Educational Competencies and Personalized Learning

Introduction

This chapter elaborates on a definition of personalized learning, delineates aspects of competency inherent in the definition, traces the evolution of personalized learning, and explores the complementarity of the personal and the interpersonal in personalized education. The chapter addresses and attempts to resolve tensions and tradeoffs between seemingly competing facets of personalized learning: (a) academic, career, and personal competencies; and (b) individualization, personalization, and socialization.

What Is Personalized Learning?

The term "personalized learning" sprang onto the scene in recent years as several learning technologies and repositories of information (especially via the Internet) advanced to the point of showing great promise as efficient ways to individualize instruction and enrich the curriculum. Ronald Taylor and Azeb Gebre, in their chapter in this volume, define personalized learning as "instruction that is differentiated and paced to the needs of the learner and shaped by the learning preferences and interests of the learner." This is a lean and serviceable definition.

The Center on Innovations in Learning (CIL) has considered the concept of personalized learning and constructed a more complex definition to capture elements that are not apparent in a simpler description:

> Personalization 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. Personalized learning varies the time, place, and pace of learning for each student, enlists the student in the creation of learning pathways, and utilizes technology to manage and document the learning process and access rich sources of information. (Twyman & Redding, 2015, p. 3)

The CIL definition of personalized learning contains phrases that, when further explicated, reveal the complexities and subtleties of the concept. Let's sort them out.

Personalization: Understanding the Learner

The CIL definition of personalized learning goes beyond individualization—discussed in more detail below—which, in short, attends only to the learner's prior learning and readiness for new learning. For CIL, personalization does this too, but it also seeks to understand the person of the learner—his or her personal preferences, interests, and aspirations—and to make use of that understanding. In the definition, personalization, understanding the learner, is introduced into education in three ways, through relationships, engagement, and personal competencies.

Relationships. "Teacher's relationships with students and their families" adds onto the standard definition of personalization two new elements. First, it introduces the teacher as a central figure, engaging the learner in identifying what is to be learned and in the design of how it is to be learned, intentionally building students' personal competencies that propel learning, and forming relationships with students and their families to better understand the student, the student's needs, and the student's aspirations. In fact, the teacher uniquely possesses an asset for the student through "relational suasion," as described by Redding (2013):

> The teacher possesses the power of relational suasion that technology cannot match. Through the teacher's example and her instruction, the student learns to value mastery, to raise expectations, to manage learning, and to broaden interests. The teacher is singularly capable of teaching social and emotional skills and engaging families in their children's academic and personal development. (pp. 6–7)

Second, the definition implies that relationships are important in personalization. If we were to probe even deeper into the notion of relationships and consider the collaborative and peer-learning aspects of personalization, we would extend the definition further to include under its blanket the relationships among learners, the students themselves.

Student Engagement. Enlisting "the student in the creation of learning pathways" honors the student's interests and aspirations, encourages the student's sense of responsibility for learning, and exercises the student's ability to navigate the learning process.

Personal Competencies. Enhancing "the student's personal competencies" means intentionally building the student's capacity to learn by incorporating into instruction and teacher–student interactions the content and activities that enhance the student's cognitive, metacognitive, motivational, and social-emotional competencies. These four personal competencies are the propellants of learning and together form students' learning habits. Because personalized learning emphasizes the student's self-direction in learning, personal competencies are especially important to the student's success.

Personalization: Variety and Flexibility

The CIL definition of personalized learning breaks from the traditional image of school learning—that is, a student sitting at a desk listening to a teacher or completing the same assignment as the other students—substituting a view of the teacher, aided by learning management software, pivoting from a succinct, interactive presentation of a new concept to walk among her students, encouraging them as they engage with activities they have helped plan and are preparing to continue on their laptops at home that evening. Varying the mode of instruction and the time, place, and pace of learning for each student,

expanding the venue of learning beyond the classroom, and detaching expected outcomes from a rigid timeline are hallmarks of personalized learning.

Modes of Instruction. "Use of multiple instructional modes" means that the teacher's lesson plan includes the right mix of different methods of instruction: whole-class, teacher-directed small group, student-directed small group (including cooperative learning and peer-to-peer), technology-assisted (blended), independent work, and homework (including the flipped classroom). Each mode serves its own purposes, and for each mode we have a body of research on how it is most effectively employed. The teacher selects the right mode for the right student at the right time.

Time, Place, and Pace. Varying the "time, place, and pace of learning" rests, in part, on mastery learning's precept that the pace of learning is the chief variable in permitting most students to arrive at the same outcome, albeit at different points in time or with different amounts of time devoted to the specific learning task (Bloom, 1971). The variation in personalized learning goes beyond mastery learning's simple manipulation of pace and time to recognize that learning can occur anywhere. Access to the Internet—at home, in school, or at the coffee shop—is obviously the factor that animates personalized learning's extension of learning's locale.

Personalization: Individualization Facilitated by Technology

This aspect of CIL's definition of personalization concerns what is typically referred to as individualization—that is, as mentioned above, placing each student on his or her own learning plan, with assignments carefully calibrated to the student's prior mastery and expected trajectory. For teachers, true individualization has been a noble but immensely time-consuming undertaking, one likely realized only in special circumstances. Now, however, learning technology has made true individualized, targeted instruction possible for all teachers.

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Targeted Learning. In the CIL definition of personalization, scaffolding "each student's learning" is how a teacher individualizes learning activities to match each student's readiness and finds the appropriate level of challenge. Well-designed, computer-based instructional programs apply techniques of predictive analytics (also called learning analytics; see Ryan Baker's chapter elsewhere in this book) to adjust the learning progressions in response to an individual student's progress. "Scaffold" may be a term that is becoming obsolete, as technology is now able to do what once took massive amounts of teacher time to accomplish.

Learning Technology. Utilizing "technology to manage and document the learning process and access rich sources of information" describes the centrality of technology to the efficient individualization of learning. Not only can learning software provide for learning that is targeted to the individual student, it also tracks the learning process, adapts instruction accordingly, and tests to confirm mastery. Further, the seemingly endless resources of the Internet enable a student to pursue an infinite array of topics.

What Is Competency-Based Education?

CIL's expansive definition of personalized learning includes components that overlap with a conventional definition of competency-based education (CBE). More accurately,

the definition subsumes competency-based education as one of its pillars, along with the definition's emphasis on the student's interests and aspirations, engagement in the design of learning, and relationship with the teacher and other learners. Competency-based education (CBE) supports students' progression through their academic work toward mastery within defined competencies—regardless of time, method, place, or pace of learning (U.S. Department of Education, n.d.). Competency-based education stresses acquisition and demonstration of targeted knowledge and skills (Twyman, 2014). The targeting first requires the definition of the knowledge and skills, and how they are related (clustered) to form a competency. As will be later explained, the competency may be personal, academic, or related to career and occupation.

The essential components of a competency-based approach to personalized learning are (a) an identified cluster of related capabilities (the competencies); (b) variation in the time, place, and pace of learning; and (c) criteria, including demonstrated application, to determine and acknowledge mastery. The U.S. Department of Education (n.d.) says this about competency-based learning:

> Transitioning away from seat time, in favor of a structure that creates flexibility, allows students to progress as they demonstrate mastery of academic content regardless of time, place, or pace of learning. Competency-based strategies provide flexibility in the way that credit can be earned or awarded, and provide students with personalized learning opportunities. . . . This type of learning leads to better student engagement because the content is relevant to each student and tailored to [his or her] unique needs. It also leads to better student outcomes because the pace of learning is customized to each student. (para. 1)

In competency-based education, a competency is identified and its boundaries defined by specifying the specific skills and knowledge contained within it. Sounds much like a standards-based approach. Obviously, learning standards are useful in this exercise, and a standards-based system differs from a competency-based system primarily in its: (a) close alignment with in-school, curriculum objectives; (b) reliance on written assessments; and (c) conformity to a set temporal frame (grade levels and course sequences, for example). In other words, a standards-based system does not necessarily vary the time, place, and pace of learning or include a behavioral demonstration or application of the skills and knowledge to determine mastery.

What Is a Competency?

A competency is a defined cluster of related capabilities (skills and knowledge) with methods and criteria to determine the degree to which a person demonstrates mastery in them. Competencies often correspond to roles, such as student, plumber, or writer, and mastery may be benchmarked toward the ultimate demonstration of proficiency in that role. For example, communication might be a broad categorization of a competency, and it might include subparts such as reading comprehension, speaking, listening, and writing. Or writing might be the competency under a different scheme of categorization with a finer grain size. In either case, the competency would be further defined by itemizing the measurable or observable skills and knowledge that constitute it. Finally, the competency's definition would include criteria and methods for determining mastery of the competency's constituent skills and knowledge, and the assessment would include demonstration or application.

Competencies in education can be categorized as personal, academic, or career/occupational. The first, what I call the *personal competencies*, are the propellants of learning, the inputs in the learning process. Personal competencies are "an ever-evolving accumulation of related capabilities that *facilitate learning* and other forms of goal attainment" (Redding, 2014, p. 4). The four personal competencies in my framework are:

- Cognitive competency—*what we know*; prior knowledge which facilitates new learning, broad knowledge acquired in any context, accessible in memory to facilitate new learning, sufficient depth of understanding to expedite acquisition of new learning
- Metacognitive competency—*how we learn*; self-regulation of learning and use of learning strategies
- Motivational competency—*why we learn*; engagement and persistence in pursuit of learning goals
- Social/Emotional competency—*who we are*; sense of self-worth, regard for others, emotional understanding and management, ability to set positive goals and make responsible decisions

Advocates of "deeper learning" espouse an approach that includes attention to aspects of a student's development similar to those expressed here as personal competencies. The American Institutes for Research (AIR), for example, couch deeper learning within the context of 21st-century workplace (and learning) skills. Citing the dimensions of deeper learning identified by the William and Flora Hewlett Foundation (2013), AIR lists the following characteristics: (a) mastery of core academic content; (b) critical thinking and problem-solving; (c) effective communication; (d) ability to work collaboratively; (e) learning how to learn; and (f) academic mindsets (AIR, 2014, para. 6). Table 1 illustrates the approximate relationship of personal competencies and dimensions of deeper learning.

**Table 1. Approximate Relationship of Personal Competencies and Dimensions of Deeper Learning**

	Personal Competencies			
	Cognitive	Metacognitive	Motivational	Social/Emotional
Dimensions of Deeper Learning				
Content Mastery	■			
Critical Thinking		■		
Communication				■
Collaboration				■
Learning Skills		■		
Academic Mindset			■	

The second, academic competencies, include the clusters of knowledge and skill in academic areas, associated with the school curriculum and commonly measured against content standards, such as communication (with its subparts—reading, writing, listening/speaking), or even in the more traditional disciplines (e.g., mathematics) or subjects (e.g., algebra). We use the word "academic" to describe these competencies because they relate to the subject content of school and standards set by the school, even if the competencies are acquired, at least in part, outside school.

Finally, career/occupational competencies are clusters of knowledge and skill related to the world of work, even if they are acquired largely through schooling and are commonly defined and measured within the school setting. Career competencies cover knowledge and skill in selecting, preparing for, acquiring, and transitioning between jobs. Occupational competencies are specific to a job—for example, competency in computer programming or welding. The National Skill Standards Board (2000) offers a categorization of knowledge and skills into three types—academic, employability, and occupational/technical, which correspond to the academic, career, and occupational categories proposed here.

As repertoires (the behaviors that signal competency) are complex and interlocking, overlap between personal, academic, and career/occupational competencies are expected. Figure 1 illustrates the relationships among the three types of competencies described here (academic, career/occupational, and personal) within a competency-based education model in which personal competencies converge to form the learner's patterns of behavior (learning habits) when engaged in learning.

Figure 1. Competency and Mastery in a Competency-Based System
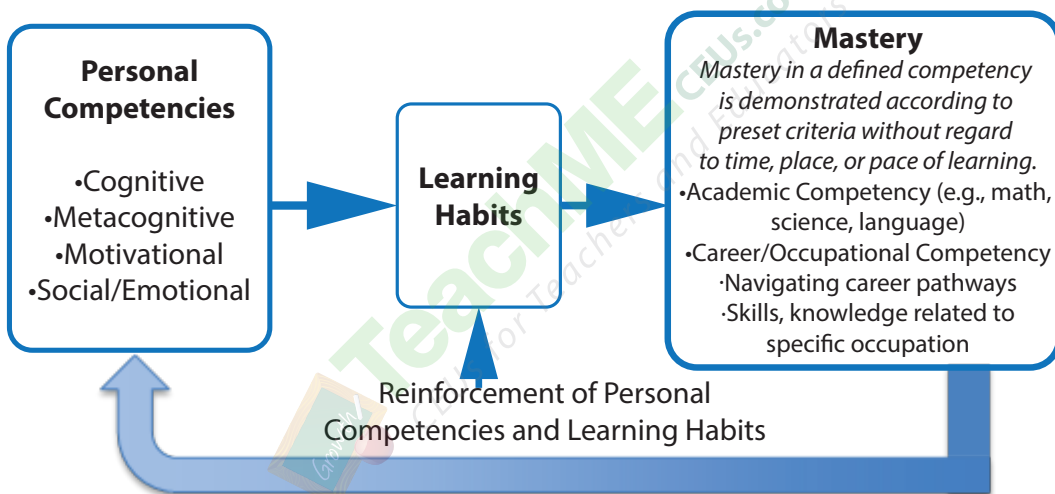
Assessing Competencies

Academic and career/occupational competencies are commonly assessed with standards-based tests, although in a true competency-based environment, evidence of application of the learning would also be required. A challenge for educators is to find ways to measure personal competencies (or deeper learning). Conley and Darling-Hammond (2013) outline directions for new assessment systems that include ways to determine students' progress toward personal competencies. Such assessments will be necessary at every level—formative assessments to guide instruction (including personalized instruction) and systems assessments to inform accountability.

A danger inherent to a competency-based approach is the fragmentation of knowledge and the shallow itemization of isolated skills. True mastery in a competency must be determined by examining the student's facility with an array of skills, understanding of overarching concepts, and ability to perform over time rather than to achieve a peak performance on a single test.

McClarty and Gaertner (2015), writing of competency-based education (CBE) in higher education but applicable to CBE at any level, stress the significance of categorical definition and valid assessment:

External validity is the central component of our recommendations:

- CBE programs should clearly define their competencies and clearly link those competencies to material covered in their assessments.
- To support valid test-score interpretations, CBE assessments should be empirically linked to external measures such as future outcomes.
- Those empirical links should also be used in the standard-setting process so providers develop cut scores that truly differentiate masters from nonmasters.
- In addition to rigorous test development and standard setting, CBE programs should continue to collect and monitor graduates' life outcomes in order to provide evidence that a CBE credential stands for a level of rigor and preparation equivalent to a traditional postsecondary degree. (pp. ii–iii)

Critical to the success of competency-based education are (a) the appropriateness of the definitional boundaries set for the competency; (b) the criteria established to determine mastery; and (c) the validity of the methods of assessment. Then the means of recognition (i.e., badges, certificates, degrees) can be established. If the student is allowed to demonstrate mastery in the competency at any time, without regard to time or place of learning, we have competency-based education. To qualify as personalized education, a few more elements are required. The student would be given a role in designing how the learning would be attained, and the content of the learning would be adapted to the student's interests and aspirations as much as the parameters of the criteria for mastery would allow. In addition, the criteria for mastery would include facility with an array of related skills, an understanding of overarching concepts, and the ability to perform over time.

The Road to Personalized Learning

The road to the modern-day version of personalized learning can be traced by examining the evolution of competency-based education, the efforts to address student diversity through differentiation, and the advent of learning technologies. Brown (1994), reviewing the substantial impact of CBE on the Australian education system, traces the origins of CBE to the scientific management movement that arose in the 19th century at the height of the industrial revolution. As jobs became more specialized, identifying competencies and their component skills enabled efficiencies in training workers for the jobs, doing the work, and evaluating performance. To this day, CBE is a strong element in the workplace and in career and technical education.

A second influence on the evolving notion of CBE developed in the 1920s and 1930s with mastery learning (popularized by Benjamin Bloom in the 1960s and 1970s), in which the time a student devoted to achieving preset learning objectives was made elastic. The emergence of mastery learning coincided with B. F. Skinner's (1954, 1968) work on behaviorism and the introduction of programmed learning. The military in the U.S., U.K., Australia, and elsewhere adopted objective-based training strategies during the World War era (WWI, WWII) to efficiently prepare unskilled soldiers for specific roles.

Mulder, Weigel, and Collins (2006) describe the behaviorist approach to competency in the business sphere, based on the research of psychologist D. C. McClelland (1973),

known for his achievement motivation theory. This approach was applied by the Hay Group in behavioral-event interviews to appraise levels of competence in selecting and training corporate and governmental leaders. The behaviorist approach cleaved competency from intelligence and asserted that competency could be developed through training, can be observed and assessed in behavior, and accounts for a significant portion of the differences in the job performance of individuals.

In the 1960s, Robert Mager's (1962) writing on performance-based objectives and criterion-referenced instruction further reified school learning, reducing the curriculum to small, measurable pieces and instruction to discrete steps. Thus, measurable objectives entered the mainstream of education, paving the way for the standards movement of the 1990s that spawned curriculum content standards in every state. CBE was a perfect fit for the standards environment, and the National Skill Standards Act of 1994 created a national board to establish a voluntary set of skill standards, assessments, and certifications. The National Skill Standards Board identified 15 workforce sectors. In 2008, the National Association of State Directors of Career Technical Education Consortium (NASDCTEC) published "industry-validated expectations of what students should know and be able to do after completing instruction in a career program area" (NASDCTEC, n.d., para. 1). The statements (updated in 2011–12) are organized into career pathways for all careers in 16 career clusters. The National Occupational Competency Testing Institute (NOCTI, n.d.), a nonprofit consortium founded in the 1960s, provides assessments to determine proficiency in career and technical areas. It recognizes achievement with badges and certificates which employers and schools may choose to also recognize.

Antecedents of personalized learning can be seen in the progressive education philosophy of John Dewey, William Kilpatrick, and others in the early decades of the 20th century. A great leap forward, however, came later, as educators sought methods to address student diversity. In the wake of Congress's 1975 passage of the Education for All Handicapped Children Act (now reauthorized as the Individuals with Disabilities Education Act—IDEA), educators sought methods for teaching an increasingly diverse student body. Margaret C. Wang's book, *Adaptive Education Strategies: Building on Diversity* (1992) and her related research and publications proffered an Adaptive Learning Environments Model (ALEM) with methods for individualizing instruction and managing classrooms that included students with widely divergent abilities and needs. Carol Ann Tomlinson popularized and provided research substantiation for instructional differentiation, beginning with her 1995 book, *How to Differentiate Instruction in the Mixed Ability Classroom*.

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As the first decades of the twenty-first century unfolded, the time was ripe for the fabric of personalized learning to take shape from the threads of CBE, differentiation, content standards, and a national clamor for, at last, significant education reform. Technology, especially learning management software and the burgeoning resources of the Internet, catalyzed this weaving of elements and burst of enthusiasm for personalization. The technology industry, with ideas and resources from the Bill and Melinda Gates Foundation and endorsement from the U.S. Department of Education, signaled that the age of personalized learning had arrived. The Gates Foundation (2010) itemized several of the threads, as follows:

Learning models that support personalized learning pathways require some basic building blocks. These include effective assessment tools that align with college preparation standards and clear postsecondary learning objectives, engaging digital content, algorithms that match student needs with content and delivery methods, technology-enabled professional development tools, and learning management platforms that integrate and deliver these diverse components. (p. 2)

In 2012, the U.S. Department of Education funded the Center on Innovations in Learning (CIL), and among its charges was to assist state education agencies and districts with personalized learning.

The Individual, the Person, and the Group

The difference between the individual and the person, in the realm of education, is the difference between (a) a targeting of a student's learning activities based on calculations of prior learning and readiness, and (b) engaging the student in designing and navigating learning pathways based on calculations of prior learning and readiness plus personal preferences, interests, and aspirations. Individualization can be done by a machine; personalization, as CIL has defined it, requires a teacher who might employ a machine. The teacher attends to the student's subtle, behavioral idiosyncrasies. The teacher knows her subjects and the possible paths a student might take in studying them. The teacher is an indispensable component in personalized learning.

The student is at once an individual scholar and a constituent of a group of learners, and his or her relationship with the group constitutes some of what it means for a young person to become socialized. Interactions with teachers and peers sharpen a student's thinking, elicit new interests, and provide insights to the nuances of human behavior. Personhood, in fact, is acquired through social interaction, as the self is defined and understood in relationship to other people. The Internet and software that coordinates the work of co-learners across time and place provides a middle ground between isolated, individualized learning and a face-to-face classroom experience. The ideal may be a blending of group learning in the traditional classroom with individualized learning and with personalized learning that includes virtual learning cohorts.

Competency-based education and individualized education are efficient means for matching learning content and tasks with each student's readiness and for determining and recognizing the student's mastery. Personalized learning includes these pedagogical attributes—matching content and tasks to the student's readiness and assessing progress based on demonstrated mastery—and adds a deeper regard for the person of the student.

Strategies to Personalize Learning

Use of Technological Tools

Learning technology makes personalization practical, at once reducing the time required for a teacher to differentiate instruction, opening access to unlimited content, structuring content and activity into manageable pathways, assessing progress and scaffolding tasks, and facilitating individual and group work across time and place. Blended learning, a method of personalization, mixes traditional classroom instruction with online delivery of instruction and content, including learning activities outside the school, granting the student a degree of control over time, place, pace, and/or path (Bonk & Graham, 2006). In a blended learning approach, technology is not seen as a replacement for the

traditional classroom, but rather as a powerful tool to enhance what is already proven to be effective pedagogy. "In this hybrid conception of personalization, educators can carry out a series of practices to make sure that technology and data enhance relationships, but do not pretend to substitute for them" (Sandler, 2012, p. 20). Personalization takes advantage of online learning, online testing for mastery, MOOCs (massive, open, online courses), and other Internet-enabled methods. Interventions in a technology-assisted personalized scheme are, in a sense, not necessary when predictive analytics are applied to continuously adjust learning tasks to demonstrated mastery, build in review spirals, and ensure each student's sufficient background of skill and knowledge before moving forward.

Competency-Based Education

Strategies to implement competency-based education in personalizing learning include:

- **Flexible credit schemes** break the ties among class time, learning time, and assessment. Flexible credit schemes include (a) dual enrollment and early college high schools, (b) credit recovery, and (c) multiple paths to graduation.
- **Service learning**, a dimension of many character and social/emotional learning programs, is easily accommodated in a personalized learning environment. Community-based learning directed at competencies (personal, academic, and career/occupational) extends the time and opportunity for learning beyond the school day and provides rich experiences beyond the classroom.
- **Internships** and **job shadowing** offer students opportunities for "real world" learning in business settings that both interest them and contribute to defined competencies.
- **Differentiated staffing**, taking advantage of teachers' different skills and interests, becomes feasible, even desirable, in a personalized learning environment in which recognition of students' progress within competencies is determined by demonstrated mastery rather than enrollment in a specific course with a specific teacher.
- **Acceleration and enrichment** flow naturally when the pace of learning is made fluid, allowing learners to move more rapidly as they demonstrate their mastery and encouraging them to pursue curricular content beyond the confines of a syllabus.
- **Recognition** of mastery may be expressed with the awarding of badges and recognition of proficiency with certificates and credits.
- **Student learning plans (SLPs)**, also known as individual learning plans, designed with a student, enable each student to take a different path, at a different pace, to reach standards. Constructing SLPs (with student input) are time-consuming for a teacher, but instructional software now makes the process more time efficient.
- **Study groups** and research teams enable students to work together to design projects aimed toward a hypothesis or outcome. The students may be members of a class or the group may be assembled across the miles via the Internet.

Personal Competencies

These strategies enhance students' personal competencies:

- **Cognitive competency** is enhanced by instruction that makes connections between what has been previously taught, what the student knows (regardless of where

learned), and the new topics. Reinforcing mastered knowledge through review, questioning, and inclusion in subsequent assignments builds students' retention of knowledge in accessible memory. Vocabulary is a critical element of cognitive competency and can be built in every subject area. Writing assignments encourage the association and integration of new learning and deep understanding, especially when connected to rich reading. Student curiosity to learn, in and out of school, is enhanced when students are engaged in designing pathways to exploration and discovery.

- **Metacognitive competency** grows when students observe teachers "thinking out loud" to approach learning tasks. Specific learning strategies and techniques can be taught and learned. Also, the metacognitive processes of (a) goal setting and planning, (b) progress monitoring, and (c) revising work based on feedback can be taught and reinforced. Self-checks and peer-checks as part of assignment completion are beneficial, and student graphing of assignment completion and objective mastery reinforces attention to learning. For critical thinking, students can be taught procedures of logic, synthesis, and evaluation. For creative thinking, students can be taught methods of divergent thinking.

- **Motivational competency** accrues from a growth mindset that bolsters the student's persistence toward ultimate mastery, from differentiated instruction that targets learning activities to the student's readiness, and from connections between learning tasks and the student's personal aspirations. The goal for teachers in promoting student mastery is to encourage students to find their reward in mastery. The fun is in learning, and the reward is the celebration of mastery.

- **Social/Emotional competency** is multi-faceted, incorporating emotional management as well as personal and interpersonal skills. Skills, strategies, and techniques can be taught and learned for social interactions, goal setting, and decision making. Classroom norms model and reinforce personal responsibility, cooperation, and concern for others. Cooperative learning methods serve a dual purpose of facilitating academic learning and building social skills. Parent programs can help parents teach and reinforce personal responsibility and alert parents to signs of emotional distress. Many evidence-based programs—applied schoolwide, in individual classrooms, or with specific students—address social/emotional competency.

Caveats and Conclusions

Reservations about personalized learning, apart from the current paucity of hard evidence of its effectiveness, follow two lines of concern: (a) the potentially negative effects of over-reliance on technology, and (b) the fear that individualization (or differentiation) opens the door to lowered expectations and a fragmented or diluted curriculum. Of course, learning can be personalized without technological tools, but the tools certainly facilitate it. Sherry Turkle, a professor at MIT, set off an alarm about the ill effects of life spent with a nose (or ear) to a screen—computer, tablet, video game, or smartphone—in her 2011 book, *Alone Together: Why We Expect More From Technology and Less From Each Other*. She followed in 2015 with the publication of *Reclaiming Conversation: The Power of Talk in a Digital Age*, in which she cautions that too much reliance on social connection via technology may stunt a person's emotional development, empathy, self-reflection, and social dexterity.

In discussing the distractions (technological or otherwise) that diminish our attention, Sven Birkerts (2015) warns that "between our own inevitable adjustments to the stimulus barrage of modern life—all the editing, skimming, compartmentalizing, accelerating— and the increasing psychological assault of others using their devices, we find it ever harder to generate and then sustain a level of attention—focus—that full involvement in experience requires" (p. 7). Matthew Crawford (2015) echoes Birkert's thoughts and advocates the "point of triangulation with objects and other people who have a reality of their own" (p. x; as opposed to a virtual reality) that fosters true individuality. In essence, reservations about technology in education center around the separation of students from social interactions and the fragmentation of learning into bits of information that do not congeal into understanding.

Interestingly, personalization of learning is espoused as an "antidote to the widespread feelings of anonymity, irrelevance, and disengagement that students report, especially in large, urban high schools" (Yonezawa, McClure, & Jones, 2012, p. 1). One might read this as an indication that the group context of classrooms for some students does not provide a desirable sense of connection, belongingness, and stimulation. Rather, the individual student feels isolated within the group, perhaps alone with her or his particular interests and stymied by a pace of instruction that is too fast or too slow. Personalized learning, on the other hand, so tailors the education experience to the preferences, interests, and aspirations of the individual student that the student is enlivened and engaged.

The objections to personalization, apart from the intrusions of technology, rest on faith in the pedagogical efficacy of teacher-centered, direct, whole-class instruction and the benefits of a common or shared learning experience. A variant of this objection is the complaint that differentiation, itself, is an unproven fad. Mike Schmoker, in an *Education Week* commentary (2010), articulated the case against differentiation by arguing that: (a) no solid evidence supports the effectiveness of differentiation; (b) differentiation's emphasis on "student preference" too easily slides into a practical alliance with the much discredited "learning styles"; (c) attempts to vary instruction result in nonsense activities; and (d) a teacher's time is best devoted to constructing a single, high-quality instructional unit with frequent opportunities for student response. This critique of differentiation strikes at the heart of personalized learning.

If you think of personalization as extreme tracking (one track for each student), you run up against the standard objections to tracking. Jeannie Oakes, formerly a UCLA professor and president of the American Educational Research Association, now director of education and scholarship at the Ford Foundation, built a substantial research case against tracking and other methods of dividing students into groups based on appraisals of their ability and potential for learning. In a 1992 interview following her 1985 publication of *Keeping Track*, Oakes explained that:

> When I talk about harmful effects of tracking and ability grouping, I'm talking about all of those forms of grouping that are characterized by educators making some rather global judgment about how smart students are—either in a subject field or across a number of subject fields. Sometimes, it's defined in terms of IQ, sometimes it's defined in terms of past performance, sometimes the criteria are predictions of how well children are likely to learn. In other words, some grown-ups in the school are making a judgment about how smart the students are. (O'Neil, 1992, para. 4)

Whether the sorting of students is done by teacher or machine, into groups *or individual tracks*, some risks are involved, including especially the relegation of some students to learning opportunities well below their capacity for mastery.

Warnings about the potential abuses of personalized learning serve to moderate the enthusiasm of its proponents, put boundaries around its excesses, and encourage research to confirm its effectiveness. But the objections are likely to fall away as teachers and technology get better at personalization.

Personalized learning in schools holds the potential to engage the disengaged students and build students' academic, career/occupational, and personal competencies. Personalized learning is made practical by technology that organizes curricular content, facilitates differentiation, opens vast and diverse avenues of learning, provides ongoing checks of mastery, and ultimately confirms mastery. Personalized learning encourages and confirms learning that takes place anytime, anywhere, and is thus a companion to competency-based education.

Personalized learning steps beyond the mechanical individualization of learning by incorporating the teacher's deep understanding of each student's interests, aspirations, backgrounds, and behavioral idiosyncrasies. Personalized learning mixes the targeting of learning to the individual student with opportunities to learn with a group, one-to-one, face-to-face, or across the miles.

Action Principles for States, Districts, and Schools

Action Principles for States

  a. Remove regulatory and statutory barriers to competency-based education. Course credit, grade promotion, and graduation requirements are often tied to enrollment and time spent in specific courses rather than to demonstrated mastery.

  b. Define specific academic, career/occupational, and personal competencies. In order for instruction to be aimed at competencies, the competencies must first be defined, including the enumeration of their constituent skills and areas of knowledge.

  c. Provide protocol and instruments for assessing competencies to determine mastery. Academic competencies may be defined as coinciding with state content standards and thus mastery may be determined through standards-based assessments. Career/occupational and personal competencies need similar means for determining mastery.

  d. Ensure that all schools have technology adequate for multiple methods of personalization, and provide training for district and school personnel in the use of the technology. Indeed, personalized learning is made practical by recent advances in technology, but the technology must be available and personnel trained to use it.

  e. Showcase local strategies and models that effectively employ personalized learning methods. Everywhere in the country, some teachers, schools, and districts are in the vanguard of practice in personalization. Identify them, and shine a spotlight on them in state publications and conferences.

Action Principles for Districts

a. Set district policies that encourage personalization. Be sure that course credit, grade promotion, and graduation requirements facilitate the recognition of learning wherever and whenever it occurs. Advance flexible credit schemes, such as (a) dual enrollment and early college high schools, (b) credit recovery, and (c) multiple paths to graduation.

b. Include the language of specific academic, career/occupational, and personal competencies in curriculum guides and course descriptions. In order for instruction to be aimed at competencies, the competencies must first be defined and included in curriculum guides and course descriptions.

c. Provide professional development for school leaders and teachers in methods for personalizing learning and for assessing competencies to determine mastery. Academic competencies may be defined as coinciding with state content standards, thus, mastery may be determined through standards-based assessments. Career/occupational and personal competencies need similar means for gauging mastery in formative assessments.

d. Ensure that all schools have technology adequate for multiple methods of personalization, and provide training for district and school personnel in the use of the technology. Indeed, personalized learning is made practical by recent advances in technology, but the technology must be available and personnel trained to use it.

e. Showcase schools and teachers employing strategies and models that effectively incorporate personalized learning methods. Build a vanguard of practice in personalization. Identify the leaders, and shine a spotlight on them in district publications and conferences.

Action Principles for Schools

a. Provide professional development for teachers in methods for enhancing students' personal competencies. Personal competencies are the propellants of learning, and teachers can build them in students through their intentional inclusion in instructional plans.

b. Incorporate service learning, internships, and job shadowing as means to facilitate out-of-school learning. Recognizing learning that occurs beyond the school day and outside the classroom is one thing, but enabling the learning to occur often requires intentional programming.

c. Include intentional incorporation of personalized learning methods in instructional planning, and provide teachers training and time to prepare for personalized learning. To ensure that personalized learning methods are systematically employed by teachers, make the inclusion of personalized learning strategies a routine component of instructional planning by teacher teams.

d. Ensure that school personnel are adept in the appropriate use of technology to personalize learning. Indeed, personalized learning is made practical by recent advances in technology, but the technology must be available and personnel trained to use it.

e. Enable teachers who are advanced in personalized learning strategies to share their work with other teachers. Some teachers invariably move in the direction of personalization before others; take advantage of what they are learning and doing by giving them opportunities to share with other teachers.