
Core Function: Personalized Learning: Digital Learning

**Effective Practice****Using appropriate technological tools and programs to enhance student learning**

Overview: Digital tools and programs are changing and evolving constantly. Teachers can personalize student learning by using appropriate digital tools and standards-aligned online curricula, as well as blended learning approaches and digital portfolios to capture student learning; however, job-embedded and sustained professional development is essential. School leaders and technology teams must evaluate broadband access, device availability, and device use policies when weighing the selection of digital learning tools, and they must ensure that online learning programs generate student data that is accessible and actionable. School leaders and peer mentors observing technology use and blended teaching must adjust protocols to reflect the changing teacher role in these classrooms. All stakeholders within the school community need training and support to use technological tools and programs effectively.

Evaluate Your Practice: Does your school have an instructional technology team and if so, are all stakeholder groups represented? What level of broadband access is available in the school and in students' homes, and is it sufficient to take advantage of multiple digital tools? Does your school have a stated device use policy? What steps may be necessary to allow for one-to-one device access for your students? What observation protocols are used to look for teachers' use of online and/or blended learning practices? Are online learning programs standards-aligned, and do they produce personalized student data that are easily accessible and used to guide subsequent learning? Are teachers proficient with a variety of digital tools, actively using blended and/or online learning practices, and contributing resources to online communities of practice? Do students use digital portfolios to capture their skills, interests, and growth over time? Is teacher technology professional development personalized, sustained, and job-embedded? Do all stakeholders (including parents) participate in appropriate technology training?

Introduction

Learner-centered or personalized learning refers to “tailoring learning for each student’s strengths, needs, and interests—including enabling student voice and choice in what, how, when, and where they learn—to provide flexibility and supports to ensure mastery of the highest standards possible” (Patrick, Kennedy, & Powell, 2013, p. 4). The student is actively involved with the teacher in co-constructing their individualized learning pathway, and the location, time, and pace of learning may vary from student to student (Redding, 2016). Technology makes personalized learning approaches possible at scale and can assist in all areas of teaching and learning, including student data and assessment, curriculum selection and alignment to standards, and instruction and learning (Redding, 2014; Wolf, 2010). A good deal of research evidence has supported the use of technologies to increase student achievement (e.g., Tamin, Bernard, Borokhovski, Abrami, & Schmid, 2011). Recent preliminary research also suggests that personalized learning practices that incorporate technology and online curricula, when implemented with fidelity, may result in positive and large student achievement gains, particularly for students behind academically (Greaves, Hayes, Wilson, Bielniak, & Peterson, 2012; Pane, Steiner, Baird, & Hamilton, 2015).

Digital tools and programs can play a key role in improving instruction and learning; however, schools need leadership and decision making that allows for the selection of appropriate tools and programs, monitoring implementation, and assessing effectiveness for student learning. Classroom instruction that personalizes student learning requires teachers who can appropriately select digital tools and standards-aligned online curricula and who are inspired professionals that contribute teaching ideas and content to online learning catalogs. All stakeholders within the school community will need training and ongoing support in using digital tools and programs in order to maxi-

mize the potential benefits of digital technologies for student learning. This brief provides a review of best practices in these areas.

What leadership and decision making is necessary for the selection, implementation, and assessment of the effectiveness of digital tools and programs?

Schools must match their digital learning needs with appropriate devices and programs that promote learning for all students through a comprehensive digital infrastructure (Grant & Basye, 2014; Thigpen, 2014). Strong leadership capable of developing this infrastructure along with a shared vision of all community members is required in order for technology to truly transform learning (U.S. Department of Education, 2016). School leaders must organize instructional technology teams in which teachers (and others where appropriate, e.g., media specialists, students, parents, etc.) are tasked with selecting digital tools; this process can help increase the effectiveness of implementation as well as ensure crucial teacher, student and parent buy-in (Grant & Basye, 2014; Overbay, Mollette, & Vasu, 2011).

Considerations for selection of digital technologies.

School leaders and instructional technology teams selecting digital tools must consider a variety of factors, including broadband access, device availability, device use policies, and the capacity of online programs to capture and report accessible and actionable student data. It is critical that teachers and students have fast and reliable Internet access in order to use a wide range of digital tools, including learning and content management systems, video streaming, social networks, cloud capabilities, and online communication and videoconferencing tools (Thigpen, 2014). Approximately one-quarter of schools still lack sufficient broadband to take advantage of modern digital tools to promote learning (Education Superhighway, 2015); similarly, many homes lack high speed connectivity, leaving many children, particularly those in low-income, non-white and rural communities, without the capacity to use digital tools for homework and school projects (Thigpen, 2014). While recent federal initiatives have addressed broadband inequities and narrowed the gap in access, many schools still need to consider both school and home broadband access when selecting digital technologies to ensure that they will be usable in both settings.

School leaders must also consider how many digital devices to purchase and policies for their use. Recent literature suggests that a one-to-one ratio of devices to students combined with effective implementation is likely ideal for improving student outcomes. For example, a recent meta-analysis of research on one-to-one laptop programs found these programs, when well-integrated with curricula and with plenty of professional development for teachers, led to increased achievement, enhanced student engagement and enthusiasm, and more student-centered and project-based instruction (Zheng, Warschauer, Lin, & Chang, 2016). However, schools must consider whether there is sufficient funding to pay for devices, enough bandwidth to support all students using their devices simultaneously, and how to distribute and manage so many devices (Herold, 2016). Some schools have implemented “bring your own device” (BYOD) policies to allow and encourage students to use their personal digital devices for learning at school. Schools implementing BYOD policies need strong leadership and substantial planning in order to avoid potential pitfalls that can arise with these policies. Some examples include inequity (some students’ families may not be able to afford a device for their children), student distractions that can inhibit learning, lack of security features to secure student data, and students using a range of different devices with different capabilities, which can cause an instructional burden for teachers (U.S. Department of Education, 2016).

Monitoring implementation of digital technologies and programs and their impact on learning.

School leaders must work with experienced peer mentors to assess and guide online or blended teaching practices (or hybrid approaches combining both elements along with traditional, direct instruction) in order to successfully implement personalized learning practices within their schools (Horn, 2015). The rapid pace of technological change requires teachers using these approaches continually learn and innovate within their work with students (Powell, Rabbitt, & Kennedy, 2014). Teachers implementing online or blended approaches may shift from primarily being conveyors of knowledge to coaches or mentors that encourage student ownership of their learning. Digital learning can also allow teachers to focus on encouraging critical thinking and application of knowledge, since digital content can successfully address the foundational levels of Bloom’s taxonomy, such as memorization (Powell, et al., 2014). Therefore, in order to assess the classroom

implementation of these approaches, school leaders and experienced peer mentors must utilize tools and techniques that appropriately capture key teacher behaviors that are reflective of sound instructional blended or online teaching (see Education Elements, 2014 for an example of a rubric to measure these behaviors). School leaders will likely need to rethink walk-through tools and better align them to identify effective blended teaching practices (TNTP, 2014a). An additional priority is measuring “off-stage” teacher activities to capture data on collaboration, data analysis, and planning (TNTP, 2014b). For example school leaders can observe teachers as they examine formative data gathered from online assessments, and determine their proficiency in both understanding and acting on the assessment data to enhance student learning.

School leaders should also ensure that online learning programs used by the school generate student data that reveals program use, student performance, and progress. Online learning programs used within personalized learning systems should provide easily accessible student data to the student and his/her teacher (and often parents); this data then drives instruction as the student masters goals and achieves standards (Glowa & Goodell, 2016). Some schools and districts have developed online *personalized learning plans* that consist of daily actionable goals, action steps, and competencies. Students develop these plans in partnership with their teachers and document how they will meet established goals. These plans can contain assessment data and are used to document academic growth; they also may allow teachers (and school leadership) to capture data on non-academic skills and competencies (Educause, 2016). Data or learning dashboards provide a single place that “integrates information from assessments, learning tools, educator observations, and other sources to provide compelling, comprehensive visual representations of student progress in real-time” (U.S. Department of Education, 2016). These dashboards can provide data in easily accessible formats tailored to various stakeholders (e.g., students, parents, etc.); they can also suggest resources to help students continue their learning and provide early detection of students who are struggling and may be at risk for failure or drop-out.

How can teachers use digital tools and online curricula to enhance their instructional practice?

Select appropriate digital tools. There are an ever-increasing variety of digital tools available to teachers and schools to enhance classroom instruction and learning. Prior to making a decision to use a digital tool to teach a lesson, teachers must first consider the learning goals, activities, and formative and summative assessments that will make up the lesson; the selection of digital tools should follow naturally from other instructional planning decisions rather than serving as the *focus* of instruction (Hobgood & Ormsby, 2011; Leimbach, 2015). Koehler and Mishra (2009) provide a widely used framework of technology integration, TPACK (Technological Pedagogical Content Knowledge), which suggests that effective technology integration occurs when teachers carefully consider the interplay between the content (subject matter), pedagogy (teaching methods), and technology. Reflecting on all three domains together “results in a lesson in which all the component parts are aligned to support the learning goals and outcomes of the instructional plan” (Hobgood & Ormsby, 2011, p. 2).

Ensure online curricula used are standards-aligned with measurable goals. Online curricula and technologies must be aligned with national, state, or local standards, with clearly stated and measurable goals that describe what students will be able to know or do at the end of instruction (Worthen & Patrick, 2015). Many online curriculum providers are heeding the call for transparency as to how their materials align with standards and improve learning outcomes. For example, Khan Academy and the NROC (Network Resources Open College & Career) programs are open educational resources that link all online lessons/curricula with Common Core State Standards (CCSS) and provide students with learning dashboards that identify gaps and show progress towards standards and learning goals (Watson & Murin, 2014). Rubrics are now available to assist educators with selecting online curricula that are standards-aligned and demonstrate positive impacts on student learning. For example, Achieve’s EQuIP Project provides rubrics that ask teachers to consider the extent to which the lesson or curriculum unit “elicits direct, observable evidence of the degree to which a student can independently demonstrate the major targeted grade-level CCSS standards” (Achieve, 2016). Training modules provide teachers and professional learning communities with the skills needed for using the rubrics.

Contribute to online learning content catalogs. International Society for Technology in Education (ISTE) standards suggest that teachers should be able to design and develop digital learning experiences and assessments by “incorporating contemporary tools and resources to maximize content learning in context” (ISTE Standards, 2008). These online learning content sites provide a digital space for teachers (and others) to upload, organize, and access educational content, and they allow teachers to create, edit, and publish digital materials such as lesson plans, teaching videos, teaching suggestions, and other multimedia content. These sites offer the opportunity for increased collaboration among teachers and allow teachers to tailor learning content to meet their students’ needs. Online learning content is often organized around professional communities of practice; for example, ISTE’s arts and technology network helps educators make explicit connections between art and technology, with members sharing resources, ideas, and lesson plan examples (ISTE, n.d.). When teachers are expected to create, refine, and update their own curricular resources, their role shifts from manager to more of a pedagogical professional (Tonks, Weston, Wiley, & Barbour, 2013).

Use online or blended learning approaches and digital portfolios to provide personalized learning. Blended learning is defined as “a formal education program in which a student learns at least in part through online learning, with some element of student control over time, place, path, and/or pace... the modalities along each student’s learning path within a course or subject are connected to provide an integrated learning experience” (Christensen, Horn, & Staker, 2013, p. 10). It is critical to note, however, that technology and data do not substitute for the student’s relationship to the teacher and other students within blended learning environments; rather, technology serves as a tool to enhance already proven effective pedagogy (Redding, 2014). Blended learning combines “the effectiveness and socialization of the classroom with the technology-enhanced active learning possibility of the online environment” (Dziuban, Harman, & Moskal, 2004). Completion of activities, readings, and assessments happens in the online environment, while face-to-face time is preserved for discussion and collaboration between teachers and students and between students and their peers. K-12 blended learning research is limited (Sparks, 2015); however, some evidence

suggests that students with access to blended learning models may outperform those experiencing only one type of instruction (Bakia, Shear, Toyama, & Lasseter, 2012; Means, Toyama, Murphy, & Baki, 2013; Means, Toyama, Murphy, Bakia, & Jones, 2010; Pane, Griffin, McCaffrey, & Karam, 2014; Pane, Steiner, Baird, & Hamilton, 2015). It is essential that teachers are properly trained and supported in order to successfully function in their new roles (Horn & Staker, 2015); identifying a small core group of teachers to begin blended learning implementation prior to whole-school adoption can allow for adequate support for these teachers and encourage them to serve in support roles as the program expands (Darrow, Friend, & Powell, 2013).

Digital portfolios are purposeful collections of work, captured by electronic means, which serve as an exhibit of individual efforts, progress, and achievements and thereby offer additional opportunities for personalized learning (Cramer, 2009). They are used as part of ongoing assessment of learner progress in one or more subject areas, but can also create an authentic and public way for students to demonstrate mastery of basic media skills (Cramer, 2009; Weidner, 1998). Digital portfolios offer several advantages over paper-based approaches, including high rates of active student participation in selecting the media to capture events, enhanced creativity, heightened student interest, motivation and responsibility for learning, and easier access to materials by assessors (Athanases, 1994; Buschmann, 1993; Newhouse, 2015; Vizyak, 1994). Teachers must decide in advance what they wish students to demonstrate within their digital portfolio; in addition, expectations must be clear to both students and assessors, with explicitly defined learning objectives serving as a guide (Stobart & Eggan, 2012).

How should professional development be structured to maximize the benefits of digital tools and programs?

Implementing a sophisticated technology program that includes online tools and curricula as well as learning and student management systems requires stakeholder buy-in and will be most effective if *all* stakeholders participate in appropriate training in how the various tools can best be used to meet their needs (Moeller & Reitzes, 2011). Technology professional learning should be personalized for teachers and should be ongoing, job-embedded, and relevant to their instructional needs (Schifter, 2016; U.S. Department of Education, 2016).

Leaders should “learn alongside teachers and staff members, ensuring that professional learning activities are supported by technology resources and tools, time for collaboration, and appropriate incentives” (U.S. Department of Education, 2016, p. 42). Traditional professional development with technology tools has primarily focused on how to use these tools within current teaching and learning models rather than on helping teachers use technology in transformative ways that change their roles and pedagogical practices and impact the way students are learning within the classroom (Blanchard, LePrevost, Tolin, & Gutierrez, 2016). Teacher technology-enhanced professional development should be sustained (longer than one year), embedded in content, matched with stated objectives, and allow for teachers to reflect on and refine their pedagogical approaches (Gerard, Varma, Corliss, & Linn, 2011). Additionally, working with multiple teachers from the same school helps provide a supportive structure for technology integration (Gerard, Bowyer, & Linn, 2010). In order to increase access for teachers and provide transparency to stakeholders, district administrators may want to consider creating a “digital hub” to contain all worthwhile professional development materials (Cooper, 2015).

Parents also benefit from training and support to learn relevant aspects of a school’s technology program; this can translate into stronger parent engagement and thus higher levels of student engagement (The Children’s Partnership, 2010; U.S. Department of Education, 2016). Parent training may also be particularly valuable as schools adopt the use of new learning and student management systems. Learning management systems allow users to avoid signing in and out of multiple applications and provide a centralized place for teachers to post learning resources and personalize student learning, as well as promote more student-oriented social and collaborative learning experiences (Remis, 2015). When these systems are introduced within schools, administrators, teachers, support staff, students, and parents should participate in organized and ongoing training customized to their needs in order to maximize the benefits of these systems.

Indicators to Support the Effective Practice
Administrators, teachers, staff, students, parents, and other stakeholders participate in an organized training and support system incorporating program methodologies (including the use of online tools and curricula) and the proper use of the learning management and student management systems.
Instructional teams determine which digital learning tools (hardware) are appropriate based on device availability, Internet and broadband access, and device use policies (such as “bring your own device”).
School leaders and peer mentors regularly observe and measure instances of online, hybrid, or blended teaching to ensure instruction is implemented fully and with fidelity.
Online programs generate accessible and actionable student data about their use, performance, and progress.
All teachers use appropriate technological tools to enhance instruction.
All teachers use online curricula with content, assignments, and activities clearly aligned to identified standards (state or national).
All teachers use online curricula whose goals are measurable and clearly state what students will know or do at the end of instruction.
All teachers regularly add new content and teaching suggestions to the online learning content catalog.
All teachers use online, hybrid, or blended learning as a part of a larger pedagogical approach that combines the effective socialization opportunities within the classroom with the enhanced learning opportunities available in online instruction.
All teachers enable students to place selected work into a digital portfolio that is updated throughout the student’s school experiences and provides a picture of interests, skills, competencies, and growth over time.

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