CORE FUNCTION	EFFECTIVE	INDICATOR
Dimension A	Instructional Excellence and Alignment	The district supports a student-centered approach and provides an instructional framework based on learner profiles that inform individualized learning paths and competency-based progression in a flexible learning environment. (6829)

Explanation: Student-centered learning offers the potential to help students engage in deeper learning to acquire the competencies needed for 21st century success. Personalized, competency-based learning can provide an instructional framework to individualize learning pathways and allow students to achieve mastery, progressing at their own pace within flexible learning environments. While very little research exists on whole-school personalized learning models, extensive support can be found for the individual components of these student-centered models. Districts must identify and select those components with rigorous research backing, monitor and identify implementation successes and barriers, and monitor student performance to ensure equitable student outcomes.

Questions: *Does the district's published instructional framework reflect each of the four pillars of personalized, competency-based education at each school level (elementary, middle, and high)? What evidence can the district show to demonstrate that it supports a student-centered approach in each of its schools? How can the district collect information to document how each school is using student-centered approaches? Who can or will be in charge of monitoring implementation and tracking results? How will the resulting information be shared and used to support schools? What process does the district use to identify research-supported student-centered innovations? Do teachers have the data and training they need to personalize instruction, and do data systems operate as intended to maximize student learning and the productive use of teachers' time? What processes are schools using to identify suitable instructional materials for personalized learning? How will the district monitor student performance and ensure equitable instruction and student outcomes? What steps are district leaders taking to work with state leaders to ensure that mastery learning approaches do not conflict with age- or grade-based assessments, standards, and accountability? What other district policies and practices must be reviewed to ensure their consistency with, and support of, student-centered learning?*

Many researchers and educators are calling for a move away from traditional, one-size-fits-all factory approaches in which students move from grade to grade with a wide range of competencies, with many advancing with large gaps in their knowledge and skills that cause them to fall further and further behind (e.g., Haynes et al., 2016; Le, Wolfe, & Steinberg, 2014). Students are often entering the workforce with insufficient knowledge and/or skills, or entering college unprepared for rigorous academic work, and ultimately failing to attain a college degree (Frost & Worthen, 2017; Hammonds & Moyer, 2018). To thrive in the 21st century, students need to develop an expanded set of competencies that include "the mastery of core academic concepts, as well as analytical thinking and problem-solving skills, intrapersonal and interpersonal skills, and the capacity to transfer learning to new problems and contexts" (Surr & Redding, 2017, p. 1). These new competencies have been referred to in the literature as "deeper learning" (e.g., Hoffman, 2015; Mehta & Fine, 2015; Noguera, Darling-Hammond, & Friedlaender, 2015; Pellegrino & Hilton, 2012) and "personal competencies" (Redding, 2014, 2016).

In order to expand competencies to better prepare students for college and/or career, many researchers and educators are calling for *student-centered* instructional approaches that individualize instruction to meet each student's strengths and challenges, while continuing to hold high expectations for all learners (Friedlaender et al., 2014; Le et al., 2014). Student-centered approaches are based on evidence from the cognitive and learning sciences and youth development

that demonstrates positive learning outcomes for students when 1) education is personalized to their needs; 2) they advance upon mastery of clear learning targets; 3) they are provided with a range of both in- and out-of-school learning experiences; and 4) they can exert voice, choice, and agency into learning experiences (Hinton, Fischer, & Glennon, 2012; Jobs for the Future, 2013; Le et al., 2014; Toshalis & Nakkula, 2012). Personalized Learning (PL) and Competency-Based Education (CBE) movements overlap in practice and are based on enhancing the degree to which K-12 education is student-centered to ensure positive and equitable learning outcomes for all students. North Carolina's conception of student-centered learning rests on four pillars of PL/CBE: learner profiles, individualized learning paths, competency-based progression, and flexible learning environments (see Glowa & Goodell, 2016). A review of these components and how they are complementary and intertwined, as well as an overview of research, follows.

Defining Personalized Learning and Competency-Based Education

PL has been defined in various ways in the literature and overlaps with CBE in several features, which has often led to a lack of understanding among educators seeking clarity (Cavanaugh, 2014; Twyman, 2014). Twyman and Redding (2015) describe learner-centered, or PL as "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[1]" (p. 3). 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). PL also enables student voice and choice regarding what, how, when and where they learn, while also tailoring learning for their individual strengths, needs, and interests; all of these practices are consistent with research on learning, motivation, and engagement (Gross, Tuchman, & Patrick, 2018; Le, et al., 2014; Patrick, Kennedy, & Powell, 2013; Toshalis & Nakkula, 2012). In order to implement PL and CBE at scale, the use of technology is often (but not always) essential (Patrick et al., 2013). Attributes of a PL model include (Pane, Steiner, Baird, & Hamilton, 2015):

- **Learner profiles** that capture individual students' strengths, weaknesses, skills gaps, and interests and aspirations;
- **Personal learning paths** that provide diverse learning experiences matched to students' needs and consistent with their learning goals and objectives;
- **Individual mastery** of learning goals and objectives with continuous assessment of progress and advancement based on demonstrated mastery (competency-based progression); and,
- **Flexible learning environments** with multiple instructional delivery approaches that optimize available resources to support student learning.

PL and CBE go hand in hand, as described by Lopez et al. (2017):

> Personalized learning relies on the competency-based structures that produce consistency in validating proficiency based on student work, and careful monitoring of pace and progress. This consistency and monitoring is important for districts and schools becoming accountable for student success. Personalization without a competency-based system has the potential to perpetuate and, in some cases, even exacerbate inequity. Competency education without personalization means that students will not receive the instruction and support they need to learn. While the design of competency-based structures and personalized learning practices naturally support equitable education, realizing this goal requires intentionality. (p. 15)

Personalized CBE frameworks often include flexible uses of time both during and outside of the traditional school day and in formal and informal settings, and places an emphasis on learner agency by giving students some choice in how they engage with core content and demonstrate their competencies (Le et al., 2014). PL often necessitates the use of technology in order to implement practices at scale; however, digital tools should never substitute for the student's relationship to the teacher and other students, but instead should serve as a tool to enhance already proven effective pedagogy (Le et al., 2014; Pane, 2018; Redding, 2014). In fact, some schools are incorporating social-emotional skills and

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1 Personal competencies refer to the cognitive, metacognitive, motivational, and social-emotional research-based learning habits necessary to propel learning regardless of context. The personal competencies framework was developed at the Center on Innovations in Learning (CIL) (see Redding [2013] for more information). Personal competencies can be compared with deeper learning competencies advocated by the William and Flora Hewett Foundation (see National Research Council, 2012; Pellegrino & Hilton, 2012).

nurturing stronger relationships with students' families, which are also important predictors of postsecondary success, as strategies within PL (Pane, 2018).

Research on Personalized Learning Models

Proponents of PL acknowledge that the research support as a schoolwide model thus far is sparse (e.g., see Herold, 2016; 2017; Pane, et al., 2015; Pane, Steiner, Baird, Hamilton, & Pane, 2017; Pane, 2018). However, indirect research support can be drawn from studies addressing several of the foundational components of CBE and PL. An overview of the research on student impact and implementation at the state and national levels is presented below, followed by a brief summary of research support for the underlying components of PL and CBE, and important considerations for their implementation.

Several studies conducted by RAND Corporation researchers examined the impact of PL approaches on students' mathematics and reading test scores in a series of quasi-experimental studies (Pane et al., 2015, 2017). Schools were funded through a variety of Gates Foundation initiatives that emphasized PL as a key school-wide approach, and were located in urban areas with large percentages of low-income minority students. Schools were free to select PL approaches (e.g., learner profiles, personal learning paths, competency-based progression, and flexible learning environments) appropriate for their contexts and student populations, and implementation varied across schools. The researchers found that students in PL schools outperformed similar students in non-PL schools by approximately three percentile points on average in both reading and math, although only the math estimate was statistically significant. However, effects for individual schools varied widely (Pane, 2018), suggesting wide variation in implementation across schools. Implementation challenges have been reported in a recent study of PL implementation (Gross & DeArmond, 2018).

Haynes et al. (2016) conducted quasi-experimental research that compared the implementation of CBE practices in CBE-focused high schools and similar comparison schools that had not implemented CBE, and examined changes to ninth grade students' learning capacities (academic mindsets and dispositions, self-regulated learning, and academic behavior). CBE practices, including the provision of clear learning targets, credit-earning opportunities beyond the classroom, and use of varied instructional strategies, were strongly linked to increases to students' intrinsic motivation. Steele et al. (2014) also used a quasi-experimental design to examine implementation and outcomes in three pilot technology-infused CBE programs within five urban school districts serving large proportions of low-income or minority students. CBE models that emphasized student choice and project-based learning were more successful than those emphasizing proficiency-based grading or flexible pacing; however, the researchers were unable to make causal connections between these practices and student outcomes.

Much more research is needed to address the impact of PL/CBE schoolwide models; however, support for components of these models can be found when examining research from the learning sciences and motivation fields.

Research Support for the Components of Personalized Learning

While there is little research on CBE/PL itself, theory and research within the cognitive/learning sciences and motivation fields support many of the components of these structures, suggesting that they have the potential to positively impact student learning (Laine, Cohen, Nielson, & Palmer, 2015; Lopez et al., 2017; Summit Learning, 2017). For example, mastery learning, a key component of PL/CBE models (individualized learning paths, competency-based progression), has been shown to enhance student achievement, particularly for academically weaker students, and short- and long-term retention of what is learned (Kulik, Kulik, & Bangert-Drowns, 1990, as cited in Laine et al., 2015; Pane, Griffin, McCaffrey, & Karam, 2014). In addition, Hattie's most recent meta-analyses of research demonstrates that mastery learning-based instructional strategies have potential to accelerate student achievement (Hattie, 2018). Vygotsky's (1978) theory of the zone of proximal development is consistent with mastery learning and also supports the use of learner profiles, and suggests that students learn best when they attempt to learn content they are ready for because they have already acquired the prerequisite skills. Many low-performing students in non-mastery-based learning environments work frequently outside of their zone, leading to knowledge and skill gaps (Pane, 2018). Pane (2018) describes the potential benefits for PL for these students:

In contrast, personalized learning instruction, which is designed to have students work in their zones of proximal development and master material before moving on, could lead to better learning and retention. In this approach, students should experience greater success, gain confidence in their abilities, and be better prepared to continue experiencing success on the material they move to subsequently. There are also possible benefits for high achievers who might not be adequately challenged in non-mastery-based systems if they are constrained to work at the pace of their peers. (p. 7)

Allowing students to engage primarily in self-paced learning will likely be ineffective; flexible pacing ensures that students learn academic material at a suitable breadth and depth (Kirschner & van Merriënboer, 2013).

Student-centered systems have the potential to contribute positively to students' motivation. For example, PL provides an opportunity for students to have some degree of choice and control over their learning, as they are involved in the creation of individual learning pathways that honor their interests and aspirations (Redding, 2016). Motivation and engagement are likely to increase when students are given some (but not too much) choice, control, and appropriate challenge to meet and exceed learning standards (Goodwin, 2010; Patall, Cooper, & Robinson, 2008; Toshalis & Nakkula, 2012). A meta-analysis of 41 studies revealed a strong link between providing students with choices and their intrinsic motivation, task performance, and willingness to accept increasingly challenging tasks (Patall et al., 2008). In fact, a recent study demonstrated that competency-based practices were associated with increases in intrinsic motivation in high school students (Haynes et al., 2016). Providing some choice within personalized learning systems may also positively impact students' sense of autonomy within the learning process (Ferlazzo, 2017; Stefanou, Perencevich, DiCintio, & Turner, 2004); however, too much choice can be detrimental (see Kirschner & van Merriënboer, 2013). Developmental psychology evidence suggests that students entering middle and high school are ready to assert their autonomy; however, often few meaningful opportunities are available for them to take ownership of their learning (Farrington et al., 2012).

What Should Districts Consider When Implementing Student-Centered Personalized Learning Approaches?

Pane (2018) suggests several guiding principles as districts and schools work to incorporate student-centered approaches such as personalized learning:

1. Look for teaching/learning innovations with demonstrated positive effects (e.g., adaptive learning products); use sources such as IES's[2] *What Works Clearinghouse* for innovations with rigorous research support.
2. When research evidence is scarce or nonexistent, evaluate potential PL components based on how they support what is known about cognitive/learning sciences and motivation, and rule out those without support.
3. Make sure instruction makes productive use of students' time and attention, through research-based processes such as "individualized attention, content at an appropriate level, and pacing based on mastery, along with quality interaction, guidance, and nurturing from educators" (pp. 7–8).
4. Maximize the use of teacher skill by freeing teachers up to focus on individuals or small groups while other students are engaged with technology (Staker & Horn, 2012). Effective data use is critical for PL (Bingham, Pane, Steiner, & Hamilton, 2018), and technology systems must function efficiently and effectively so that teachers' time is not spent on technical support issues. Recent evidence suggests that these issues may represent significant implementation barriers in some schools (Bingham et al., 2018).
5. Use rigorous instructional materials but do not necessarily shelve traditional ones; consider how they may be adapted and reused in a PL classroom. Apply a quality rubric to evaluate new materials before adoption.
6. Monitor implementation of PL components and be prepared to make changes as necessary. For example, mastery-based approaches will need careful monitoring to ensure that students who are working below grade-level are not excluded from learning higher-level content. Districts and schools must also take steps to ensure that student-centered learning does not increase learning inequities among students. For example, metacognitive strategies that allow students to self-regulate their learning are strong contributors to student academic performance, and are essential for success within CBE and PL learning environments in which students are expected to manage their own learning to some degree (Farrington et al., 2012; Hattie, 2018; Lewis et al., 2014; Redding, 2016). Low income or low-achieving students may be less likely to possess these skills (Howse, Lange, Farran, & Boyles, 2003; Pappas, Ginsburg, & Jiang, 2003; Stevens, Lauinger, & Neville, 2009), which could lead to further inequities (Lewis et al.,

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2 Institute of Education Sciences. See: https://ies.ed.gov/ncee/wwc/

2014). District and state leaders will also need to grapple with the conflict between mastery learning approaches and their incongruity with standards, assessments, and accountability that are age- or grades-based.

The U.S. Department of Education's Office of Educational Technology (2016) provides district-leadership related evidence-based practices for PL implementation:

- Ensure clearly defined district- and school-wide learning outcomes (based on competencies and alignment with teaching and learning standards) that guide instruction;
- Establish district policies that provide educators with tools, professional learning, and support that enable them to collect and analyze ongoing student learning evidence;
- Make sure policies allow students to develop and demonstrate their competencies through personalized learning paths that challenge them and reflect their interests;
- Make sure district policies enable students to learn through diverse learning activities;
- Ensure on-demand access to high-quality and diverse content and tools aligned with learning outcomes and activities; and,
- Establish a district team-based culture in which teacher teams are encouraged, supported, and recognized to take leadership in developing learning outcomes, designs, pathways, and assessments.

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