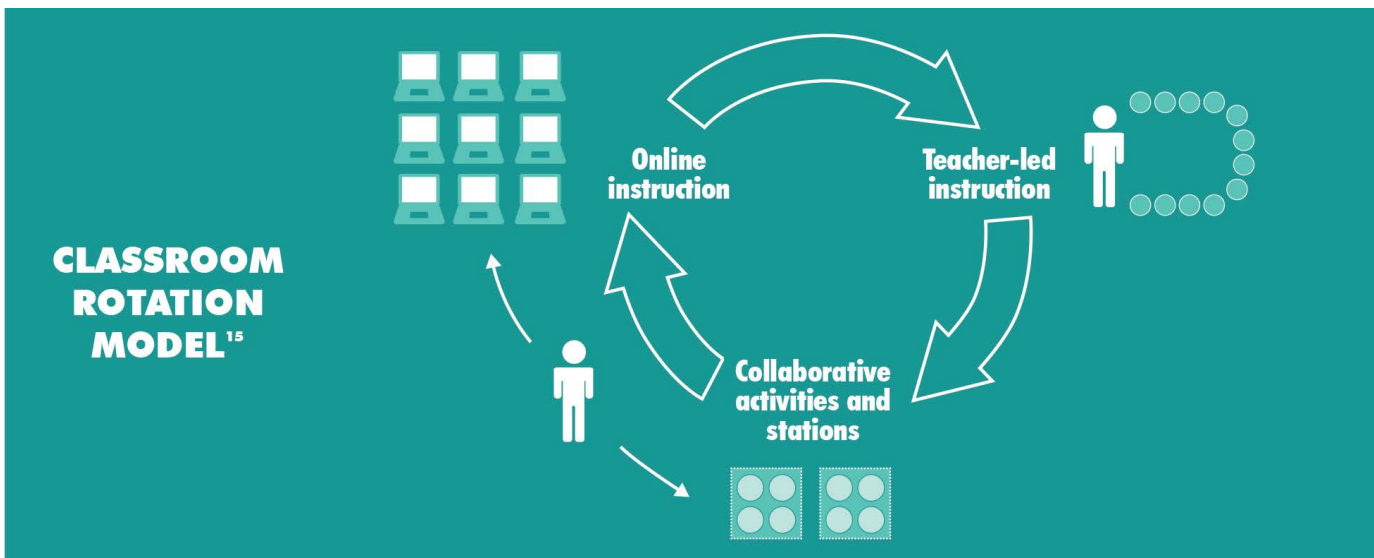
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BLENDED TRENDS

Over the last 15 years, the most common blended learning model has been lab rotation, where students spend a portion of their time in a computer lab, usually three to five times per week. Lab rotation models have been used successfully from preschool to graduate school as well as in corporate and military training scenarios. When mobile devices were expensive and when most digital content was resident on local servers, lab models were a cost effective way to boost student access to technology.

Lab models remain an important delivery system for server and Flash-based content that doesn't run as well on some mobile devices. Lab rotation models are still common in elementary schools but even when used with success, districts and networks find it challenging to connect the lab instruction and assessment to classroom activities.[11]

Plummeting device costs and cloud-based instructional software have created opportunities for more flexible instructional models that move beyond traditional lab rotations and boost student access to technology. This is evidenced by the growing prevalence of classroom rotation models, where students use different devices as they move through stations inside their existing classroom. Teachers have been rotating students through learning experiences for decades and therefore find this form of blended learning relatively easy to implement.

CLASSROOM ROTATION MODEL[15]

Online instruction · Teacher-led instruction · Collaborative activities and stations

Source: DigitalLearningNow.com

Moving a step beyond classroom rotation models, the combination of better device access and more sophisticated software has led to the development of school-wide blends that allow teachers to work in teams to move students seamlessly through multi-grade sequences. School-wide blends are driving improved conditions and career opportunities for teachers, and a growing number of schools are creating what *Public Impact* calls an *Opportunity Culture.* These models leverage highly effective teachers and support new teachers with contemporary staffing patterns, structures and schedules.[12]

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While the shift to blended learning represents a growing trend in K–12 education, the *Blended Learning Implementation Guide* points out that the shift "is not just another district initiative" but rather "a large-scale opportunity to develop schools that are more productive for students and teachers by personalizing education to ensure that the right resources and interventions reach the right students at the right time."[13] Implementing blended learning means more than ordering a truckload of the latest devices without a school-wide instructional plan. Rather, blended learning implementation begins with defining academic goals, reorienting the system around students, and then employing technology to create a more personalized learning environment.

WHAT DOES THIS HAVE TO DO WITH COMMON STANDARDS?

New common standards for college- and career-readiness pose both challenges and opportunities. Incorporating blended learning strategies while adopting new standards makes for a daunting duo. However, it is very difficult to help all students reach these high standards without the more productive instructional models that blended learning affords.

Teachers in states that have adopted Common Core State Standards (CCSS) are beginning to enjoy improved ability to share tools and resources. For example:

- Over 9,000 teachers and administrators have scored more than 7.3 million standards and uploaded more than 48,000 assessments aligned to the Common Core using *MasteryConnect*[14]

- The *Literacy Design Collaborative* is working with 39 professional development providers nationally to help teachers create thought provoking Core-aligned reading and writing tasks

- Over 150,000 teachers are sharing video resources on *LearnZillion*, with around 5,000 more signing up each week[15]

- Many of the 2 million teachers on *Edmodo* share lessons and resources

- Combined, *ShareMyLesson* and *BetterLesson* offer nearly a half million resources

- Millions of students every month benefit from Core-aligned open content including *Khan Academy*, *OpenEd*, *CK12*, *Gooru*, and *PowerMyLearning*

WHAT IS PERSONALIZATION?

The U.S. Department of Education's National Education Technology Plan calls for "an alternative to the one-size-fits-all model of teaching and learning." Championing personalized learning, the report goes on to explain,

"Personalization refers to instruction that is paced to learning needs (i.e., individualized), tailored to learning preferences (i.e., differentiated), and tailored to the specific interests of different learners. In an environment that is fully personalized, the learning objectives and content as well as the method and pace may all vary."

We've been grouping students by birthdate out of convenience for more than 100 years, resulting in 100 years of evidence that this batch-processing model doesn't work very well for students or teachers. In traditional classrooms, some students are bored because they are not challenged and others are frustrated because they are unprepared for the current lesson.

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American classrooms have grown more diverse in every respect, thereby expanding the range of challenges that most teachers face. When added to the pressures of accountability, test-based evaluation, and stagnant budgets, even maintaining the status quo is untenable.

The alternative to the factory model is a more personalized learning environment where all students are engaged and learning at their own pace in the best way possible for each of them. This is achievable—at scale—with improved Internet access, new adaptive technology, and competency-based learning environments. Promising models suggest that it is possible to serve more students well while improving working conditions for teachers.

The most compelling reason to shift to online and blended learning is the potential to keep students at the center of the learning experience. The NGLC grant program that supports "breakthrough school models" lays out the following design principles of personalized learning related to instruction:

- **Student centered:** Designed to meet the diverse learning needs of each student every day

- **High expectations:** Committed to ensuring that every student will meet clearly defined, rigorous standards that will prepare him or her for success in college and career

- **Self-pacing and mastery-based credit:** Enables students to move at their own optimal pace and receive credit when they can demonstrate mastery of the material

- **Blended instruction:** Optimizes teacher and technology-delivered instruction in group and individual work; requiring that at least 25 percent of all students' core literacy and math learning time be spent using digital content that gives students control over their path and pace

- **Student ownership:** Empowers students with the skills, information, and tools they need to manage their own learning

WHAT IS COMPETENCY-BASED LEARNING?

CompetencyWorks, a project of the *International Association for K-12 Online Learning* (iNACOL), defines competency education as a system in which students advance upon mastery, as determined by assessing a set of explicit, measurable competencies over time. Teachers use ongoing, authentic and integrated assessments to gather information about where students are on their individual learning trajectories in order to guide curriculum and instruction. Because students must "show what they know," learning becomes the metric for student evaluation, not seat-time or birth date.

While technology is not a prerequisite for competency education, learning environments that offer easy and reliable access to blended and online opportunities certainly streamline the assessment and feedback loop for teachers and students. In *The Shift from Cohorts to Competency*, the authors explain that advances in technology are making it possible to bring competency education to scale, thanks to the growing set of tools that can customize learning. Additionally, the authors contend that, "Without leveraging technology and discovering new ways to use time and resources differently, we will fail to achieve the goals

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of college- and career-ready standards like the CCSS. Shifting to competency education is an important step in this process."

WHAT IS ADAPTIVE LEARNING?

In its simplest terms, adaptive learning uses the computer/tablet as an interactive device to engage students with educational material according to student learning needs. How well it adapts to the individual is entirely dependent on the sophistication of the software that drives the device. The same sophisticated, predictive, intelligent use of data that has accustomed us to personalization in online shopping and music, and show us content we are mostly likely to appreciate and potentially use, has come to learning and education. Smart instructional content adjusts its path based on response to questions. Like computer games, adaptive systems calibrate the difficulty to maintain an appropriate level of challenge. But there is a level beyond shopping and gaming where an entirely new class of adaptive learning software exists, and it is called Intelligent Adaptive Learning™.

WHAT IS THE POWER OF INTELLIGENT ADAPTIVE LEARNING™?

Beyond passively delivering previously recorded lessons, presenting digitized textbooks, or providing memorization drills, the best educational use of technology involves assessments and levels of interactivity that approximate human levels of coaching. Intelligent Adaptive Learning™ is a next generation education technology that enables new learning experiences, and adjusts path and pace to stay within the child's zone of optimized learning to accelerate understanding and critical thinking. The system also provides formative and summative data to the student's teacher to enable a more personalized experience in the classroom.

This advanced form of digital learning is designed to provide:

- **Intelligent analysis of a student's solutions:** The system interacts with the student by analyzing the data from the student's actions in real time as he solves problems, explores concepts, and makes decisions

- **Interactive problem solving support:** Extensive, detailed feedback provides prompts to the student that encourage him to rethink his strategies and solutions, and ultimately correct his own misunderstandings or mistakes by furthering his understanding; instead of simply "telling" a novice student what the "next step" of an expert's strategy would be, the system emulates the questions and feedback of an effective teacher

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- **Curriculum sequencing:** The system sequences each student's progression through the modularized curriculum by providing an optimal planned sequence of lessons and curriculum units as the student demonstrates readiness

- **Multiple learning experiences:** The intelligent adaptive learning system uses pedagogically sound approaches that support students as they learn important concepts and skills; tasks are meaningful, at an optimal level of difficulty for the student, and contextualized in ways that enable students to build schemas so they can make sense of the concept within the world around them

- **Customized presentation and pace:** Diagnostic, adaptive assessments are embedded within each lesson to assess mastery in a fluid, transparent way that doesn't create anxiety for students; as a student progresses through the system, his pace is determined by how quickly he demonstrates mastery of a concept, thus allowing pace to vary between learners

CASE STUDY: CLEVELAND ELEMENTARY

Principal Cynthia White has come full circle. Last year, she decided to accept the principal position at *Cleveland Elementary School*, which was the lowest performing elementary school in its Santa Barbara, California District, and the same school where she started her career as Kindergarten teacher 30 years ago. After a decade of teaching, White moved into administration roles for the following 20 years. Just previous to this principalship, she served as the district's Curriculum Director, so she was very well prepared to take on a challenge.

Cleveland Elementary educates over 400 students every day, ranging from PreK to sixth grade. Although White sits in an office with a million-dollar view, overlooking the majestic Pacific Ocean, the population of her school is far from living the type of life the view might suggest. Eighty-five percent of her students live at the poverty level. Santa Barbara is a destination town but most of the families at Cleveland are the working poor—the first or second generation to live in this country working in the tourist industry and living on scant hourly wages. Seventy-five percent of the students know English as their second language. These are the well-known circumstances that make it difficult for schools to achieve high success rates for their students.

But Cleveland is defying the odds. When White took the reins last year, the school was equipped with computers from the early 1990s. The speed and capabilities of the machines were virtually

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worthless. She knew she had to immediately replace these computers and develop an infrastructure in the school that would support 21st century learning for her students. "You have to have a laser-like focus on what kids really need to be successful in the future," says White, and it is clear that it is that laser focus that determines the decisions she makes for the school as a whole.

First, White convinced her site council to purchase 96 brand new laptops and divided them among the third grade classrooms, so that each classroom had enough devices for one-third of the class to be on the computers at one time. Next, she knew the school needed a strong Wi-Fi network in place and got that established. She also knew it was essential to have the support to keep the computers online and working properly, so Cleveland employs an IT specialist that not only keeps the school devices in check but is also available to help school families with their own personal devices— which means either having them bring their machines to the school or deploying him to go out to the students' homes. White values the importance of her students having unlimited access to online learning while at school and at home.

Once confident that the school's digital infrastructure was sound, White could comfortably introduce online learning opportunities for her students. From her experience as the district's Curriculum Director, *DreamBox* was at the top of her list. Although considered "expensive" by some schools, White knew this was a definite case of "you get what you pay for." In fact, she felt so confident in the product that she disappointed many of her teachers who were pushing for "topic software"—software that directly aligns text and teaching materials—and chose to invest solely in DreamBox.

Last year, White launched an "opt-in" pilot program of DreamBox for her third grade teachers from October until December. During the first few months, the third grade teachers employed an instructional rotation model, with students simultaneously working with a teacher in small groups, independently, or at a computer on the DreamBox Math program for 20–30 minutes each day. Despite the teachers' initial worries that DreamBox would not affect student achievement because it was not coherent with class instruction, they actually noticed that the students were making progress and starting to understand new number concepts by the second month of the program. The students' *CAT (California Achievement Test)* scores saw a huge jump from just the year before.

The staff at Cleveland now recognize that digital, adaptive learning is the wave of the future and not taking advantage of it and providing it for students is unwise because this is exactly how these students will be functioning and learning for the rest of their lives.

Even the teacher most adamantly against the adoption decided to keep an open mind, give the program a test run and accept the results. When she saw that every one of her students moved up an entire proficiency level and no student was left behind, still struggling to master what they had worked on throughout the year, she quickly became a firm believer in the program.

After the pilot wrapped up in December, DreamBox remained an opt-in program at Cleveland Elementary. As of this April, every teacher is still using DreamBox as part of their math program… towards the common goal of strengthening the quality of learning for students. Using DreamBox has definitely unified the staff and helped them work successfully towards the common goal of strengthening the level of instruction for students, and in turn, boosting test scores, achievement levels, and student confidence.

CONCLUSION

Given the increasing demands on classroom teachers and schools—higher class sizes, fewer resources, and more differentiated learning needs—educational technologies are a valuable tool for complementing the curriculum and personalizing learning experiences for students in new ways.

Breakthrough Intelligent Adaptive Learning™ fulfills all the criteria for excellence in education specified by the U.S. Department of Education, and has proven to be a pedagogically sound, cost-effective, student-centric, and competency-based learning solution. When children experience the sense of confidence, independence, and mastery fostered by Intelligent Adaptive Learning™, they become more persistent and proficient. The increased ability to persist, think critically, and strategize is important tools to foster progress and success throughout school, in college, in their careers, and in life.

For children who experience the sense of confidence and mastery fostered by Intelligent Adaptive Learning™, some for the first time, their ability to persist, think critically and strategize will serve them beyond school and give them the important tools to progress and succeed in college, careers, and in life.

DISCLOSURES

DreamBox Learning, Pearson, and Digital Learning Now! are Getting Smart Advocacy Partners. Edmodo, LearnZillion, Gooru, and MasteryConnect are Learn Capital portfolio companies, where Tom Vander Ark is a partner. Tom is a Director at iNACOL.

AUTHOR BIO

Author & CEO, Getting Smart

Tom Vander Ark is the author of Getting Smart: How Digital Learning is Changing the World, and the founder of Getting Smart, an education advocacy firm. Tom advocates for innovations that customize and motivate learning and extend access. Tom is also a partner in Learn Capital, an education venture capital firm investing in EdTech startups. Previously he served as President of the X PRIZE Foundation and was the first Executive Director of Education for the Bill & Melinda Gates Foundation. Tom served as a public school superintendent in Washington State and has extensive private sector experience. A prolific writer and speaker, Tom has published thousands of articles. He writes a daily EdWeek blog, "Vander Ark on Innovation", and makes regular contributions to *GettingSmart.com*. Tom is a director of the International Association for K—12 Online Learning (iNACOL) and several other nonprofits. Tom received the Distinguished Achievement Medal and graduated from the Colorado School of Mines. He received his M.B.A. in finance from the University of Denver.

(ENDNOTES)

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DreamBox Learning was founded in 2006 in Bellevue, Washington, and is transforming the way students learn mathematics through its groundbreaking combination of Intelligent Adaptive Learning™, rigorous elementary mathematics curriculum, and motivating learning environment. DreamBox Learning Math is designed to teach and reinforce key mathematical concepts through effective, individualized lessons in an engaging and fun manner, and is aligned with the Common Core State Standards. The platform has won more than 20 top education and technology industry awards and is in use in all 50 states. Learn more about DreamBox Learning at dreambox.com.

For more information, contact Client Care at 877.451.7845, email **schools@dreambox.com** or visit **dreambox.com**.