

RESEARCH **PROFESSIONAL PAPER**

EVIDENCE IN SUPPORT
OF SEVEN DIMENSIONS OF
A DIGITAL FIRST, HIGH-TECH,
HIGH-TOUCH VISION
FOR LEARNING



THE HMH RESEARCH MISSION STATEMENT

Houghton Mifflin Harcourt® (HMH®) is committed to developing innovative educational solutions and professional services that are grounded in learning science evidence and efficacy. We collaborate with school districts and third-party research organizations to conduct research that provides information to help improve educational outcomes for students, teachers, and leaders at the classroom, school, and district levels. We believe strongly in a mixed-methods approach to our research, an approach that provides meaningful and contextualized information and results.

A MESSAGE FROM

JACK LYNCH, HMH CEO



We have now entered what will mostly likely be known as the “post-pandemic” era, and the focus is on recovery for both students and teachers.

At HMH, we are always exploring two questions: what role *can* technology play in K–12 learning, and what role *should* it play? Even as an edtech company, we know that technology alone will not bring about a new era in education. As the potential benefits of edtech have become apparent, we are working to build a classroom of the future that fuses the power of technology with the proven benefit that comes with the social gathering of school communities, what we see as the “high-tech, high-touch” classroom.

Since the forcing function of the early pandemic, we now have classrooms where virtually everyone has access to a Chromebook or iPad. We have teachers that are far more proficient at using technology than they were two years ago and truly believe that it can help them personalize learning for all their students. What was once an aspirational, long-term goal now feels possible.

However, despite these great gains in the realm of access to and experience with technology, it is the “high-touch” part that is most critical. Kids need the social interaction with teachers and the benefits of the social gathering of the classroom to learn effectively. We all recognize that the relationship built and nurtured between teacher and student is foundational to academic and social-emotional growth and drives engagement. We are focused on the many ways that we can bring “high-tech” and “high-touch” together in a mutually reinforcing way and reject the false choice that classrooms must choose between tech-enabled and human connection.

In the following pages, you’ll find support drawn from both experience and evidence for this best-of-both-worlds approach. We view the “high-tech, high-touch” classroom through the lens of seven dimensions, seven key components of the interplay between technology and in-person gathering, which range from foundational elements like an integrated and personalized teaching and learning platform to virtual teaching assistants to data-driven insights to a new focus on social and emotional learning and more. Within this resource, you will learn more about each dimension and its importance.

At HMH, our digital first, connected strategy is enabling this new era. I believe our definition of the ideal future of the classroom will continue to evolve as we embrace digital solutions with a community-oriented, connected, and human mindset. We have the chance to build the classroom that our educators and students unequivocally need—now’s the time to rise to meet this high-stakes moment.

A handwritten signature of Jack Lynch in black ink. The signature is fluid and cursive, with the first name 'Jack' and last name 'Lynch' clearly legible.

Jack Lynch
President and Chief Executive Officer

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INTRODUCTION

OVERVIEW

For the first time in the history of the nation's schools, educators are responding to the same crisis at the same time—the effects of a pandemic which continues to significantly impact the academic outcomes and wellbeing of our students. With this in mind, HMM has identified Seven Dimensions of a Digital First, High-Tech, High-Touch Vision for Learning. These elements reflect lessons learned from HMM's education partners, representing a wide range of school districts throughout the country who are united in their sense of urgency when it comes to mitigating the adverse effects of the pandemic and seizing the opportunity to transform the entire system into one that achieves better results for all.

The seven dimensions of a digital first, high-tech, high-touch vision for learning presented in this report are both drawn from experience and evidence-based. This report provides the research evidence in support of the following:

1. The Power of Outcome Analytics
2. An Intensified Focus on Social and Emotional Learning
3. A Platform to Support Collaboration and Group Interaction
4. The Potential of Virtual Teaching Assistants to Improve Teachers' Working Conditions
5. Insight to Instruction: Building Bridges with Personalized Adaptive Instruction
6. Professional Learning to Support Individual Development and Collective Efficacy
7. A Platform to Support Integrated and Differentiated Teaching

This is a once-in-a-career opportunity for us to accelerate work that is already underway in these seven areas and to take on new transformational goals. The experience of our education partners and the evidence provided here are offered in support of the effort to ensure that all of our children and youth thrive in our schools and achieve their potential so that they also thrive in life and have their own positive impact on the world.

DIMENSION 1: THE POWER OF OUTCOME ANALYTICS

Today's high-tech, high-touch learning environment can help accelerate student achievement, as well as support the growth and development of teachers and leaders, ultimately improving school quality. Outcome analytics, or the analysis of outcome data (such as student performance results, student behavioral issues, and teacher satisfaction), can provide great insight to teachers as they reflect and plan learning opportunities and guide students' social growth and development. Outcome analytics, when done well, provide the bedrock for making effective data-informed decisions.

Through the implementation of outcome analytics, teachers and school leaders can use data-informed decision making to guide instruction and opportunities for strategic professional development. At its simplest, data-informed decision making is as follows: (a) define the problem; (b) determine the data needed to address the problem; (c) collect the relevant data; (d) analyze the data; (e) reflect and determine a plan for action; (f) implement the plan for action; and (g) re-evaluate the problem and begin the cycle again, if/when needed.

The U.S. Department of Education, Institute of Education Sciences (IES) examined 20 years of research to determine the most effective approach to using student achievement data to support instructional decision making (Hamilton et al., 2009). Based on this research review, IES recommends the following guidance to schools:

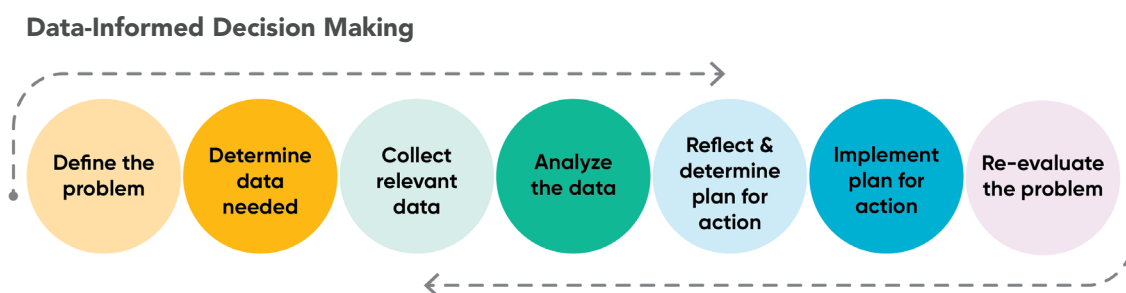
1. Make data part of an ongoing cycle of instructional improvement.
2. Teach students to examine their own data and set learning goals.
3. Establish a clear vision of schoolwide data use.
4. Provide supports that foster a data-driven (data-informed) culture within the school.
5. Develop and maintain a districtwide data system.

Case study research on school improvement lends additional support for data-informed decision making. Ronka and colleagues' (2010) review of research found that three conditions were essential to effective data-driven (data-informed) decision making: data quality, data capacity, and data culture.

To support implementation of data-informed decision making, IES (Gerzon & Guckenburger, 2015), building on the work of Ronka et al. (2010), created a toolkit designed to support building a culture of data use. Based on their research review, IES identified five essential elements found in districts and schools with effective data-use practices. Specifically, they:

1. Participated in the flow of information for data use.
2. Provided resources and assistance to make meaning from data (insights).
3. Communicated professional expectations for data use.
4. Provided professional development on data-use knowledge and skills.
5. Provided leadership to nurture a culture of data use.

Schools today generate and collect large amounts of data, often in support of data-informed decision making. Susan B. Neuman's (2016) research reminds us to stay focused on using data to drive improvement, being sure to also include soft data (such as student's body language). As we look forward to the high-tech, high-touch learning environments of the future, we must continue to focus on the importance of content-rich instruction for student learning (Neuman, 2016). From there, teachers can employ data-informed instruction, monitor student progress, and refine future instruction.



DIMENSION 2: AN INTENSIFIED FOCUS ON SOCIAL AND EMOTIONAL LEARNING

Social and emotional learning (SEL) has played an important role in students' learning even before the pandemic, but the need to focus more intently on students' wellbeing was heightened due to the pandemic's longer-lasting effects. The American Psychological Association (APA, 2020) reported that 81% of adolescents aged 13–17 had experienced more stress and increased anxiety during the COVID-19 pandemic. Similar findings of young people's increased rate of depression, anxiety, trauma, loneliness, and suicidal tendencies have resulted in the American Academy of Pediatrics, the American Academy of Child and Adolescent Psychiatry, and the Children's Hospital Association to declare a National State of Emergency in children's mental health (American Academy of Pediatrics, 2022).

In addition, teachers were negatively impacted by the pandemic. With the challenges of juggling remote, hybrid, and in-person instruction; frequent flip-flopping between remote and in-person learning environments; implementing COVID protocols within the classroom; needing to accelerate students' learning due to interrupted schooling; and navigating their own personal stressors from the pandemic, teachers reported increased stress and anxiety. Consequently, 53% of teachers said they were thinking of leaving the profession more now than they were before the pandemic, and 27% of teachers had self-reported symptoms consistent with clinical depression (CDC Foundation, 2021).

CASEL FRAMEWORK

With all this in mind, the need for administrators, educators, families, and students to come together to support one another and one's wellbeing is more urgent and critical than before. The Collaborative for Academic, Social, and Emotional Learning (CASEL) provides an SEL framework that takes an ecological approach to social and emotional development that supports and encompasses all individuals within the educational system. The guidelines recognize that multiple environments, including the classroom, the school, the student's home, and the larger community, interact to support or inhibit social and emotional development.

Within the CASEL framework are the five core competencies listed below. When prioritized across settings—districts, schools, classrooms, families, and the wider community—SEL competencies can prepare students for academic success, school and civic engagement, health and wellness, and fulfilling careers (CASEL, 2020).



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1. **Self-awareness:** The individual's ability to recognize and label their emotions, to recognize their strengths, and to build skills related to confidence and self-efficacy.
2. **Self-management:** The ability to regulate one's actions, thoughts, and emotions in any situation or environment. This competency includes skills such as impulse control, stress management, self-motivation, perseverance, goal setting, and organizational skills.
3. **Social awareness:** This competency is related to understanding that other people have different perspectives and are worthy of respect. It includes having empathy for others and appreciating diversity.
4. **Relationship skills:** These skills involve the ability to create and maintain healthy relationships with people regardless of their abilities or backgrounds. This competency focuses on social engagement, communicating clearly, working cooperatively, and negotiating conflict, as well as seeking and offering help.
5. **Responsible decision-making:** This includes making personal and social choices that are related to ethics, safety, and social norms, as well as considering the consequences of those choices.

In order to support our students to achieve their academic goals, it is paramount to attend to and nurture students' social and emotional development so they can each reach their fullest potential.

DIMENSION 3: A PLATFORM TO SUPPORT COLLABORATION AND GROUP INTERACTION

Student learning is maximized when learners have the ability to ask questions and receive feedback (Metcalf et al., 2009). Such communication is the foundation of building strong relationships between students and teachers. These relationships are critical as they build trust between educators and students. This trust is a critical element of creating a successful classroom dynamic (Adams & Forsyth, 2009). Further, researchers have demonstrated that developing trust is crucial in digital/virtual learning environments (Du et al., 2017).

However, it has become increasingly clear that fostering purposeful group interactions is more difficult in a digital/virtual learning environment.

When teachers are able to build strong connections with students that encourages trust, the entire classroom experience is dramatically enriched. When these bonds among students and teachers exist, student engagement is increased, students' sense of self-worth is improved, and greater learning takes place (Cornelius-White, 2007). Students learning in digital/virtual environments are more likely to share their viewpoints and provide support to their peers when trust is present (Du et al., 2017).

The benefits of interaction in the learning process extends beyond simply teacher-student communication. When students have the ability to work with and learn from one another, their learning is also significantly enhanced through group interaction. The ability for students to work together in groups provides opportunities for practice, tutoring, and both formal and informal instruction, and has a number of general cognitive and social-emotional benefits (Wilkinson & Fung, 2002).

Thus, a digital learning platform should provide multiple modes of group interaction that allow teachers and students several occasions to interact directly with one another. Utilizing tools such as screencasts, polls, and presentations, teachers can communicate with the entire class, small groups, or one on one with students. These dynamic features provide authentic and real-time feedback that mirror the interactions students are accustomed to experiencing in the physical classroom, helping to foster trust in the learning process.

More importantly, these technologies must provide opportunities for both virtual and in-person communication and collaboration among students and teachers. Neither mode of delivery is favored as teachers can seamlessly switch from digital platforms to in-person conversations and instruction, by incorporating components of a "connected

teaching and learning system" (Houghton Mifflin Harcourt, 2021; Lynch, 2020). In addition, such flexibility allows for group interaction beyond just the teacher and student.

Access to "quality learning environments" enables students both to collaborate and interact with one another, which has both direct and indirect effects on learning (Brindley et al., 2009). Further, collaborative learning allows for students to be exposed to diverse perspectives and encourages students to learn from each other (Palloff & Pratt, 2005). Providing a means for students to partner together to complete assignments, share information and learning, as well as socialize, is essential in a digital/virtual learning environment.

Fostering trust among peer groups is also necessary to improve collaboration and group interaction. Research by Du and colleagues (2017) found that when trust exists in peer groups, online collaboration and interactivity between group members is heightened. Additionally, the same researchers reported that the use of digital media also increased when group members engaged more with each other and trusted one another.

When interactivity in online learning is enriched, students take a more active role in the learning process. Further, there is the opportunity for greater feedback from both teachers and peers, with online interaction allowing for more chances for learning and personal growth (Swan, 2002).

Digital platforms need to support students' ability to interact meaningfully with one another, to build trusting relationships and ultimately enhance student learning. Teachers can play a supportive role as students learn how to navigate online platforms and develop good communication habits. Encouraging the use of online tools to collaborate, ask and answer questions, as well as socialize, will inevitably lead to more engaged learners.

A well-thought-out platform can provide several ways that students and teachers can connect with one another in a digital medium. Teachers can create groups that allow students to work jointly on assignments and tasks. Messaging capabilities exist to allow students to communicate with each other when working independently. These different forms of online communication must work not only when at school, but also when students are at home. A good platform can provide learning that occurs beyond the classroom in a safe, and secure, online space that encourages group communication and investigation.

DIMENSION 4: THE POTENTIAL OF VIRTUAL TEACHING ASSISTANTS TO IMPROVE TEACHERS' WORKING CONDITIONS

The pandemic accelerated educators' reliance on technology, and its applications permeated throughout classrooms and schools across the nation, thereby transforming the way students learn, educators teach, and administrators manage resources and interpret data. Advances in the fields of artificial intelligence (AI), human-computer interaction and hardware systems, and the development of "intelligent" computer-based assessments and instruction, now known as the Intelligent Tutoring System, have evolved from computer laboratories and are increasingly being implemented into mainstream classrooms with positive results.

Artificial intelligence is increasingly being integrated with common technology used within our daily lives, particularly embedding speech recognition software—in smart phones, smart watches, smart speakers, and smart cars, to name a few. Although artificial intelligence has been researched since the 1940s in academic laboratories, its application into mainstream schools and Tier 1 classrooms within the past two decades is becoming more widespread. In literary instruction, for example, AI tools have been enhancing instruction in foundational literacy skills, fluency, comprehension, and writing.

One of the driving forces of the widespread uses of AI in education is providing students with adaptive learning paths and integrating AI in educational games to enhance interactivity and motivation. There are numerous ways AI has the potential to transform the educational landscape (eSchool News, 2017; Utermohlen, 2018):

- 1. Automation of Administrative Tasks:** Grading homework, accessing students' multiple-choice assessments, and evaluating writing assignments are time-consuming tasks for educators. AI software that can expedite these tasks, archive students' data, and report out on students' progress frees up teachers' time to focus on students who need more one-on-one or small-group instruction.
- 2. Addition of Smart Content:** AI can help digitize textbooks or create customizable learning digital interfaces that apply to students of all age ranges and grades.
- 3. Smart Tutors and Personalized Instruction:** Professors and teachers may have limited time, but smart tutoring systems allow all students within a classroom to have access to a tutor that provides individualized instructional support.
- 4. Universal Access for All Students:** AI tools allow students with specific disabilities to access instructional content using features such as text-to-speech, speech-to-text, translations, etc.
- 5. Out-of-School Time (OST) Instruction:** AI software can allow students to access digital content and instruction outside of the school hours. Extending instruction time can assist students who need additional practice or support students in a virtual learning environment.

When AI software is implemented effectively within a classroom and students are engaged with online practice on the computer, the classroom teacher is freed to concentrate efforts on individual student needs or to provide targeted small-group instruction. Because AI-based software provides teachers with electronically collected and organized information about students' individual work through online assessments and program usage, the data can be extremely useful for individualizing instruction.

DIMENSION 5: INSIGHT TO INSTRUCTION: BUILDING BRIDGES WITH PERSONALIZED ADAPTIVE INSTRUCTION

The promise of personalized learning is one of the main drivers for integrating technology into education. Personalized learning optimizes the pace, content, and instructional approach for each individual learner (U.S. Department of Education, Office of Educational Technology, 2017). School leaders, teachers, and students can all see the potential value of instruction that is tailored to each student's interests and needs. If implemented effectively, this approach should increase students' motivation to learn and ability to achieve their learning goals.

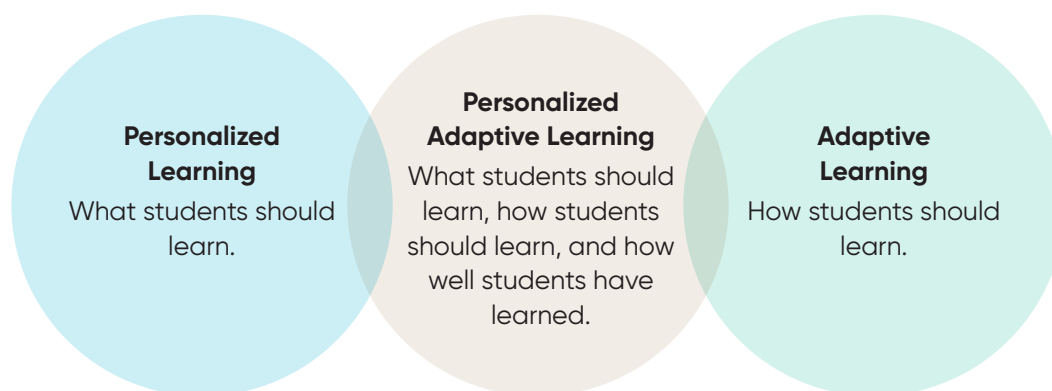
Adaptive learning uses data and technology to monitor student progress and adjust instruction to help students master learning objectives (Adams Becker et al., 2017). Adaptive learning integrates learning sciences and technology to create personalized learning pathways that are adjusted based on the learners' progress.

Personalized adaptive learning is a "technology-empowered effective pedagogy which can adaptively adjust teaching strategies . . . based on real-time monitored (enabled by smart technology) learners' differences and changes in individual characteristics, individual performance, and personal development" (Peng et al., 2019). Personalized adaptive data-driven instruction helps teachers decide what students should learn, how students should learn, and how well students have learned. What students should learn is based on the individual characteristics of the student. Recommendation engines can factor in the student's interests and needs and compile an organized list of resources. How students learn is informed by the student's performance data and adjusts activities based on this data. Finally, a personalized adaptive learning environment assesses how well the student has learned and then recommends additional resources to scaffold instruction. A personalized adaptive learning environment accomplishes

these tasks through learner profiles, competency-based progression, personal learning, and flexible learning environments (Peng et al., 2019).

Personalized adaptive learning environments generate massive amounts of data on individual students, but the ways that the data is stored, accessed, and analyzed can have enormous repercussions on learning. Without an effective system for making the data meaningful and actionable for teachers, it is largely useless. Teachers know they can use data to adjust their instruction but often do not have the time or resources to use it in a meaningful and effective way. They know data can be more actionable and better linked to their curriculum materials, but making sense of it can be overwhelming. Teachers want more training and meaningful professional learning opportunities to develop their data analytics skills and refine instructional best practices (Eicholz et al., 2018). Research focused on learning data in smart learning environments has thus far focused more on technological approaches than on pedagogical approaches (Cheung et al., 2021).

A thoughtful, user-friendly approach to data management, including collection, storage, and analysis, is critical to ensure that teachers and administrators can track and respond to behavior, attendance, and achievement for every student. Smart learning environments that make learning data easy to use can help teachers spend less time planning instruction and more time supporting students. Personalized adaptive learning environments also show promise in providing more equitable education to students (Palanisamy et al., 2021). By linking student progress to content that the student is interested in and effective instructional practices, personalized adaptive learning has the potential to accelerate learning for all students.



DIMENSION 6: PROFESSIONAL LEARNING TO SUPPORT INDIVIDUAL DEVELOPMENT AND COLLECTIVE EFFICACY

Identifying effective professional development has been a high priority for the United States government, local school districts, and educational organizations for years. Vetting and scaling these efforts can cost billions. Teacher professional development is estimated to cost up to \$18 billion yearly, around half of which is spent on workshops (TNTP, 2015). Given the considerable investment being made, how can school leaders be sure this money is well spent?

Finding a trusted professional learning partner is key. Houghton Mifflin Harcourt (HMH) has years of experience collaborating with school districts to help set goals and effectively plan, encourage collaboration, co-construct coaching situations, personalize professional learning, co-develop teachers' pedagogy, accelerate technology adoption, and monitor progress towards system goals. By taking a personalized approach, the professional learning offered can be adapted to the changing needs of teachers and school leaders.

HMH Professional Services provides school districts with unique solutions that are proven and based upon years of efficacy research, including *Implementation Matters: Systems for Success* (Salinger et al., 2010), which detailed what is needed for a successful adoption and implementation of *Read 180*®. This report, written in partnership with the American Institutes for Research® (AIR®) and the Council of the Great City Schools (CGCS), identified the key characteristics of effective implementations across three phases—initiating, developing, and sustaining. The lessons learned from this report drive the co-development of goals to ensure meaningful and lasting change for schools and districts and academic success for all students.

The pandemic accelerated the move online not only for students but for teachers as well. It provided companies creating professional learning the opportunity to rethink their approach and leverage the latest technology innovations. Given the rapid changes from in person to online, HMH wanted to ensure the experience for either offering was of the highest quality. The good news is that the research to date suggests that the medium through which coaching is delivered is less important than the quality and substance of the learning opportunities provided to teachers (Matsumura et al., 2019).

HMH has been at the forefront of the edtech space; whether through our in-house research team or pruning the latest education literature and insights, the goal is always to provide educators with solutions that work. One of the most effective ways we work with districts and provide professional learning is through sustained, job-embedded coaching. The effect of these partnerships has proven to consistently have a positive and measurable impact on both instructional practices and student achievement (Kraft, et al., 2018). The “sustained” component of coaching is also essential to the partnership's success and directly impacts student outcomes. For example, when looking at ELA assessments and *Reading Inventory*® measures, each additional coaching session was associated with an increase of 0.25 of a standard deviation on the state ELA assessment, suggesting that with only four online coaching sessions, student scores can, on average, be increased by a standard deviation (Meyer et al., 2020).

DIMENSION 7: A PLATFORM TO SUPPORT INTEGRATED AND DIFFERENTIATED TEACHING

Education has been a vital area of interest throughout recorded history. The observation attributed to Aristotle over 2000 years ago and adopted to a degree by the Gestalt psychology movement in the early 20th century states that “The whole is greater than the sum of its parts.” Despite its lack of recency, this is a useful concept to consider when we look at integrated systems or, more specifically, integrated teaching and learning systems or learning platforms of today. When we view and subsequently study each component of a teaching or learning system, we often arrive at statements of evidence for the efficacy of those components on outcomes of interest. For example, we may study the impact of a professional learning session on a group of teachers and measure whether desired practices manifest themselves or increase in their frequency in the classroom. We may also conduct a study on achievement gains for a particular group of students who are below grade level in math and document whether an intervention provides an accelerated learning path to grade-level proficiency. We may be interested in the utility of a core curriculum to prepare students for end-of-year standards and measure this by examining student progress on the standards throughout the year. All of these investigations are useful and of value in attempting to understand what is most helpful for preparing and supporting teachers and providing students with the tools they need to be successful.

However, education and much of our experiences do not exist solely as discrete entities but rather as components of a larger and more complicated system. The consideration of this system is where we bring our original observation of a whole being larger than the sum of its parts to bare. It is also important to consider that our example does not assume a simple assortment of programs but rather an integrated system that is designed to work compatibly. Such a system, and the platform that supports it, allows for capabilities and efficiencies to emerge that may not have been possible with any single component or even the simple aggregate of those components. For a well-integrated system, there is a value add that affords additional utility and efficiencies.

A platform that incorporates a system of efficacious programs that leverage targeted resources is now available through the use of emerging technologies that hold the promise to truly innovate how instruction is delivered inside and outside the classroom.

Learning is enhanced when instruction accommodates the differences in learning needs among individual children (Sousa & Tomlinson, 2011). Although valued for some time in educational research, the challenge of differentiated instruction in the past has been centered around its practical implementation. We can acknowledge the differences in students’ learning and the desire for teachers to deliver instruction that meets their needs, but for differentiated instruction to be successful it is important to gather meaningful data and offer instructional solutions in a timely manner. Advances in assessment and digital instructional programs that work together as a system have come a long way in addressing these challenges. Advancements in assessments can be seen in the development of Computer Adaptive Tests (CAT).

Benefits of these assessments include:

1. On-demand delivery
2. Automated scoring
3. Immediate feedback
4. Delivery in school or virtual settings
5. Efficient item delivery allowing for shorter testing times
6. Metadata tagged to items to inform targeted instructional supports and detailed score reporting

Technology-based assessment and instruction provide data for every student through ongoing formative and progress-monitoring assessments, where instructional programs use this data to target instruction and group students according to their needs (Stecker et al., 2005).

The benefits of an integrated instructional platform are not unique to the student; leveraging technology to address individual needs can benefit teachers as well. A platform that allows teachers to assess their students’ progress and performance and provide instructional resources will ease some of the responsibilities placed on them. An integrated teaching and learning system can also allow teachers to choose the content and scope of their professional service, providing them with relevant material in a timely manner, accommodating their already overtaxed schedules. In addition to providing formal training, online teacher platforms also allow for access to less formal on-demand topics of interest and offer the potential to engage in professional communities of practice.

CONCLUSION

While we're well aware of the challenges ahead, this is our time to find solutions to the problems we're facing, including some preceding the pandemic. Experience and the evidence base for the Seven Dimensions of a Digital First, High-Tech, High-Touch Vision for Learning presented here can help us create a path forward to a more effective, engaging, and empowering system for teaching and reaching all students.

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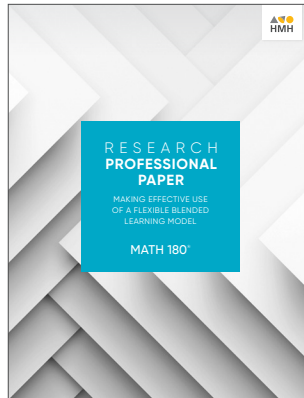
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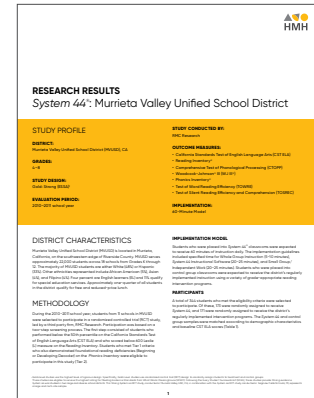
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