| Core Function | Personalized Learning: Metacognitive Competency | Effective Practice | Teaching and modeling of metacognitive processes and strategies to enhance student self-management of learning |

Indicator: The teacher builds students' ability to use a variety of learning tools. (D12)

Explanation: Personal learning models typically emphasize extensive use of digital tools to build students' metacognitive competency and encourage management of their own learning. Effective teachers foster metacognitive competency by teaching students to use a variety of digital learning tools that meet students' individual learning needs. Teachers must be sure to teach and model critical thinking strategies as students encounter digital sources, as well as the self-regulatory strategies necessary to successfully master content within computer-based learning environments.

Questions: What are the benefits of teaching students to use a variety of learning tools? How can digital tools facilitate student learning? What skills do students need to use digital tools to enhance their learning?

What Are the Benefits of Building Students' Metacognitive Competency?

Learner-centered, or personalized learning refers to "a teacher's relationships with students and their families and the use of multiple instructional modes to scaffold each student's learning and enhance the student's personal competencies" (Twyman & Redding, 2015, p. 3). The student is actively involved with the teacher in co-constructing their individualized learning pathway, and often through technology the location, time and pace of learning may vary from student to student (Redding, 2016). Metacognitive competency, one of four personal competencies within recent personalized learning frameworks[1] becomes critical for student success, particularly within personalized learning pedagogies, as students are responsible to some degree for managing their own learning. Metacognition refers to how students learn, and self-regulate learning and use of learning strategies (Redding, in press). Metacognitive strategy instruction is particularly imperative given many states' and districts' adoption of Common Core Standards, which require students to be able to use metacognitive learning strategies extensively in order to engage in higher-order processes such as researching and synthesizing information, and critically reading and evaluating texts (Conley, 2014).

How Can Digital Tools Facilitate Student Learning?

Students must be taught to use a variety of learning tools that can help build their metacognitive competency and achieve learning goals. There are numerous examples of learning tools frequently found in classrooms, from dictionaries to atlases to hand-held calculators. However, personalized learning models also offer ways to provide differentiated instruction to learners using a variety of digital learning tools; research has shown differentiated instruction, while difficult to implement, is effective in enhancing learning (McTighe & Brown, 2005). According to Hobgood and Ormsby (2011):

[1] Other personal competencies are Cognitive, Motivational, and Social/Emotional. For a complete description of a personalized learning framework see Redding, in press: http://www.centeril.org/2016handbook/resources/Redding_chapter_web.pdf)

Many of the obstacles to implementing differentiated instruction can be overcome with the effective use of technology…Technology can equip teachers to address students' needs in an almost limitless number of ways, through content input, learning activities, and opportunities to demonstrate comprehension. And because many students come to the learning environment with a predisposition for using tech seamlessly, technology can become an intermediary that bridges the relationships between teacher and student, allowing the teacher to meet the student in a familiar realm. Technology also addresses the necessity to cover a wide range of content in a short length of time by minimizing the need to take each step of the curriculum at a slower pace… By providing audio, visual, or concept-mapping supports [to students that need them] while introducing new concepts, teachers lessen the need for review and remediation after the initial instruction. (p. 2)

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 (Hobgood & Ormsby, 2011). Teachers must also understand their students' interests, readiness, and learning profiles in order to design learning activities and select digital tools to meet individual needs (Grant & Basye, 2014). Grant and Basye describe digital tools within five main educational areas:

- Literacy resources: E.g., eBooks, audio books, blogs and discussion forums can introduce students to multiple texts on similar topics, and assistive technology devices such as text-to-speech tools can make these texts available to a wide range of students.

- Web tools: E.g., wikis, podcasts, and multimedia editors allow students to make choices about how to demonstrate their learning and help them explore new technologies and develop critical 21st century skills.

- Digital information sources: Provide immediate access to encyclopedia sites, podcasts, expert sites, media sites and blogs, allowing students to interact with relevant content and experts.

- Social networking sites: Can be useful particularly for special needs students who may feel isolated from peers. For example, an autistic student can connect with peers using Edmodo, a social networking site designed to let students within a classroom connect with each other around class content.

- Learning management systems (LMS): Provide a platform for students to access content and allows for documentation of student progress. Teachers use these systems to organize their instruction and communicate with students and parents (e.g., Edmodo, Blackboard).

What Skills Do Students Need to Use Digital Tools to Enhance Their Learning?

Recent research evidence suggests that using digital tools to access and use online content requires critical evaluation skills that allow students to assess the relevance, accuracy, bias and/or perspective, and reliability of the material accessed (Coiro & Coscarelli, 2013; Coiro, 2014). Many students do not possess these skills (Coiro & Coscarelli, 2013; Bennet, Maton, & Kervin, 2008), and research has also found significant achievement gaps between students from higher and lower income brackets in their online reading ability (separate from measures of offline reading ability) (e.g., Leu, Forzani, Rhoads, Maykel, Kennedy, & Timbrell, 2015). Researchers within digital literacy suggest that teaching these "new literacies" begin as early as possible with young students, and recommend teaching the use of new digital tools to the weakest students first (Leu, Zawilinski, Forzni, & Timbrell, 2014). Coiro also recommends explaining and discussing the dimensions of critical evaluation with older students (relevance, accuracy, bias/perspective, and reliability), and providing plenty of explicit modeling and guided practice with critical evaluation of online content. Research has also shown that students need to possess metacognitive competency and the ability to regulate their learning within computer-based learning environments, particularly when learning within conceptually rich domains such as math, science and social studies (Azevedo, 2005; Greene, Moos, & Azevedo, 2011; Cernal Nat, Walker, Bacon, Dastbaz, & Flynn, 2011). Azevedo (2005) argues that "learning within computer environments requires students to analyze the learning situation, set meaningful learning goals, determine which strategies to use, assess whether strategies are effective, and evaluate their emerging understanding of the topic" (p. 193). Students who are not able to self-regulate learning will likely not learn effectively within

computer-based learning environments (Azevedo, 2005; Cernal Nat, et al., 2011). Teachers using digital tools to teach conceptually rich content should themselves think carefully and critically about the content, model how they might self-regulate their learning with the material, and provide plenty of opportunity for students to try out self-regulatory processes to determine which are most effective for them (Green, et al., 2011).

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