

# Preparing Students for the Future of Work: A Formative Assessment Approach

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# 3

## Preparing Students for the Future of Work: A Formative Assessment Approach

Alex Casillas, Patrick C. Kyllonen, and Jason D. Way

The role of schools in developing students' character and in preparing students for the workforce has been recognized at least since Horace Mann (1868). This theme was renewed in the Secretary's Commission on Achieving Necessary Skills (SCANS; Department of Labor, 1991), which identified interpersonal skills and personal qualities (responsibility, self-esteem, sociability, self-management, and integrity) as ones that "all American high school students must develop...if they are to enjoy a productive, full, and satisfying life" (p. i) and that are "needed for solid job performance" (p. iii). The importance of school is not limited to job preparation. As noted in the SCANS report, the school has a variety of functions, including to "prepare people to live full lives, to participate in their communities, to raise families, to enjoy the leisure that is the fruit of their labor. A solid education is its own reward and has value beyond specific skills" (p. i). Several relatively recent reports (National Research Council, 2012; Office of Economic Cooperation and Development, 2015) document evidence for the wide range of outcomes affected by school and the skills developed in school, including educational, social, civic, health, and workplace outcomes.

It is helpful to divide the skills that are acquired in school into three categories—cognitive ability, social (interpersonal) skills, and emotional and self-management (intrapersonal) skills. In this chapter, we focus on the latter two, which go by many names—noncognitive skills, soft skills, character skills, and 21st-century skills. For our purposes, in the chapter, we use the term *social-emotional learning (SEL) skills*, which has developed currency in the K-12 literature over the past decade or so, primarily due to the work of the Collaborative for Academic, Social, and Emotional Learning (CASEL, 2018).

There are several sources of evidence attesting to the importance of SEL skills in school and in the workplace. A number of employer surveys have identified SEL skills as among the most important skills employers seek when recruiting new graduates. In the annual employer survey conducted by National Association of Colleges and Employers (NACE, 2017), of the 20 skills identified as the "attributes employers seek on a candidate's resume," over half fall into the SEL category, including the ability to work on a team (78% of employers), strong work ethic (72%), leadership (69%), initiative (66%), flexibility (64%), detail-oriented (62%), organizational abilities (48%), friendly outgoing personality (26%), tactfulness (26%), and risk-taker (20%). Other employer surveys have produced similar lists, such as one by Casner-Lotto and Benner (2006), which identified critical thinking/problem-solving, oral and written communications, teamwork/collaboration, diversity, information technology, leadership, creativity/innovation, lifelong learning/self-direction, professionalism/work ethic, and ethics/social responsibility as the applied skills employers believed were "very important" for the new workforce entrant's success

at work. In higher education, Lumina's Degree Qualifications profile and the AAC&U's value rubrics also point to the importance of such factors (Markle, Brennehan, Jackson, Burrus, & Robbins, 2013).

In addition to employer surveys, a number of prediction studies have shown high correlations between SEL skills measured during school and education and labor market outcomes measured many years later. The measures include Likert-scale personality self-assessments (Poropat, 2009), forced-choice measures (Salgado & Tauriz, 2014), ratings by others (Connelly & Ones, 2010; Oh, Wang, & Mount, 2011), 30-minute clinical interviews (Lindqvist & Vestman, 2011), and teacher ratings (Poropat, 2014; Segal, 2013). Outcomes range from educational attainment to supervisor ratings, training school success, earnings, unemployment, and chronic unemployment. Given the empirical data supporting the positive association between SEL skills and education and labor market success, one question is whether any or all of these skills are teachable. There is evidence that education naturally teaches SEL skills. Students are rewarded for showing up, turning in their homework on time, not fighting with their teacher or other students, and learning from each other, and so it might be assumed that students are learning SEL skills in addition to mathematics, science, and language skills. In fact, there is evidence for a so-called "noncognitive" effect of education, in that the economic returns to education are substantially higher than the returns to the cognitive skills that students acquire in school (Bowles, Gintis, & Osborne, 2001; Garcia, 2014; Heckman, Stixrud, & Urzua, 2006; Levin, 2012). The benefits of early learning programs, which putatively target IQ, seem to be primarily noncognitive in nature (Heckman, 2006) in that the IQ gains fade after a few years, but the noncognitive effects persist (Borghans, Duckworth, Heckman, & ter Weel, 2008). Students who drop out of school but later obtain a general educational development (GED) have labor market performance that matches dropouts rather than degree holders, suggesting that although their cognitive skills are sufficient (they obtained a GED) their lack of noncognitive skills (what led to their leaving school) hampers them (Heckman, Kautz, & Humphries, 2014; Heckman & Rubinstein, 2001). There is also some evidence for direct training effects. Despite the widespread assumption that personality is fixed from birth, meta-analysis have shown that personality naturally changes significantly over the life span (Roberts, Walton, & Viechtbauer, 2006) and that it can be changed substantially (approximately 0.5 standard deviation) by direct interventions, such as psychotherapy (Roberts et al., 2017) or major life transitions (Bleidorn, 2012). Perhaps more pertinent to the present concerns, two meta-analyses of SEL programs in schools (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Taylor, Oberle, Durlak, & Weissberg, 2017) and after school (Durlak, Weissberg, & Molly, 2010) show substantial and sustainable effects of SEL training on a variety of outcomes, including social and emotional skills themselves, but also attitudes, positive social behaviors, conduct problems, emotional distress, well-being, decision-making, graduation, and achievement test scores. In addition, there is preliminary evidence that social-emotional skills can be developed through interventions in higher education (National Academy of Sciences, Engineering, and Medicine, 2017).

In summary, there seems to be some consensus on the important role of schools for developing social-emotional skills, and in the workforce's desire to identify new workers with such skills. There is also evidence that SEL skills can be taught and that doing so leads to a variety of positive outcomes. A question is how do we best go about teaching SEL skills? There are some suggestions from Durlak et al.'s (2011) study that successful SEL programs are ones that are "SAFE": (1) sequenced (connected and coordinated set of activities), (2) active (active learning orientation), (3) focused (at least one component dedicated to developing SEL), and (4) explicit (targets SEL skills, not positive development in general). We propose that SEL training can be accomplished with a formative assessment<sup>1</sup> system that targets SEL skills. We now turn to how we might go about doing that by leveraging design science guiding principles or criteria for the development of such a system.

## **Designing a Better Bridge for Future Workers by Leveraging Design Science**

Design science is the scientific study and creation of artifacts, which are human-made (as opposed to natural) objects or processes developed to solve problems and improve practices (Simon, 1996). Design science has its roots in engineering (the "sciences of the artificial"; Simon, 1996), and although it has been influential in a number of applied fields including architecture and computer science, it is less known in educational and psychological assessment. We propose that tests, score reports, and interventions can be treated as artifacts and thus could be approached from a design science perspective.

In design science, three guiding principles or criteria are used to evaluate successful designs: desirability (Does a design solve a problem? Do people want it?), feasibility (How probable, from a technical perspective, is a solution? How defensible is it?), and viability (Is the design capable of producing a profit or attaining the intended goal?) (Brown, 2009). Using these design criteria to test our assumptions, we believe that an SEL formative assessment system would "build a better bridge" that helps students develop the knowledge and skills needed for making a successful transition or "crossing" into the workforce. This system would include not just an assessment delivered at a single time point, but an ongoing cycle of student assessment, instruction, and professional development (PD) for instructors, as informed by both assessment and instruction—all of which would lead to better immediate, short-term, and long-term outcomes for students. We consider the three design criteria and how the proposed assessment system fulfills them.

**Desirability—Do people want a bridge?** This criterion developed out of human-centered design practices, which focuses on developing solutions to problems by involving the human perspective in all steps of the problem-solving process (IDEO, 2015). The point of this criterion is to reinforce that a solution will be used by humans and thus must be user-friendly in order for a solution to be effective. Based on a variety of reports on workforce readiness skills dating more than 10 years, practitioners have rated SEL skills (e.g., persistence and work ethic, collaboration

and teamwork, curiosity and flexibility) as highly desired by employers. For example, Casner-Lotto and Benner (2006) found that, when employers were asked to rank the most important skills for new entrants into the workforce, “applied” skills (e.g., professionalism/work ethic, teamwork/collaboration, oral communication, ethics/social responsibility) were consistently rated as the top five skills. In fact, compared to “basic” knowledge (e.g., English language, mathematics, science, reading comprehension), only one was consistently rated in the top five: reading comprehension (for detailed rankings, see Casner-Lotto & Benner, 2006, Tables 3–5). More recent research reports continue to reinforce this notion. For example, in a national survey of 8,969 respondents that included K-12 educators, postsecondary instructors, as well as workforce supervisors and human resource professionals, Elchert, Latino, Bobek, Way, and Casillas (2017) found that an overwhelming number of K-12 educators (90.4%), postsecondary instructors (86.3%), and workforce professionals (83.0%) consider SEL skills to be important for success in college<sup>2</sup> and work. Further, a recent report from LinkedIn (2018) shows that training for SEL skills in areas like leadership, collaboration, and communication is the number one training priority for workforce professionals, which included 1,800 talent developers, people managers, and executives (from a sample of 4,000 global professionals contacted via their LinkedIn profile). Thus, altogether, the evidence for the desirability of SEL skills in the workforce is strong, particularly given that organizations around the world are emphasizing a need to train for these skills and seem prepared to make a substantial monetary investment in this area.

**Feasibility—Can we build a bridge?** This criterion focuses on a solution having the empirical and technological support necessary to be delivered and implemented successfully. For the purpose of the proposed system, we focus on a low-stakes application; that is, we focus on a solution that is meant to help individuals develop their skills based on assessment, feedback, and intervention (as opposed to a high-stakes application such as selection or promotion). From an empirical perspective, there are hundreds—if not thousands—of primary studies and several influential reviews and meta-analyses (e.g., Barrick & Mount, 1991; Poropat, 2009; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007; Sackett & Walmsley, 2014) that show personality, behavior, and SEL skills are important predictors of academic, work, and life outcomes above and beyond cognitive ability. In addition, there is a growing literature (e.g., Corcoran, Cheung, Kim, & Xie, in press; Durlak et al., 2011; Kautz, Heckman, Diris, Ter Weel, & Borghans, 2014; National Academies of Sciences, Engineering, and Medicine, 2017; National Research Council, 2012) that demonstrates that SEL skills are amenable to instruction and development. Together, this literature can be leveraged to build validity arguments and support claims that (1) SEL skills are associated with important outcomes, (2) we can measure these skills with reasonable levels of reliability and validity, and (3) these skills can be improved. Besides empirical support, another aspect of feasibility is whether technology can support a solution like an SEL formative assessment system. The technology needed is likely to involve an online platform accessible via a variety of Internet-connected devices (e.g., desktops, laptops, mobile) with a user-friendly interface that can administer an assessment, score said assessment, deliver reports, and provide

personalized recommendations on resources that can be used to improve a user's SEL skills. Although this list of features may not have been feasible 15 years ago, we are happy to report that current assessment delivery technology fully supports such features. Indeed, there are some offerings that incorporate many of these features (e.g., ETS's [n.d.] WorkFORCE® Assessment for Job Fit).

**Viability—Should we build a bridge?** This criterion often focuses on financial aspects, including costs, to build and sustain a solution (Brown, 2009). Although profit is an important consideration when designing and developing a solution—particularly if it is a product or service that is offered for sale—in this thought exercise, we focus on other important considerations that are relevant to achieving the goal of helping individuals to be better prepared for the workforce. Specifically, we focus on two key issues: (1) using a common framework to which educators and workforce professionals can align, and (2) incorporating checks for fidelity of implementation. First, there are a number of SEL frameworks that have been advanced in the past few years (e.g., Camara, O'Connor, Mattern, & Hanson, 2015; Nagaoka, Farrington, Ehrlich, & Heath, 2015; National Research Council, 2012). Although each of them have relative strengths and weaknesses, what is important to this discussion is that they all use theory and empirical evidence to articulate a comprehensive framework by which knowledge and skills that are relevant to education and the workforce should be organized. Most importantly, they all serve as a way to create a common language among stakeholders (e.g., students, parents, educators, administrators, employers, and policymakers) that can be used to better align the skills needed by employers to those taught in the educational pipeline. Thus, these frameworks appear viable for serving as a foundation for a formative assessment system that can help to bridge the SEL skills needed in workforce settings. Second, fidelity of implementation is as important as the content of a solution. It is not unusual for implementation problems to be linked to lowered—or even null—efficacy (e.g., Marzano, 2013; Penuel, Fishman, Cheng, & Sabelli, 2011; for a comprehensive review of factors affecting implementation, see Durlak & DuPre, 2008). Thus, from our perspective, viable solutions need to include system-wide supports for implementation that include awareness campaigns (e.g., information about SEL skills), user training (e.g., PD and/or professional learning communities), documentation on how a program should be implemented as well as how it actually was implemented, and regular evaluation and discussion of lessons learned during implementation. All of these would be designed to realize the maximum potential for the efficacy of the solution. All in all, the evidence suggests that an SEL formative assessment system could be viable.

Knowing that an SEL formative assessment system is desirable, feasible, and viable is a critical first step in the design process. However, it is also critical to determine how the design will be developed. To this end, we recommend a principled approach to designing an SEL formative assessment system. This approach is described below, followed by an example of what elements an SEL formative assessment system might contain.

## **Principled Approach**

To design and develop desirable, feasible, and viable assessments, it is important to follow design-based approaches, better known as principled approaches or evidence-centered design (see Ferrara, Lai, Reilly, & Nichols, 2016). These approaches provide guidance for considering factors external to the assessment along with the actual content of the assessment (Ferrara et al., 2016; Mislavy & Haertel, 2007; Nichols, 2013). In addition to measuring the construct of interest, under principled approaches, developers are reminded that having more data is not the same as having useful data (Mislavy, 2011). When creating assessments, developers may become preoccupied with measuring the intended construct without considering what information the assessment will provide, who the appropriate population is, how the assessment will be delivered, and how the information can inform the purpose for designing and developing a measure (e.g., diagnosis, intervention, training). Principled approaches address these important considerations and allow for assessment development across a variety of content areas with a broad range of assessment types.

When developing assessments under a principled approach, it is valuable to have a theory of action (a.k.a. theory of change) that keeps the intended purpose, users, uses, and consequences of the assessment in mind throughout design and development decisions. A theory of action is a way to describe the types of actions (in the form of an intervention, program, coordinated initiative, or solution) that bring about the intended outcomes and consequences of an initiative, such as the one articulated in this chapter. Each activity is tied to an outcome in a causal framework, revealing the web of activities required to bring about an intended outcome. A theory of action provides a working model against which to test hypotheses and assumptions about what design decisions will best bring about a solution that will accomplish the intended purpose (Taplin & Clark, 2012).

## **Description of the Formative Assessment & Instruction System Theory of Action**

For the purpose of this chapter, we articulate a theory of action of a formative assessment and instruction system for assessing and developing SEL skills. The primary purpose of the system is to provide accurate information and feedback (to educators, administrators, students, and parents) on high school students' SEL skills that can inform instruction and interventions for helping students to improve their skills, succeed in educational contexts, and be better prepared to enter the workforce. Figure 3.1 provides a flowchart capturing a high-level theory of action, which is briefly described below in narrative form. The theory of action is divided into three overall portions: awareness and system design, a formative assessment and instruction cycle, and outcomes.

<COMP: Place Figure 3.1 Here>

## Awareness and System Design

**User education and awareness of SEL.** The theory of action begins with user education and awareness of SEL, what it is, and how these concepts can facilitate students' academic, workplace, and life success. This awareness may, in turn, lead to institutions (schools/districts) designing a solution (or purchasing an existing one, if it is sensitive to the local context) and making it available to their students. Unlike core academic skills solutions, which are well known in the marketplace, SEL is relatively new and may require a much more intentional and persistent awareness campaign to educate users on the appropriate (and less appropriate) ways to utilize this type of information.

**Design.** This part of the process captures the design of an SEL formative assessment system. Note that a school/institution could also choose to purchase and use an existing system. If designing a new system, the content should be informed by the existing research on SEL skills that predict outcomes of interest (e.g., the literature that shows conscientiousness predicts grade point average, higher year-over-year retention, and graduation rates) and resources that clearly identify these skills and break them down into measurable/observable pieces, such as ACT's Behavioral Performance Level Descriptors (PLDs; Casillas, Way, McKinniss, Colbow, & Hileman, 2016), which are empirically supported descriptions of the effectiveness levels of task-related, interpersonal, and self-regulatory behaviors needed to be successful in education and career contexts (for an example of PLDs for Persistence: Maintaining Effort, see Figure 3.2; for a review of the development of the PLDs, see Latino et al., 2017).

<COMP: Place Figure 3.2 Here>

## Formative Assessment and Instruction Cycle

**Administration.** Administration of the SEL assessment system would ideally take place online. This would streamline the time and resources needed to administer and score the assessment, provide reports, and track progress on SEL skill development over time. Administration should be facilitated by simple and intuitive administrator controls, which could be refined on the basis of user experience (UX) research and iteration of the user interface.

**Reports.** After a student has completed an assessment, an interpretive report should be available highlighting areas where a student exhibits strength and also areas where a student can improve. These interpretive reports will be informed, in part, on the empirically established levels of behavioral effectiveness available in the SEL research literature and existing descriptions of effective SEL behavior (e.g., ACT's Behavior PLDs). Ideally, these reports could be refined on the basis of UX research and customer feedback. Reports should also be available at the aggregate level (classroom, school, and district) to allow educators and administrators to evaluate aggregate patterns of SEL skills and allow them to make instruction and resourcing decisions (Manning, Way, & Casillas, 2017). It is the unfortunate case that schools and districts often have limited resources available to assist their students with SEL skills. Therefore, if a teacher (or district) notices that a particular student (or school) is struggling with certain SEL skills, then the



resources that are available can be directed to where there will be the most benefit, that is, to the students (or school) that needs them the most.

**Instruction/self-guided interventions.** A distinguishing feature of formative assessment systems is their direct connection to instruction (for groups and classrooms) and self-guided interventions (for individuals). In the case of an SEL formative assessment system, these should be based on the literature of effective SEL instruction and interventions, such as Durlak et al.'s (2011) meta-analysis showing that SEL interventions improve students' SEL skills (effect size = 0.57) and academic achievement (effect size = 0.27). A more recent meta-analysis of school-based SEL intervention research that met high methodological standards (Corcoran et al., in press) also found support for SEL interventions in school, such as predicting achievement in reading (effect size = 0.25), mathematics (effect size = 0.26), and science (effect size = 0.19). In addition, there are organizations such as OpenEd that contain online resources and offer more activities and opportunities for personalized instruction to individual students, as well as organizations like the National Council for Community and Education Partnerships (NCCEP) that have developed in- and after-school curriculum that emphasizes SEL skills (NCCEP, 2017). Finally, frameworks of SEL skills such as the Behavioral PLDs within ACT's Holistic Framework (Camara et al., 2015; Casillas et al., 2016) can guide the organization and scaffolding of curriculum, tools, and/or activities according to empirically established levels of behavioral effectiveness.

**Re-administration.** As is the case with any formative solution, part of its value lies in the re-administration of the assessment in order to track growth and examine change. Based on existing usage patterns and the research literature, we believe that the assessment component of a formative system could be administered approximately twice per academic year. Given this recommendation, a number of issues would need to be addressed in detailing a solution that goes beyond this high-level sketch. These would include how reports can accommodate tracking of changes (both in terms of UX and criterion-referenced reporting metrics that allow users to track meaningful changes in SEL skills), research on test-retest patterns and growth/change models for students in high school, as well as the need to develop multiple equated forms that demonstrate the psychometrically properties (e.g., reliability, accuracy) needed to support the intended interpretations across user groups (e.g., students, parents, educators, administrators).

**User training.** Given the relative novelty of SEL solutions in the market, it is important for an SEL formative assessment system to receive the support of a range of services that can assist users with a variety of adoption, implementation, and training needs. These include system adoption and implementation, embedding the system into district- and school-level plans, interpretation and dissemination of assessment results, PD options for educators and administrators, district and school SEL improvement planning, as well as professional learning communities that come together to discuss successes and address concerns. These services would go a long way to support intended uses of an SEL formative assessment system and to ensure it is implemented properly. Monitoring of the implementation of the system is an important point that should not be overlooked. As with any intervention, it is critical to ensure the SEL formative

assessment system is implemented with fidelity in order for the maximum benefit to be attained. Schools and districts should periodically monitor the delivery of the assessment and curriculum to ensure that efficacious delivery of the system according to best practices. Further, it is important that school staff be the ones to deliver the interventions; for example, the Durlak et al.'s (2011) meta-analysis found that improvements in academic achievement as a result of SEL interventions were not found when those interventions were delivered by nonschool staff.

## **Outcomes**

The outcomes section of the SEL theory of action is divided into four parts, depending on when the outcome is expected to occur after taking part in the SEL formative assessment system. The primary short-term outcome is an improvement in SEL skills. Short- to moderate-term outcomes include increased engagement in academic activities, improved conduct, increased attendance, and increased learning. Moderate- to long-term outcomes include improved grades (grade point average), increased retention, improved school climate, increased high school graduation rates, and a successful transition to college. Finally, long-term outcomes include increased college performance, increased college graduation rates, increased work readiness (i.e., increased likelihood of task performance, organizational citizenship, and decreased likelihood of counterproductive behavior), and increased life satisfaction and well-being.

As can be seen in the above discussion, having a theory of action allows designers, developers, and researchers to have a common understanding of the intended purposes, users, uses, and consequences of a solution. However, since the theory of action is written at a high level, we wanted to provide a more specific example to illustrate the use of an SEL formative assessment system.

## **Improving Persistence: A Use Case**

As an example of how such a formative assessment system might work, let's consider a cycle of the assessment/intervention loop as shown in Figure 3.1 that focuses on the SEL skill of persistence, which has been documented in research studies as one of the most predictive SEL skills (Poropat, 2009). In this case, an assessment of persistence would be administered to establish a baseline measure of the skill for each student. After taking the assessment, each student would be provided an interpretive report that gives their assessment score and feedback that helps to contextualize the score and provide a basis for improving their persistence.

However, even the best interpretive report is not sufficient for skill building. Therefore, the next step would be some kind of instruction or intervention, either self-guided, led by an instructor, or a combination, which shows students how to improve their persistence across a range of relevant scenarios. A few months later, the assessment would be re-administered in order to track students' skill growth and provide further feedback and guidance in an iterative or "formative" manner.

After giving feedback and interventions to help the students improve their persistence skills, the re-administration of the assessments would reflect the most immediate outcome of those improved skills. Increased persistence will be more likely to lead to better learning and engagement, as students learn not to get discouraged by difficult academic assignments, social pressures, or other challenges typically faced by high schoolers, where instead they persevere on their academic tasks and complete their work. Ultimately, their grades are more likely to improve, and students will be more likely to stay in school. Staying in school and getting better grades makes it more likely that students will graduate high school on time and have the knowledge and skills needed to successfully transition to college. In turn, this will make it more likely that students will persist in college-level coursework, successfully graduate from college, and be prepared to transition into the workforce. Throughout this process, students would be more likely to feel efficacious as a function of increased persistence and its positive outcomes, and thus would be more likely to feel confident in school, enjoy school, and maximize their learning.

There are several additional elements to be considered to ensure that the formative assessment system works as intended. First, PD, as mentioned previously, is critical to enable educators to be able to provide quality instruction on improving SEL skills (for a review of key components for PD, see DeSimone, 2009). This can include best practices for teaching SEL skills, detailed descriptions of various levels of effectiveness of SEL skills (see example of Persistence PLDs in Figure 3.2; Casillas et al., 2016), and sets of prebuilt activities that educators can either use or adapt to their classrooms (e.g., ACT Tessa Teacher Playbook; ACT, 2017). Additionally, it is important that interventions are implemented with fidelity, otherwise their positive benefits may not be fully realized (Durlak & DuPre, 2008). This could be addressed through PD activities, professional learning communities, and through teachers being observed by SEL subject-matter experts to provide constructive feedback and suggestions. Finally, there are various kinds of assessments and technology that could be leveraged to provide indicators of SEL skills and implementation fidelity. Assessments could range from simple self-report assessments, experience sampling, choosing among potential responses to hypothetical situations (i.e., situational judgment tests), gamified assessments where the assessment aspect is less salient and tasks are more engaging, and teacher behavioral observations of student SEL skills. Technology allows even more options to present engaging assessment and instruction, as well as ensure that interventions are implemented with high degree of uniformity and fidelity. Students could take online assessments that include animations or video clips, play an online game or activity designed to assess certain skills, receive interactive reporting that allows them to take a deeper dive into their assessment scores, and view live or recorded online lessons focused on improving SEL skills. Online delivery of assessments and instruction provides a higher degree of implementation fidelity, as it is easier to ensure each student is receiving the same content and quality UX as they move through the formative assessment system.

## **Conclusions and Future Directions**

This chapter has communicated the value of developing students' SEL skills in preparation for entering the workforce and proposed features of a formative assessment system that would achieve this goal, while following design science principles of desirability, feasibility, and viability. As described at the beginning of the chapter, SEL skills are critical to workforce readiness in terms of both predicting important work outcomes and in terms of employer desirability. However, the oft-discussed “skills gap” shows that we are still a long way from meeting the workforce demand for work-ready employees (for a thoughtful and wide-ranging discussion of this topic, see Burrus, Mattern, Naemi, & Roberts, 2017). Educational institutions, employers, and governments can leverage design science to bridge the skills gap between K-12 and workforce and design SEL formative assessment and training systems that will enable future workers to develop the skills they need throughout their educational journey and cross the bridge that allows them to be successful not just at work but also in life.

There are additional factors that should be considered during the design and development of a system such as the one described in this chapter. The first is beyond the scope of this chapter and involves identifying institutional constraints and hurdles to implementing such a system in K-12 and postsecondary institutions and possible ways to overcome such hurdles. An incomplete list would include aspects such as constraints on classroom time, teacher availability, financial resources, empowering educators through PD and professional learning communities to deliver SEL curriculum, and so on. One possible solution to some of the constraints (e.g., teacher time) is placing more emphasis on the importance of SEL skills and their associated outcomes to make the case to administrators and policymakers that classroom time spent on this topic has beneficial short-, moderate-, and long-term effects<sup>3</sup> and return on investment (see, for examples, Taylor et al., 2017). Further, supports for educators such as PD, professional learning communities, and help with evaluating implementation fidelity of instruction will help SEL formative assessment systems to be successful.

Stakeholders also need to emphasize the importance of holistic approaches that include empirically supported frameworks that can be leveraged for communication purposes, as well as serve as a common foundation from which to develop formative systems. Further, engaging in design thinking (i.e., approaches based on design science) by designing assessments and interventions with the end in mind (i.e., an important outcome of education should be a workforce with a broad range of SEL competencies) will help to avoid creating solutions that are looking for a problem to solve (e.g., a one-shot SEL summative test that will “magically” address workforce readiness needs) but that only contributes noise to an already noisy discussion. Especially important in the design process is the need for iteration, which is common in research—as it is part of the scientific process—but is less commonly seen in education and workforce practices, which are replete with examples of applying the “latest trend” without taking the necessary time for iterating through variations of a solution. Equally important as iteration is evaluation. Without proper evaluation of a solution, including UX, examination of individual components, and fidelity of implementation, it is difficult to determine the solution's efficacy and to pinpoint where iteration is needed and where it is “good enough.” Finally,

evaluation can help us to answer the ultimate question of any scaled approach aimed to help individuals develop skills: What works for whom when (or under what circumstances)? Of course, no one solution can ever address all of the needs surrounding workforce readiness, but we believe that a system such as the one articulated in this chapter has a great deal of potential for helping prepare the students of today to be the hardworking, cooperative, resilient, and creative employees of tomorrow.

Figure 3.1 Proposed theory of action for an SEL formative assessment & instruction system

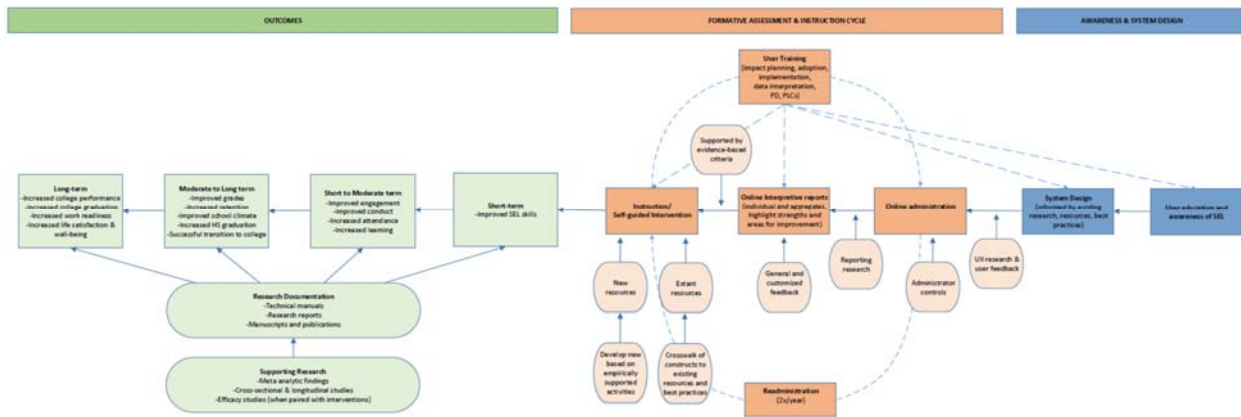


Figure 3.2 Example of Persistence PLDs (maintaining effort subcomponent) from ACT Holistic Framework

Reproduced by permission from Casillas, Way, McKinniss, Colbow, & Hileman, 2016.

<b>Domain</b>	<b>Sustaining Effort</b>
<b>Component</b>	Persistence
<b>Sub-component</b>	Maintaining Effort
<b>Sub-component</b>	<b>Puts in the time and sustained energy needed to successfully complete a task.</b>
<b>Behavioral Knowledge and Skill Statements for Maintaining Effort</b>	
<b>Highly Effective</b>	<ul style="list-style-type: none"> <li>• Almost always completes tasks even when he/she finds them boring, irrelevant, or unstimulating</li> <li>• Almost always maintains an appropriate level of effort even during challenging tasks and even without help</li> <li>• Works consistently at an appropriate level and knows when to take breaks</li> </ul>
<b>Effective</b>	<ul style="list-style-type: none"> <li>• Maintains an appropriate level of effort with help</li> <li>• Modifies his/her effort when he/she is working too quickly or slowly in order to get back on track</li> </ul>
<b>Somewhat Effective</b>	<ul style="list-style-type: none"> <li>• Needs frequent intervention and help to complete a task he/she finds unstimulating</li> <li>• Sometimes works too quickly or slowly but can get back on track and complete tasks with supervision</li> </ul>
<b>Not Effective</b>	<ul style="list-style-type: none"> <li>• Does not maintain an appropriate level of effort even with help</li> <li>• Abandons tasks that he/she finds unstimulating</li> <li>• Works too quickly and gets burned out or works too slowly and doesn't complete tasks</li> </ul>

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<sup>1</sup> The purpose of formative assessment is to monitor student learning to provide ongoing feedback to instructors for improving their teaching and to students for improving their learning; formative assessments tend to be low stakes. In contrast, the purpose of summative assessment is to evaluate student learning at the end of an instructional unit, course, or term of study by comparing the results against some standard or benchmark; summative assessments tend to be high stakes (Black & Wiliam, 1998).

<sup>2</sup> We use the term “college” to refer to a broad range of possible postsecondary opportunities rather than just a traditional four-year university. This includes, but is not limited to, two-year degree-granting institutions, certificate programs, vocational training, and so on.

<sup>3</sup> For example, time spent on helping students to develop their self-management and self-control skills will lead to better behaved students, thus lowering the amount of time that teachers need to spend dealing with classroom

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misconduct. In turn, this will lead to additional instruction time and more learning opportunities for students. Therefore, time spent developing students' SEL skills can not only lead to better students (and improved classroom learning environments) but, over time, to better workers.