BEST PRACTICES FOR EVALUATING DIGITAL CURRICULA

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WHITE PAPER

Blended learning, which combines face-to-face classroom instruction with online learning, has the potential to improve education while helping schools meet the challenge of ensuring high achievement for all students.

Introduction

Technological advances and innovations have changed countless aspects of our lives and are increasingly being used to design new approaches in education. At a time when demands on schools are growing but resources are decreasing, many educators are looking for technologies that can support the personal learning needs of even more diverse groups of students. Blended learning, which combines face-to-face classroom instruction with online learning, has the potential to improve education while helping schools meet the challenge of ensuring high achievement for all students.

One of the most important steps to take when implementing a blended learning model is to critically evaluate digital curricular resources. With the requirement for schools to meet rigorous benchmarks such as the Common Core State Standards (CCSS) while classroom sizes are growing and budgets are shrinking, the quality of digital curricula significantly impacts how well it can empower both educators and learners to meet their goals. With new technologies and programs continually being released, how do educators effectively evaluate and select high-quality digital curricula from the vast array of both open-source and proprietary resources?

A thorough evaluation of digital curricula requires defining goals, honoring learning principles, research analysis, and a focus on student empowerment and critical thinking. This white paper discusses some of the unique considerations involved with selecting digital resources and includes an evaluation criteria checklist to help educators in their search to find appropriate tools that will improve student learning outcomes.

Blended learning is the means. Improving student outcomes is the goal.

As with any educational initiative or strategy, a blended learning model and the digital curricula used in conjunction with it should deepen student understanding, critical thinking, and independent problem-solving capabilities as outlined in the Common Core and other standards documents.

As educators begin the search for appropriate digital curricula, consider the observation of education authors and consultants Grant Wiggins and Jay McTighe: "Contemporary school reform efforts and the related assessments typically focus too much on various means: structure (such as block scheduling), programs (such as Success for All), professional development (such as book study), curriculum (such as mapping), and instructional practices (such as cooperative learning). Certainly, such reforms serve as the fuel for the school improvement engine, but they must not be mistaken as the destination...Today's educational leaders must remain vigilant about the confusion between means and ends by constantly reminding staff of the desired results: improved learning."[2] Educators selecting curricular resources for blended learning models should avoid placing too much focus on inputs (actions by teachers and structures in the school) rather than outputs (evidence of improved student learning outcomes). Educators must continually maintain their focus on learning outcomes as they work toward redefining, refining, and making use of new school models and technologies.

It's tempting and easy to shift away from learning to concentrate on trends like "flipped classrooms" and exciting devices such as the iPad®, but ultimately, blended learning is a strategy to improve achievement for every learner by making learning experiences more personal and relevant.

"Blended Learning is a formal education program in which a student learns at least in part through online delivery of content and instruction, and at least part in a supervised brick-and-mortar location away from home, with some element of student control over time, place, path, and/or pace."

—Heather Staker and Michael B. Horn, "Classifying K–12 Blended Learning"[1]

BLENDED LEARNING APPROACHES SHOULD BE EVIDENCE-BASED AND HONOR ESTABLISHED PRINCIPLES

What's interesting about the term "blended learning" is that we don't typically see the term "blended" used outside of the educational sphere. For example, there aren't "blended" hospitals that practice "blended healing". Because medical professionals understand a great deal about how the body heals and how that process can be assisted by various treatments, they find and use technologies that honor biological principles to help restore patients to health. The healing process is necessarily personal and treatments are personalized, but doctors don't call the use of technology "blended medicine". They simply call it good, evidence-based medicine, and there is usually strong agreement about these practices throughout the profession and medical institutions.

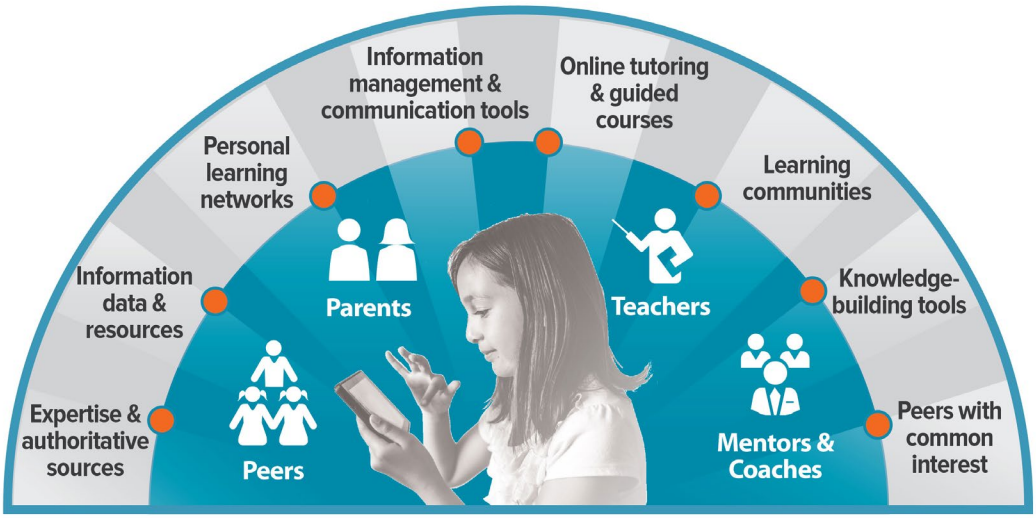
Yet that's still not the case in education. It's not because we don't know what good, evidence-based learning principles are—it's because, despite decades of research validating principles about how the brain develops cognitively, there are still ongoing philosophical disagreements about how students learn best. To make further progress toward high achievement for all students, educators need to agree upon and make use of the educational research: we understand how people develop understanding, we know how students engage to make sense of things, and we've researched how knowledge acquisition and transfer are effectively accomplished. Learning resources—both print and digital—must honor these basic principles.

A readable synthesis of research findings from cognitive psychology that informs the work of many professional educators is *How People Learn: Brain, Mind, Experience, and School*[3] (a publication of the National Research Council). It summarizes decades of research in learning, particularly contextualized learning and cognition and has been validated by additional research since its original publication. For educators developing blended learning environments, this book describes optimal, research-based practices that empower students as they learn. The following list is derived from an Executive Summary[4] by the authors of *How People Learn:*

The ability to think and solve problems requires that knowledge of a subject area be accessible and linked to current understanding. Designs for subject area study should help students learn with understanding instead of promoting the acquisition of disconnected sets of facts and skills.

- **Student-centered environments.** Effective learning begins with what learners bring to the environment; this includes cultural practices and beliefs, as well as knowledge of academic content. Evidence shows that learners use their current knowledge to construct new knowledge and what they know and believe at the moment affects how they interpret new information.
- **Knowledge-centered environments.** The ability to think and solve problems requires that knowledge of a subject area be accessible and linked to current understanding. Designs for subject area study should help students learn with understanding instead of promoting the acquisition of disconnected sets of facts and skills.
- **Assessment-centered environments.** Students' thinking must be made visible, and feedback must be provided on an ongoing basis to give them the opportunity to revise and improve the quality of their thinking and understanding. The kinds of assessment chosen should reflect their learning goals.
- **Community-centered environments.** The learning environment should promote a sense of community. Classroom norms should encourage students to learn from one another and support one another's improvement. Learning in school should be connected with outside learning activities.

High standards require high student empowerment.



Source: Transforming American Education, National Education Technology Plan 2010, U.S. Department of Education[5]

As we work toward improving student learning and transforming education in ways that better meet the needs of all students, schools should hold both classroom learning and online learning to the same rigorous standards—with an unrelenting focus on bringing highly personalized learning to empower each student. Many parents and educators are looking to the abundance of new apps and games as a way to individualize learning. While there isn't a definitive number of new apps, at the end of 2013 both the Apple and Google app stores each had more than one million apps available, a growing number of which are considered educational.[6] The proliferation of digital curricula makes it even more important for educators to be discerning and to critically test and judge software before incorporating it into a blended learning program.

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REVIEWS AND INFORMATION ABOUT DIGITAL CURRICULA AND RESOURCES

A few organizations have started the process of cataloging new digital learning programs and associated reviews. The following two resources could prove helpful for educators as they begin to research information about blended learning and start on the path from evaluating printed material to reviewing digital curricula.

- Graphite, a kind of *Consumer Reports* for digital curricula, is an offshoot of Common Sense Media. This well-organized site provides unbiased, relevant information for educators. Graphite makes it easy for parents and teachers to find digital learning tools by presenting them with independent ratings and reviews based on a rubric that evaluates learning potential. The site couples in-depth analysis of ed-tech products with insights from teachers and parents about use and implementation.
- The Center for Digital Education (CDE) covers education technology in all its forms, and provides original stories, analysis, and perspective based on current research. A division of eRepublic, CDE is a national research and advisory institute that provides free in-depth reports, white papers, research, videos, and market briefings.

As more review sites like these are created, educators need to keep in mind that digital curricula must be able to accomplish the defined learning outcomes. Digital curricula should be evaluated based on alignment with relevant standards just as all print curricula developed, evaluated, and purchased by educators or schools have been for decades.

With tight budgets, many educators are looking for quick ways to locate free resources to use with students. Tom Vander Ark's white paper, "The Future of Learning"[7] includes information about how teachers in states that have adopted the Common Core State Standards (CCSS) are beginning to enjoy improved ability to share free tools and resources such as:

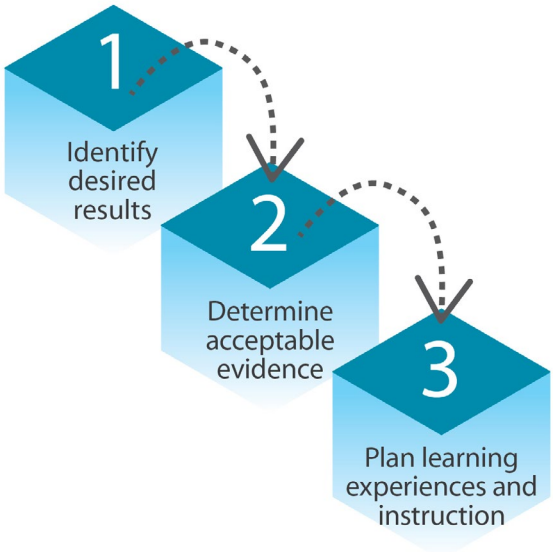
- MasteryConnect. Over 9,000 teachers and administrators have scored more than 7.3 million standards and uploaded more than 48,000 assessments aligned to the Common Core.
- The Literacy Design Collaborative. This organization works with 39 professional development providers nationally to help teachers create thought-provoking and Core-aligned reading and writing tasks.
- LearnZillion. Over 150,000 teachers are sharing video resources on LearnZillion, with around 5,000 more signing up each week.
- Edmodo. Many of the 2 million teachers on Edmodo share lessons and resources.
- Share My Lesson and BetterLesson. Combined, these sites offer nearly a half million resources.
- Khan Academy, OpenEd, CK12, Gooru, and PowerMyLearning. Millions of students access open-source content aligned with CCSS every month.

The most effective way to design learning programs, lessons, and schools is to plan with the end in mind. That way learning goals inform when and why students need certain lessons designed in certain ways, as well as whether in-person or self-directed digital experiences would be appropriate to support their success.

"Planning backwards" is the strategy. Student accomplishment is the objective.

The most effective way to design learning programs, lessons, and schools is to plan with the end in mind. That way learning goals inform when and why students need certain lessons designed in certain ways, as well as whether in-person or self-directed digital experiences would be most appropriate to support their success. While this chart is a simplification, "planning backward" is an effective three-step design strategy described in *Understanding by Design*.[8]

Planning "Backward"



Source: McTighe and Wiggins, 2005[9]

The process of planning backwards begins by defining the learning outcomes you want for students. Educators need to use relevant state standards and the local district's mission to define what students should understand and be able to accomplish as a result of the curriculum and school experience. Next, decide what evidence of learning is needed to ensure that educators know with confidence that students have met the defined learning goals. This stage involves creating assessments and documenting what should be seen in student work and performance.

The final stage involves planning specific learning experiences and instruction for students. The majority of pedagogical decisions are made during this stage. The most important point to note about this phase is that educators should create or adopt both print and digital resources that not only honor effective and research-based principles of learning, but will also truly align with the defined learning goals and evidence of learning to be collected. One of the exciting and promising aspects of digital learning resources is that they have the potential to engage students pedagogically in more interactive and innovative ways than traditional textbooks and print resources. Therefore, educators need a way to analyze whether digital curricula enhance learning through new ways of making sense of ideas or whether the technology simply digitizes existing print resources.

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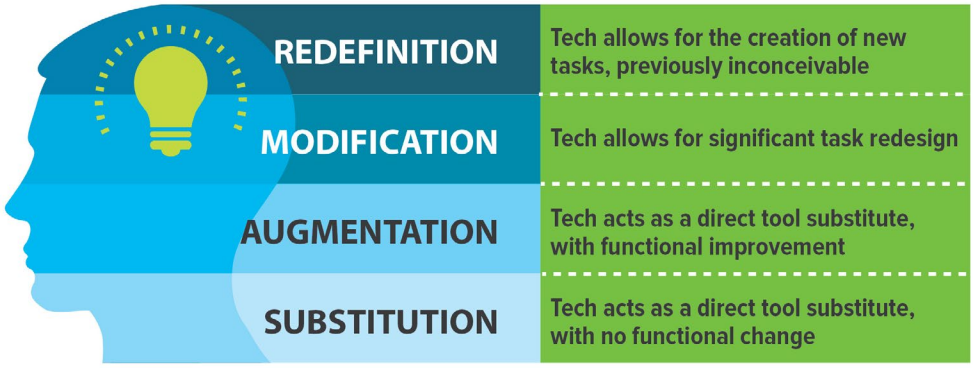
The SAMR Model as a tool for finding transformational experiences.

To determine whether a digital curricular resource is engaging students in new and effective ways, educators can use the Substitution/Augmentation/Modification/Redefinition (SAMR) model, created by Dr. Ruben Puentedura and described in "Transformation, Technology and Education."[10] The first two of the four categories in the SAMR model—Substitution and Augmentation—represent technology uses that are simply enhancements to existing non-digital resources. The second two categories—Modification and Redefinition—describe when a technology or application is truly transformative.

In general, educators should avoid using technology with students in ways that simply directly substitute digital resources for existing print resources. For example, a digitized drill worksheet viewed on a tablet or laptop doesn't significantly change or improve a student's learning because the educational task—the drill—hasn't been significantly altered. If a print worksheet is simply replicated via scanning or photography, and then presented on a tablet, it would classify only as a technoligcal Substitution. Though minor functional improvements may exist, the educational value isn't different. A digitized worksheet could perhaps qualify as an Augmentation if it empowers data collection of student answers and reports the information to a teacher. While that doesn't change the pedagogical design of the task, it may be considered an improvement because it assists the teacher.



Source: Ruben R. Puentedura's weblog[11]

The highest levels of the SAMR model describe transformative modifications and redefinitions that enable students to use technology to engage in new tasks that were inconceivable without technology. The key recurring question to ask as educators select digital curricular resources is, "Are we using technology in meaningful, modifying, redefining ways or are we just substituting for resources and practices we've always used?" Given the powerful interactions that digital technologies can facilitate for students, educators should focus on digital curricula that supply new and transformative learning tasks for students.

The following is adapted from my Guest Column in EdTech Digest, "Adaptive" Learning Technologies: Pedagogy Should Drive Platform.

UNDERSTANDING ADAPTIVE TECHNOLOGY
Beyond mere recommendation engines.

The word "adaptive" is increasingly being used in claims describing how technologies personalize and individualize education uniquely for each student.

Developers have built adaptive "recommendation engines" with the worthy goals of;

- ensuring the success of every student
- enabling each student to learn at her own pace and level of achievable challenge
- supporting teachers whose daily challenge is differentiating for an entire classroom of students who are all at different points on their learning paths

A primary way in which any adaptive platform supports teachers is by making recommendations for students in real time. Teachers are stretched thin and work tirelessly for their students; it's asking too much to require that they also analyze individual student data and make unique assignments for every student on a daily or weekly basis.

REAL-TIME RECOMMENDATIONS

A primary way in which any adaptive platform supports teachers is by making recommendations for students in real time. Teachers are stretched thin and work tirelessly for their students; it's asking too much to require that they also analyze individual student data and make unique assignments for every student on a daily or weekly basis. Not only is this continuous data analysis cycle challenging and time-consuming, it also requires deep curriculum expertise in order to preserve what the authors of the Common Core refer to as "consistent progressions" and "coherent connections" as students learn and develop.

Similar to how Netflix makes entertainment recommendations, most "adaptive" platforms begin with existing, static content such as textbook passages, online lectures, and quiz or standardized assessment items. Usually, this content is very narrow in scope in order to isolate specific skills and diagnose errors in using those skills. Next, this content is arranged into a sequence (or "learning map") based on a best guess of how students should encounter the skills. When students begin lessons, their progress data, behaviors (such as click-rates or login times) and assessment scores are subjected to "learning analytics" to establish a learner profile and position on the lesson map. That profile is then used to recommend lectures, choose lesson sequences, and report usage insights such as suggested study and practice times. Additional analytics are then applied so that crowd-sourced user behaviors inform and adjust the learning map and sequencing for future students.

INHERENT LIMITATIONS

While this "behavioral profile" platform design is effective for making entertainment recommendations, it has several weaknesses and limitations when applied directly to learning.

Transformative digital content that enables students to make sense of things on their own requires a different kind of adaptive platform—an Intelligent Adaptive Learning™ platform—that can provide feedback based on how students think for themselves in new situations.

1. It replicates many of the mistakes of Individually Prescribed Instruction (IPI)—most notably the flawed assumption that "learning comes about by the accretion of little bits [of information]."[12]
2. Such a platform is completely dependent on a pedagogical model where the teacher (or system) "delivers" content and students become "receivers" of information. The lessons and instruction are static, and students therefore never engage in authentic, independent thinking. Such a platform may collect mountains of data, but they are not data about students' understanding and cognitive development; they are data about behaviors and the ability to replicate procedures on shallow assessment items.
3. The "adaptivity" for students who are not making progress is essentially recommending that they passively receive the same or similar static content again. It seems that for online lectures, the strategy of "pause and rewind" has become the 21st century equivalent of a teacher speaking "slower and louder."

Even though "adaptive learning" developers have noble goals, the design of each adaptive platform reveals important pedagogical approaches and assumptions made by the developers. The adaptive platform determines the pedagogy and the ways students engage with learning, and not all adaptive platforms are capable of supporting strong pedagogy and rich learning tasks.

The SAMR model is valuable for evaluating the quality of "adaptive" digital curricula. In many cases, adaptive platforms are only capable of presenting students with tasks that are substitutions for existing print materials or augmentations resulting from digitizing static content or textbooks. Truly innovative learning platforms should enable the creation of new digital learning experiences that pedagogically engage students in ways that are not possible without technology.

NEXT-GENERATION INTELLIGENT ADAPTIVE LEARNING. Redefining educational technology.

As educators know from cognitive research and their own experiences, learning isn't accomplished by putting thoughts into a mind, but rather by empowering a mind to generate thoughts. Transformative digital content that enables students to make sense of things on their own requires a different kind of adaptive platform—an Intelligent Adaptive Learning™ platform—that can provide feedback based on how students think for themselves in new situations. The "intelligent" difference lies in the pedagogy and transformative nature of the digital content—a great example of the Redefinition category in the SAMR model.

POWERFUL PEDAGOGY

When created by experienced classroom teachers, lessons written for an Intelligent Adaptive Learning platform can decipher students' thought processes based on each student's interactions with the digital tools. The pedagogical power in these learning experiences enables teachers to design lessons that respond to different strategies, answers, and mistakes in specific ways; ideally just as a teacher would in person. An Intelligent Adaptive Learning platform uses pedagogy designed to empower students to develop ideas and skills in a way that makes the most of technology and supports self-directed learning and problem solving.

EMPOWERING STUDENT REALIZATIONS

Lessons written for an Intelligent Adaptive Learning platform are designed to adapt in real time and aren't simply digitized static content that replicate print resources. Instead, they are built from the ground up to be interactive and adapt at any moment to the ideas of any student. Truly intelligent adaptivity uses non-linear sequencing informed by decades of research about natural cognitive development and growth in reasoning instead of being generated from crowd-sourcing other students' behaviors with digitized print materials.

The adaptive technology and curriculum design should be developed in tandem to embrace the true nature of learning. Learning is a complex, interconnected process that develops as students have experiences in which they reason inductively and deductively. As research has verified, students need to have the opportunity to learn concepts and construct their own knowledge and understanding in a way that accounts for their unique prior understanding, knowledge, and skills.

DATA-DRIVEN LEARNING AND THE "JUST RIGHT" MOMENT

A key component of effective personalized learning environments is ensuring that the most current data about an individual student informs customized content for that student. Intelligent Adaptive Learning provides lessons and tasks that support a student's learning exactly when she needs it. It seamlessly blends exploration, fluency, and assessment while it tracks, analyzes, and responds to everything: answers, strategies, specific mistakes, and interactions. Based on the data collected about a student and how that individual demonstrated evidence of her thought process, Intelligent Adaptive Learning technology responds with immediate, personalized assistance and adjusts the level of difficulty, complexity, scaffolding, sequencing, number of hints, and the pacing of problems based upon each student's unique needs. In addition, by providing teachers with real-time, actionable

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data, it improves their effectiveness in tailoring classroom instruction. And when the curriculum is aligned to the Common Core and other standards, it supports implementation and success with those learning goals.

CONTINUOUS FORMATIVE ASSESSMENT AND INSTRUCTION FOR THE HIGHEST LEVEL OF PERSONALIZATION

To be truly personal, assessment for a student should be seamless and happen "in the moment." By tracking, analyzing, and responding every time a student takes an action to demonstrate her thinking, Intelligent Adaptive Learning software is at work in that moment. In addition to this continuous and ongoing embedded formative assessment, the learning software improves learning because every lesson provides tasks in which students are able to show their thinking. Through rich, interactive, and open-ended problem solving lessons, the platform is able to capture every decision a student makes as well as data regarding response time, strategies used, types of mistakes made, and more. These scaffolds and supports are developed in cooperation with learning experts and practicing classroom teachers.

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The idea behind continuous assessment isn't just to enable providing a slightly more difficult or easier problem in response to a single answer. It's also to understand the strategy being used by the student when an answer was submitted. This level of adaptation and personalization is what students need in order to understand key ideas, increase achievement, and experience long-lasting confidence as learners in any subject content area.

PUTTING IT ALL TOGETHER.
Critically evaluating digital curricular resources.

A logical starting point to begin your evaluation process is to assess potential digital curricula against a list of specific criteria. Not only does It require you to develop the criteria and features that will be support student learning, but it is also a way to simplify "apples-to-apples" comparisons between curricula. The checklist included here offers sample curricula to facilitate the process, but you may want to rank the criteria based on what's most important in your own blended learning environment.

SAMPLE DIGITAL CURRICULA EVALUATION CHECKLIST

LEARNING EXPERIENCES AND INSTRUCTION	
Uses evidence-based design principles outlined in standards documents and educational research literature	
Develops habits of mind and ways of thinking (e.g., Common Core State Standards for Mathematical Practice, NGSS Science and Engineering Practices, or Process Standards)	
Engaging digital content using technology in transformative ways (SAMR)	
Enables independent learning and understanding of new concepts	
Enables independent practice skills	
Engages students in deep learning experiences	
Promotes thinking across multiple grade levels (coherence & connections)	
Supports standards alignment relevant to school, district, and/or state	
Provides accommodations for ELL students	
Provides appropriate support for students with learning disabilities	
ASSESSMENT, PERSONALIZATION, AND ADAPTIVITY	
Uses continuous, embedded formative assessment to adapt during every lesson	
Provides specific, useful feedback to learners	
Provides responsive scaffolding supports for sense-making and differentiation	
Provides individualized learning paths with elements of student choice	
Adapts between lessons (recommendations)	
Engaging environment that's fun for students and makes learning enjoyable	
Empower's students to persist and progress	
Uses intelligent Adaptive Learning Technology	
STUDENT REPORTING	
Provides actionable, real-time student data to inform instruction	
Standards-based reporting	
Prepares students for upcoming standardized assessments	
Trial and demo options available	
Supports home-school partnership with progress reporting for parents	
IMPLEMENTATION AND INFRASTRUCTURE	
Fast and easy to implement	
Professional development support for initial and continued success	
Available in the cloud and delivered online or via an app	
Available on devices within the school or district (via web or app)	
Works on operating systems needed within the school or district	
Enables 24/7 access from home	
Compatible with both touch-based and mouse-based environments	

NEXT STEPS.
Implementation integrity for success.

Once educators have selected digital curricula, the adoption and inclusion of these resources will be more successful when the implementation is strong and educators understrand how the technology that matches their needs and aligns with expectations for engaging student thinking and improving student learning. Project Red has identified nine key implementation factors most strongly linked to education success.[13]

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Rank Order of Predictive Strength:

1. Intervention classes: Technology is integrated into every intervention class period
2. Change management leadership by principal: Leaders provide time for teacher professional learning and collaboration at least monthly
3. Online collaboration: Students use technology daily for online collaboration (games/simulations and social media)
4. Core subjects: Technology is integrated into core curriculum weekly or more frequently
5. Online formative assessments: Assessments are done at least weekly
6. Student-to-computer ratio: Lower ratios improve outcomes
7. Virtual field trips: With more frequent use, virtual trips are more powerful—the best schools do these at least monthly
8. Search engines: Students use daily
9. Principal training: Principals are trained in teacher buy-in, best practices, and technology-transformed learning

THE NEED FOR PLANNING AND PROFESSIONAL DEVELOPMENT

The recent iPad® implementation challenges in the Los Angeles Unified School District14 point to several key concerns such as providing adequate time for implementation and paying close attention to professional development. These are common problems in implementing online learning programs and blended learning models. Allowing time for the necessary professional learning for teachers often requires months of planning and piloting, so these key development aspects need to be built into your planning process.

THE NEED FOR BROADBAND

An estimated 72 percent of public schools have connections that are too slow to take full advantage of digital learning. Furthermore, the average school has about the same capacity as the average American home, while serving 200 times as many users.[15] Another commonly reported problem is insufficient Internet bandwidth to support the substantial increase in devices in a 1:1 initiative, which leads to student and teacher frustration and reduced usage levels.

While government agencies, non-profit groups, and companies are working to solve these problems, educators must consider these factors to ensure students have sufficient access to digital tools. If a school or district needs to upgrade their technology access, the federal government E-rate program could provide assistance and help defray the costs of improving Internet access.

Conclusion

The evaluation and selection of high-quality digital curricula to support students can be the answer to many challenges: meeting new standards, supporting diverse student populations, helping underperforming learners, challenging students working above grade level, and enabling teachers to "do more with less" in their classrooms. Whether a school is building a blended learning program or simply wants to enhance learning with technology, it is critical to evaluate the quality of digital learning programs in order to select technologies that will have a positive impact on student performance. The goal is to have students at every learning level empowered as learners and thinkers so they can become proficient, reach higher levels of achievement, and enjoy success in school and in life.

About the Author

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Dr. Tim Hudson is a teacher and education leader who frequently writes and speaks about the goals of learning and educational strategies. At DreamBox, he oversees the development of innovative and interactive digital lessons that differentiate and adapt uniquely for each student. Prior to joining DreamBox, he spent over 10 years in public education, first as a high school math teacher and then as the Math Curriculum Coordinator for a K–12 school district of over 17,000 students, where he also helped facilitate the district's long-range strategic planning efforts. A frequent speaker and consultant about curriculum and schooling designs, Dr. Hudson co-authored the chapter entitled "Classrooms Where Children Learn" in a book published by the National Council of Teachers of Mathematics.

Endnotes

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LEARNING

Bellevue, Washington, and launched its first online learning product in January 2009. DreamBox Learning Math has won more than 35 top education and technology industry awards and is in use in all 50 U.S. states and throughout Canada. The DreamBox Learning Math platform offers a groundbreaking combination of Intelligent Adaptive Learning™ technology, a rigorous mathematics curriculum, and a highly motivating learning environment. DreamBox Learning Math captures every decision a student makes while working in the program and adjusts the student's learning path appropriately, providing millions of individualized learning paths, each one tailored to a student's unique needs. DreamBox supports teachers and their practice in every type of learning environment, offline or online. For more information about DreamBox Learning Math and the DreamBox Math for iPad app, please visit: dreambox.com.

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