National Institute for Learning Outcomes Assessment

February 2018

Using ePortfolio to Document and Deepen the Impact of HIPs on Learning Dispositions

George D. Kuh, Laura M. Gambino, Marilee Bresciani Ludvik, and Ken O'Donnell

Table of Contents

NILOA Mission

The National Institute for Learning Outcomes Assessment's (NILOA) primary objective is to discover and disseminate the ways that academic programs and institutions can productively use assessment data internally to inform and strengthen undergraduate education, and externally to communicate with policy makers, families, and other stakeholders.

About the Authors

George D. Kuh is adjunct research professor at the University of Illinois and Chancellor's Professor Emeritus of Higher Education at Indiana University (IU). He is a senior scholar and founding director of the National Institute for Learning Outcomes Assessment (NILOA) as well as the founding director of IU's Center for Postsecondary Research and the National Survey of Student Engagement (NSSE). George has more than 400 publications and made several hundred presentations on topics related to assessment strategies, institutional improvement, college student engagement, and campus cultures. His recent books include *Using Evidence of Student Learning to Improve Higher Education* (2015) and *Ensuring Quality and Taking High-Impact Practices to Scale* (2013). His work has been recognized with awards from the American Educational Research Association, Association for Institutional Research, Association for the Study of Higher Education, Council for Adult and Experiential Learning, Council of Independent Colleges, National Association of Student Personnel Administrators, and National Center on Public Policy in Higher Education as well as eleven honorary degrees. He can be reached at kuh@indiana.edu

Laura M. Gambino is Associate Dean for Assessment and Technology and Professor of Information Technology at Guttman Community College (CUNY) and a Visiting Scholar at the Community College Research Center, Teacher's College, Columbia University. She joined Guttman as a founding faculty member in August 2012. As associate dean, Gambino oversees such efforts as Guttman's ePortfolio program and Integrated Planning and Advising for Student Success (iPASS) initiative and leads Guttman's institutional student learning outcome assessment work, focusing on the intersection of assessment, pedagogy, and assignment design. In 2017, Laura joined CCRC to work on their iPASS and Guided Pathways projects. Previously, Laura worked for 13 years at Connecticut's Tunxis Community College as a Professor/ePortfolio Coordinator. From 2011 to 2014, she was the Research Coordinator for the FIPSE-funded Connect to Learning project at LaGuardia Community College (CUNY) helping develop the Catalyst for Learning: ePortfolio Resources and Research website. A leading ePortfolio and assessment practitioner and researcher, she is a Coach for the National Institute for Learning Outcomes Assessment (NILOA). With Bret Eynon, Laura is co-author of *High-Impact ePortfolio Practice: A Catalyst for Student, Faculty, and Institutional Learning* and co-edited the forthcoming *Catalyst in Action: Case Studies of High-Impact ePortfolio Practice.* Laura can be reached at laura.gambino@guttman.cuny.edu

Marilee Bresciani Ludvik, Ph.D. is a professor of postsecondary educational leadership at San Diego State University. Prior to that, she served as Assistant Vice President of Institutional Assessment at Texas A&M University and in a variety of student affairs, academic affairs, and alumni relations leadership roles at various types of institutions. Marilee has consulted with over 200 institutions on assessment and accountability matters. In addition, Marilee assists organizational leaders identify and leverage opportunities to collaborate across division lines, using mindfulness-based inquiry practices, nonviolent communication, difficult conversation processes, compassion practices, restorative justice, and design thinking. Marilee's research focuses on using translational neuroscience and mindfulness practices to inform the design and evaluation of workshops and curriculum to decrease students', faculty, and administrators' stress and anxiety and increase their attention, emotion, and cognitive flexibility, as well as enhance compassion, inquiry, creativity, and overall well-being. Marilee can be reached at mbrescia@mail.sdsu.edu

Ken O'Donnell is Interim Vice Provost at California State University Dominguez Hills (CSUDH). He works closely with the Provost and Vice President for Academic Affairs, managing division resources in faculty, the physical plant, and academic programs. Ken connects student success efforts and high-impact educational practices across multiple departments and divisions, advancing work to improve our understanding of educational effectiveness and student engagement. CSUDH is committed to becoming a national model for this work, sharing all it discovers in this area. Before coming to Dominguez Hills Ken was Senior Director of Student Engagement at the CSU Office of the Chancellor, leading system-wide offices and projects to strengthen STEM education, community engagement, transfer and articulation, and general education in order to improve learning and persistence and closing achievement gaps. Ken has addressed numerous conferences and workshops around the country on the intersections between deep learning and student success, learning in real-world contexts, and the role of public state systems in educational reform. Before coming to the CSU Ken was a member of the screenwriting faculty and an assistant dean at the film school at Chapman University. Ken can be reached at kodonnell5@csudh.edu

Abstract

There is growing awareness of the importance of dispositional attributes to effective performance, both during college and in the workplace. In this paper, we examine multiple facets of dispositional learning such as fluid intelligence and interpersonal and intrapersonal competencies, and explain why participation in well-designed high-impact practices (HIPs)—activities such as learning communities, service learning, undergraduate research, and community engagement—can help students cultivate conscientiousness, resilience, self-regulation, reflection and other learning dispositions. In addition, we demonstrate how and why the use of ePortfolio practice can extend, deepen, and document the impact of HIPs on these essential but often overlooked and difficult-to-measure attributes.

Using ePortfolio to Document and Deepen the Impact of HIPs on Learning Dispositions

George D. Kuh, Laura M. Gambino, Marilee Bresciani Ludvik and Ken O'Donnell

There is trouble in the land.

Skepticism about the value of college in the U.S. is pervasive. As recently as 2009, more than half of Americans believed college was necessary for success in the work world. By 2016, Public Agenda reported that share had fallen to 42%, with a corresponding rise in sentiment to the contrary, that "there are many ways to succeed in today's world without a college degree."

The good news is that the economy has improved. The bad news is the public is not inclined to share the turn toward prosperity with state support to colleges and universities at anything near pre-recession levels. Why? One major factor could be the questionable quality of undergraduate education.

According to the 2017 report from the Academy of Arts and Sciences' Commission on the Future of Undergraduate Education, the nation's top priority must be to strengthen the student educational experience:

> What was once a challenge of quantity in American undergraduate education, of enrolling as many students as possible, is increasingly a challenge of educational quality—of making sure that all students receive the education they need to succeed, that they are able to complete the studies they begin, and that they can do all of this affordably, without mortgaging the very future they seek to improve (p. 1).

Those familiar with the series of reports commissioned by the Association of American Colleges and Universities (AAC&U, 2015) about what employers want and need from colleges and their graduates were forewarned (https://www.aacu.org/leap/public-opinion-research). The consistent theme in these studies across the past decade conducted by Hart Research Associates is that too many college graduates lack the skills and competencies that translate well to the workplace. A 2017 report from McKinsey & Company by Manyika and colleagues about what is needed to respond to the near-term dynamic, rapidly evolving conditions in the workplace concluded that "Acquiring new skills that are in demand … will be critical" for both individual and organizational success.

Most informed observers generally agree that in addition to up-to-date technical knowledge, virtually every field of endeavor in the future will seek college graduates who are proficient in a range of competencies, some of which are time-honored expected outcomes of college such as critical thinking, analytical reasoning, clarity of thought and expression. Other attributes have more recently ascended in importance including curiosity; self-regulation; conscientiousness; flexibility; and the ability to work effectively with people from

Most informed observers generally agree that in addition to up-to-date technical knowledge, virtually every field of endeavor in the future will seek college graduates who are proficient in a range of competencies.

diverse backgrounds, especially those who hold varying perspectives on how to identify and devise solutions to messy, unscripted problems. Many of these attributes are reflected in the AAC&U Essential Learning Outcomes (2007) and the Degree Qualifications Profile (Lumina Foundation, 2014).

Admittedly, most of these attributes need greater definitional precision to measure and document them to determine where, when, and to what extent they emerge or deepen during the undergraduate experience. And this is why we can no longer ignore them, given the groundswell of interest by stakeholders in ensuring that graduates have acquired what have often been considered to be so-called ineffable, "soft skills."

Toward this end, for this paper we appropriate the term, dispositional learning, to represent those attributes represented by intrapersonal competence, interpersonal competence, and transferable neurocognitive skills which were recently featured in the National Academy of Science, Engineering, and Mathematics report (Herman & Hilton, 2017). Briefly:

- *Interpersonal competencies* involve expressing information to others as well as interpreting others' messages and responding appropriately.
- *Intrapersonal competencies* involve self-management, growth mindset, and the ability to reflect on and manage one's behavior and emotion to reach goals.
- *Neuro-cognitive skills* (Zelazo, Blair, & Willoughby, 2016) represent both (a) crystallized intelligence and (b) fluid intelligence that together are needed to monitor and self-regulate thought processes and behavior, which is essential to the development of inter- and intra-personal competencies as well as the ability to demonstrate applied knowledge.

Later we'll say more about these attributes.

For various reasons, dispositional learning heretofore has been under-emphasized in curricular offerings and under-examined in efforts to document collegiate outcomes. One step toward regaining the public trust and assuring stakeholders, including students, that graduates are prepared to survive and thrive during and after college is for postsecondary institutions to directly focus on cultivating dispositional learning (Figure 1).

One step toward regaining the public trust and assuring stakeholders, including students, that graduates are prepared to survive and thrive during and after college is for postsecondary institutions to directly focus on cultivating dispositional learning.

Challenges

Public Skepticism

Shrinking Support

Collegiate Quality

Opportunities

High-Impact Practices

ePortfolio

Neurocognitive Learning Outcomes Assessment

Figure 1: Selected challenges and opportunities for improving the undergraduate educational experience.

We further posit that high-impact practices (HIPs)—activities such as learning communities, service learning, undergraduate research, and community engagement – may be especially good for promoting the particular dispositional attributes that are in growing demand *if the experience is consistent with the educationally effective features common to a HIP*. The ePortfolio—recently recognized as the 11th High-Impact Practice (Kuh, 2017; Watson, Kuh, Rhodes, Penny Light, & Chen, 2016)—can play a powerful role in deepening and making visible the benefits of participating in a HIP.

We turn first to a brief overview of the literature related to High-Impact Practices, both as originally presented, and as subsequently advanced in a decade of remarkably broad and rapid adoption. Then, we discuss in more detail the nature of dispositional learning and how to document the neurocognitive attributes likely associated with participation in HIPs. Some of what is needed already exists, including a detailed vocabulary and mapping of the so-called "soft skills" and "ineffable" learning outcomes we seek (many of which, it turns out, are effable). It is worth noting that neuroscientists do not equate or refer to dispositional attributes as soft skills, inasmuch as there is nothing soft about their acquisition or their relevance and worth in responding to unanticipated, complex circumstances, inside and outside the classroom during college as well in virtually every dimension of post-college life.

But this kind of learning can be hard to measure, which is why we next describe how ePortfolios can record, extend, and deepen the dispositional attributes associated with a HIP and aligned undergraduate experiences. By narrating and making sense of their experiences as they go along, and sharing with others their evolving sense of learning and personal development, students can demonstrate the degree to which they have developed these dispositional attributes and other important outcomes. We close with some reflections on what the convergence of HIPs, dispositional learning, and ePortfolio work can mean for delivering on the promise of college in coming years.

High-Impact Practices and Dispositional Learning

Just over a decade ago, the phrase High-Impact Practices (HIPs) began to appear in the higher education literature. HIPs is an umbrella term referring to certain educationally effective activities associated with unusually positive benefits for the undergraduate students who participate in one or more of them (Finley & McNair, 2013; Kuh, 2008; Kuh, O'Donnell, & Reed, 2013). The first mention was in George Kuh's essay in the 2006 National Survey of Student Engagement (NSSE) annual report. It appeared again a few weeks later in *College Learning for a New Global Century* (AAC&U, 2007).

The original list of HIPs included ten practices (Kuh, 2008) with ePortfolio put forward as the eleventh HIP in 2017 as already noted. Indeed, for reasons discussed later, some consider ePortfolio to be a meta-HIP connecting and enhancing the influence of other HIPs on desired outcomes (Eynon & Gambino, 2017; Hubert, Pickavance, & Hyberger, 2015; Kahn, 2014).

Efforts to study and expand the number of students who participate in a HIP have become something of a juggernaut (Kuh, O'Donnell, & Schneider, 2017). Indeed, in 2017, 50 percent of provosts responding to a survey conducted by the National Institute for Leaning Outcomes Assessment (NILOA) reported that their institution was taking action to increase the number of HIP-like experiences for students, to expand access to HIPs, or to enhance their quality (Jankowski, Timmer, Kinzie & Kuh, 2018).

What has fueled this groundswell of interest? As noted earlier, the vast majority of colleges and universities are seeking ways to enhance the quality of student learning for ALL students in ways that increase the likelihood that students will complete what they start—whether it be a baccalaureate or associate degree, or another postsecondary credential. Schools also are mindful that stakeholders expect the postsecondary experience to prepare graduates who will be effective in the workplace, in civic affairs, and in one's personal life. In this context, HIPs are especially attractive because:

(a) They are associated with unusually positive effects on a variety of desired learning and persistence outcomes;

(b) They typically require applied, hands-on practice necessary for deep, meaningful, integrative learning over an extended period of time;

(c) They have *compensatory effects* for students from historically underserved populations (that is, students get a boost in their performance);

(d) They shrink the psychological size of the institution because students get to know well at least one faculty or staff member and a small affinity group of peers; and

(e) These positive effects on learning and persistence become cumulative and additive when students participate in multiple HIPs during their undergraduate program.

High-Impact Practices (Kuh, 2008)

- *First-Year Seminars and Experiences*
- *Common Intellectual Experiences*
- *Learning Communities*
- *Writing-Intensive Courses*
- *Collaborative Assignments and Projects*
- *Undergraduate Research*
- *Diversity/Global Learning*
- *Service/Community-Based Learning*
- *Internships and Field Placements*
- *Capstone Courses and Projects*
- *ePortfolio*

Eight Key HIPs Features Illustrated

Performance expectations set at appropriately high levels

Example: A writing- or inquiry-intensive first-year seminar in which assignments, projects, and activities such as multiple short papers, problem sets or projects challenge students to achieve beyond their current ability level as judged by criteria calibrated to students' pre-college accomplishment evidenced by placement tests or ACT or SAT scores.

Significant investment of concentrated effort by students over an extended period of time

Example: A multiple-part class assignment or community engagement project on which a student works over the course of the academic term, beginning with a synopsis of the problem or issue to be examined and the methods or procedures that will be used, followed subsequently with narrative sections describing the methods, findings, and conclusions which together culminate in a completed paper, demonstration or performance evaluated by an independent third party or faculty supervisor.

Interactions with faculty and peers about substantive matters

Example: Out-of-class activities in which students in a learning community or first-year seminar come together at least once weekly to attend an enrichment event such as lecture by a visiting dignitary and/or discuss common readings and assignments facilitated by an upper-division peer mentor.

Experiences with diversity, wherein students are exposed to and must contend with people and circumstances that differ from those with which students are familiar

Example: A service learning field assignment wherein students work in a setting populated by people from different backgrounds and demographics, such as an assisted living facility or shelter for abused children, which is coupled with class discussions and journaling about the connections between class readings and the field assignment experience.

Frequent, timely, and constructive feedback

Example: A student-faculty research project during which students meet with and receive suggestions from the supervising faculty (or staff) member at various points to discuss progress, next steps, and problems encountered and to review the quality of the student's contributions up to and through the completion of the project.

Opportunities to discover relevance of learning through real-world applications

Example: An internship, practicum or field placement that requires that students apply the knowledge and skills acquired during their program of study, or supervisor mediated discussions among student workers that encourage students to reflect on and see the connections between their studies and experiences in the work setting.

Public demonstration of competence

Example: An oral presentation to classmates of the required capstone seminar product that is evaluated by a faculty member and/or an accomplished practitioner, or a narrative evaluation of an internship, practicum or field placement by the work setting supervisor and/or supervising faculty or staff member.

Periodic, structured opportunities to reflect and integrate learning

Example: Linked courses in a learning community wherein an instructor of one course designs assignments that require students to draw on material covered in one or more of the other linked courses supplemented by a peer preceptor who coordinates student attendance and discussion at relevant campus events, or a capstone course in which students finalize their ePortfolio and explain the relative contributions of the artifacts contained therein that represent the knowledge and proficiencies attained at various points during their program of study.

Figure 2: Eight Key HIPS Features Illustrated.

None of the various behaviors characteristic of a HIP are unusual (Figure 2). Indeed, they can be found or incorporated in any classroom, lab, or studio as well as in educationally purposeful out-of-class activities that are intentionally structured to emphasize the features of a HIP. Examples of the latter are student government or organization leadership positions, campus employment, peer mentoring and tutoring, intercollegiate athletics (with the right coaching approach), student publications, touring concert bands and choirs, and so on. What seems to contribute to the consequential impact of a HIP is that students experience a combination of many of these effective educational features during the time they participate in the respective HIP (Figure 2).

Indeed, when done well, participating in a HIP is developmentally powerful and replete with opportunities to apply, reflect and integrate what one is learning. In fact, some see the HIPs framework as an especially promising approach for helping ensure access, equity, and educational quality. As mentioned earlier, there is a fair amount of research documenting the relationships between HIP participation and a range of desired outcomes (e.g., Brownell & Swaner, 2010; Finley & McNair, 2013; National Survey of Student Engagement, 2007, 2013, 2017). Not yet systematically examined is whether and the extent to which involvement in a HIP is linked with what we and others refer to as dispositional learning, such as the attributes briefly introduced earlier.

For example, the National Science Foundation recently commissioned the National Academy of Science, Engineering and Mathematics (the National Academies) to examine and identify a range of competencies that research shows may be related to postsecondary persistence and success, with a particular emphasis on how those competencies can be intentionally cultivated, assessed, and enhanced. The Academies charge was to gather evidence that would support and expand efforts to foster student success in STEM (science, technology, engineering, and mathematics) with an emphasis on students from historically underrepresented backgrounds. But what it learned about promising strategies to help undergraduates develop intrapersonal, interpersonal and cognitive competencies has implications for enhancing the quality of education for all students. More will be said soon about these attributes; suffice it to say that they are widely considered to be key to effective performance during and following college.

The National Academies report (Herman & Hilton, 2017) found that the competencies across all three domains were closely intertwined with—and supported the acquisition of—core knowledge and skills in science, mathematics, and English language arts. There is every reason to believe putting students in situations that demand they acquire and practice these competencies would confer similar benefits, college major notwithstanding. And there also is good reason to expect that participating in a HIP or other activity with the HIP-like features suggested in Figure 2 would put students in situations where they encounter messy, unscripted circumstances and need to expend effort on tasks that test their resolve, inducing them to practice and over time cultivate the dispositional learning that the National Academies, employers, and others assert are essential for success during and after college.

Indeed, when done well, participating in a HIP is developmentally powerful and replete with opportunities to apply, reflect and integrate what one is learning.

For example, HIPs typically put students in situations that require them to communicate and work effectively with peers and others in real time. A good example is a biology course with a community-based project where groups of students take responsibility for reclaiming an area of land that has been neglected and overgrown. Students are expected to organize their time in the field in an efficient manner and use some of what they have learned in class to determine which plants are indigenous to the region and which found their way into the area. Another expectation is that students be mindful of what they do not know to complete the project, and to reflect on and discuss their experience with their classmates and the instructor at the next class meeting. Invariably, unanticipated circumstances arise to which students must adapt and respond.

Another common example is study abroad where students encounter and must figure out how to successfully navigate a novel environment and culture, learning together what they need to know in real time to communicate in a different language and manage their resources effectively. Such situations, especially at first, create stress which in turn demands that students demonstrate resolve and flexibility, and learn how to deal with others who are grappling with similar challenges.

In both these examples, students are often surprised to see and hear their peers say and do unexpected and occasionally off-putting things. Such circumstances present opportunities every day to practice and develop some level of confidence and competence in the range of proficiencies represented by the multiple dimensions of dispositional learning and some suggestions for how to document the impact of these experiences, topics to which we turn next.

A Closer Look at Dispositional Learning

In order to assess dispositional learning associated with HIPs participation, we must first better understand what constitutes malleable dispositional attributes and what they look like in everyday life. Drawing on the work of Scharmer (2009) and Duckworth (2016), Figure 3 suggests the outcomes we often assess are the outcomes that we can more easily identify and measure, such as that represented by test scores and other metrics assumed to correlate with performance indicators, such as persistence and graduation rates. These are the surrogates for learning that many educators and leaders focus on when writing policy or making decisions. However, if we think of the desired outcomes in terms of an ocean ship captain encountering an iceberg, it's not the tip of the iceberg the part immediately visible to which the captain attends. Rather, it is what lies underneath that warrants the most attention. To avoid a potentially fatal shipwreck, a good ship captain will *always* pay *much* more attention to the part of the iceberg that lies beneath the surface. To assure that students and the larger society obtain the learning they want and need, we must direct more attention to *that* which seemingly lies beneath the surface of the easily identifiable learning. And *that* is what we are calling dispositional attributes.

Because dispositional attributes represent both what is readily identifiable as well as what lies beneath the surface, these attributes are foundational to deep, meaningful learning. Thus, we need to de-construct dispositional attributes in order to identify how and where they can be assessed at various points along student's educational journey.

The outcomes we often assess are the outcomes that we can more easily identify and measure, such as that represented by test scores and other metrics assumed to correlate with performance indicators, such as persistence and graduation rates.

Easily Identified Learning via test scores and standardized exams

Performance Metrics such as graduation rates, presistence rates, time to degree, matriculation into graduate school, and job placement

Application of skills such as: **Attention Regulation, Emotion Regulation, Growth Mindset, Resillience, Prosocial Behavior, Implicit Stereotype Threat, Regulation, Openness, Reflective Learning, Conscientiousness, Effortful Control, Academic Self-Efficacy, and Deliberate Problem Solving**

Adapted from Scharmer, (2005) and Duckworth, S. (2016) by Bresciani Ludvik, M. J. (2017)

Figure 3. Iceberg Analogy of Dispositional Learning of post-college life.

For purposes of this paper, "'learning,' 'personal development,' and 'student development' are considered "inextricably intertwined and inseparable" (American College Personnel Association, 1996, p. 2). This view is consistent with findings from cognitive neuroscience research which uses multiple measures of functional neural brain imaging, physiological marker assessment, behavioral task assessment, and first-person self-reports to better understand how people learn and what is needed to deepen learning.

Summarizing the major findings of neuroscience research for the Institute of Education Sciences (IES), Zelazo, Blair, and Willoughby (2016) explained the intricate connections between cognitive learning, experiential learning and personal development, referring to these behaviors as neurocognitive skills that are malleable and can be intentionally influenced. They divided neurocognitive skills into two categories: (1) crystallized intelligence and (2) fluid intelligence or executive functions. Returning to the iceberg analogy, *crystallized intelligence* represents the tip of an iceberg—easily identifiable facts and knowledge. *Fluid intelligence* or *executive functions* are more challenging to discern—the foundational base lying below the surface. Equally important, the learning and personal development behaviors associated with aspects of neurocognitive skills may take different forms, depending on the particular contexts in which they are found.

For example, consider dispositions that may come to the fore when a group of students enrolled in a HIP are engaged in environmental sustainability problem solving during a service-learning field experience, and a separate group are engaged in a similar problem-solving activity within a capstone course project.

The learning and personal development behaviors associated with aspects of neurocognitive skills may take different forms, depending on the particular contexts in which they are found.

Problem solving requires a set of crystallized intelligence functions related to environmental sustainability. In this context, crystallized intelligence and fluid intelligence may look similar. However, the unexpected environmental influences of the field experience may require the application of different self-control, conscientiousness, effortful control, and openness than would be used in a classroom (Bresciani Ludvik, 2016; Bresciani Ludvik, 2017). To help identify these malleable neurocognitive skills, Zelazo, Blair, and Willoughby (2016) further divided *fluid intelligence* or *executive functions* into three categories: (a) cognitive flexibility, (b) working memory, and (c) inhibitory control.

- *Cognitive flexibility* involves a person's ability to think about any one thing in multiple manners; this would include taking into account someone else's perspective or knowing how to solve a single problem in a number of ways. This would be useful, for instance, in demonstrating an openness towards learning about others' cultures or ideas and how that might change in certain contexts.
- *Working memory* involves both being able to recall known information in a relevant context and, applying it in some fashion, such as integrating multiple pieces of known information in a workable, meaningful, and appropriate method within the relevant system.
- *Inhibitory control* is the process of intentionally directing attention away from a distraction, stopping an impulsive behavior, or not acting on a highly learned or engrained habit (Bresciani Ludvik, in press, pp. 3-4).
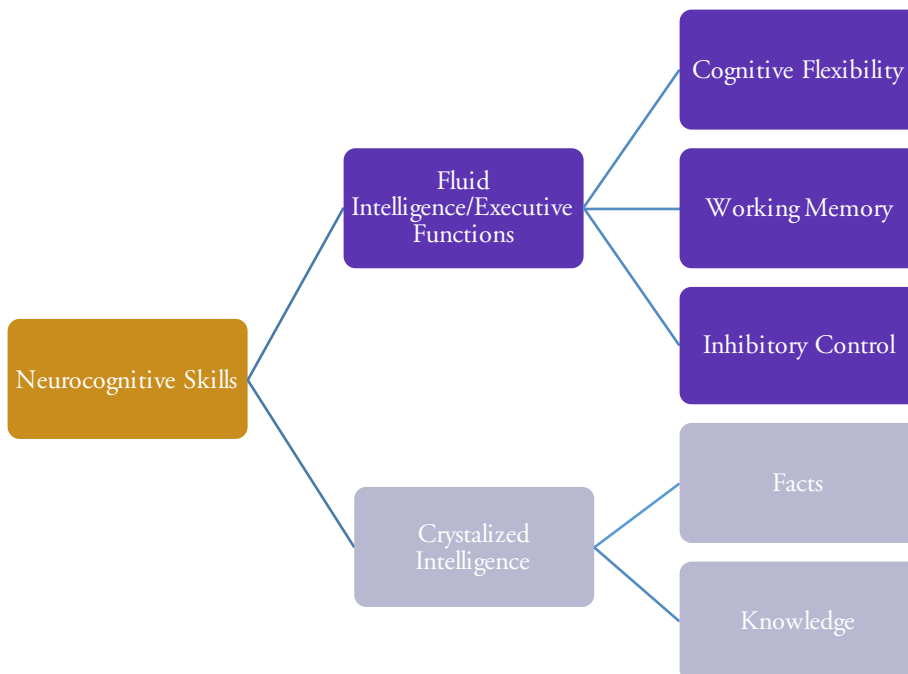
Figure 4 illustrates this conceptual alignment.

Using appropriate assessment approaches, it may be possible to document how certain educational activities such as HIPs contribute to student persistence, thereby yielding actionable information beyond recording the number of students who persist or complete a degree.

Figure 4: Learning and Development as Neurocognitive Skills
(Adapted from Zelazo, Blair, & Willoughby, 2016 by Bresciani Ludvik, M. J., in press).

While cognitive neuroscience research confirms the inseparable links between learning and personal development, it is not particularly actionable for those who want to determine the extent to which certain dispositional attributes are associated with a HIP experience or which features of a HIP (or any other educational experience) influence which outcomes. As we shall see later, however, when done well, ePortfolio has great promise for documenting and enriching the utility of crystallized intelligence (facts, knowledge) as well as fluid intelligence—the multiple contexts in which that crystallized intelligence is applied which also may reveal evidence of dispositional learning.

Figure 5 contains language more familiar to many educators, assigning executive functions into two categories: (a) temperament and personality, and (b) positive goal-directed behavior. Keep in mind that these neurocognitive skills
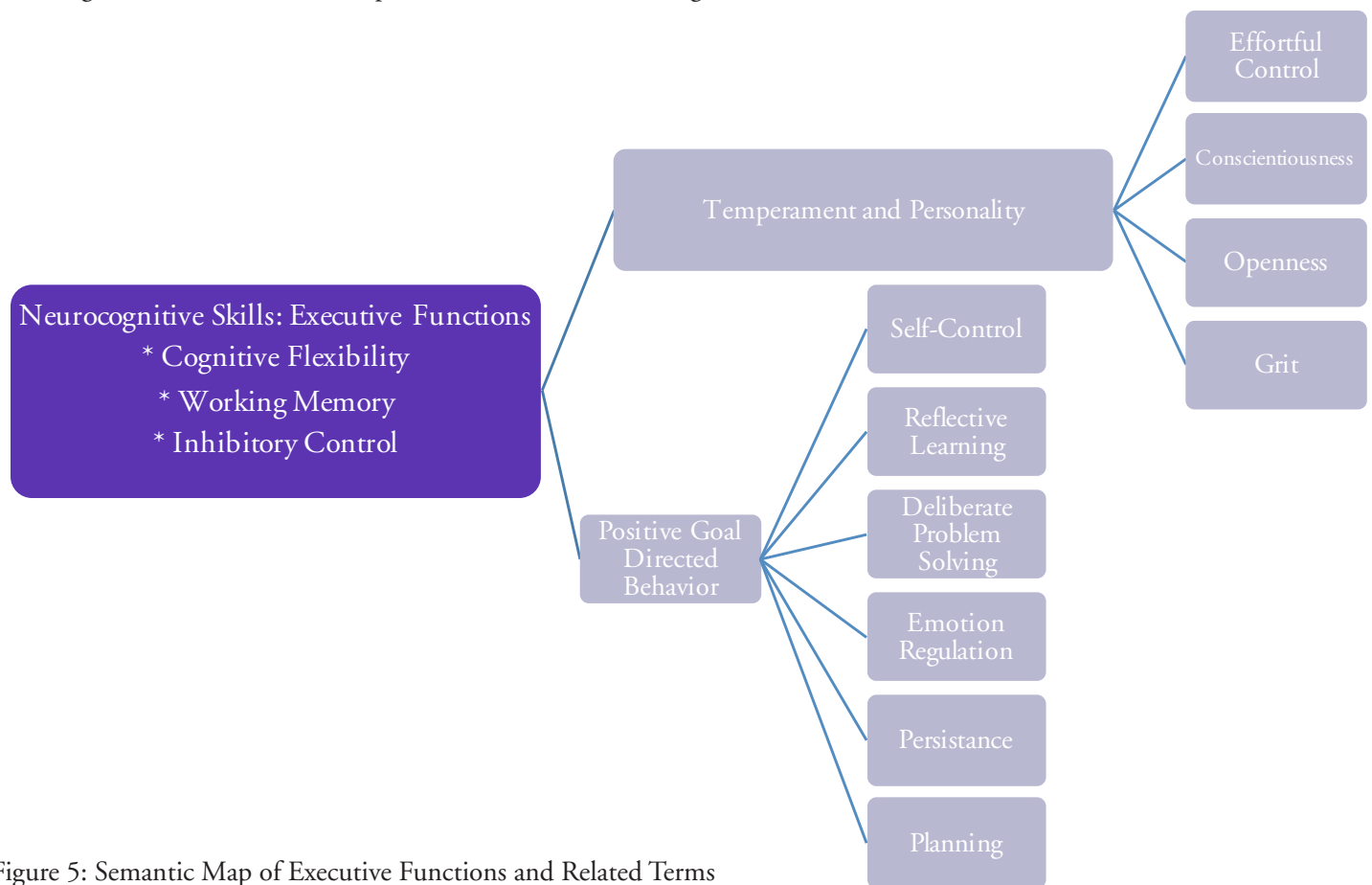
Figure 5: Semantic Map of Executive Functions and Related Terms (Adapted from Zelazo, Blair, & Willoughby, 2016 by Bresciani Ludvik, M. J., 2017).

are presumed to be malleable (Bresciani Ludvik, 2016; Bresciani Ludvik, 2017; Chaterjee et al, 2017), potentially shaped in desirable ways through intentionally designed curricular experiences and educationally purposeful out-of-class activities. Using appropriate assessment approaches (such ePortfolio discussed later), it may be possible to document how certain educational activities such as HIPs contribute to student persistence, thereby yielding actionable information beyond recording the number of students who persist or complete a degree.

As noted earlier, the National Academies (Herman & Hilton, 2017) set out to examine outcomes closely related to dispositional learning, including whether and to what extent intrapersonal and interpersonal competencies are related to student persistence and success especially in STEM. The project also examined whether these competencies could be enhanced through purposeful curricular design and other interventions. Figure 6 is an abbreviated summary of the National Academies findings which correlate well with allied efforts. The terms used by Zelazo et al., (2016) are purple and the corresponding Herman and Hilton (2017) terminology is dark gold.

Efforts to assess the dispositional attributes represented in Figures 3-6 are in a nascent stage. Fortunately, several pre- and post-experience inventories already exist, which could be used to document the extent to which certain of these attributes are associated with participating in a HIP. Among them are Dweck's (2006) Growth Mindset Scale, Duckworth and team's (2007) Grit Scale, Jazaieri et al. (2014) compassion scale to assess prosociality, and the Hoffman et al. (2002) Sense of Belonging Scale. Appendix A contains a longer list of potential assessment tools.
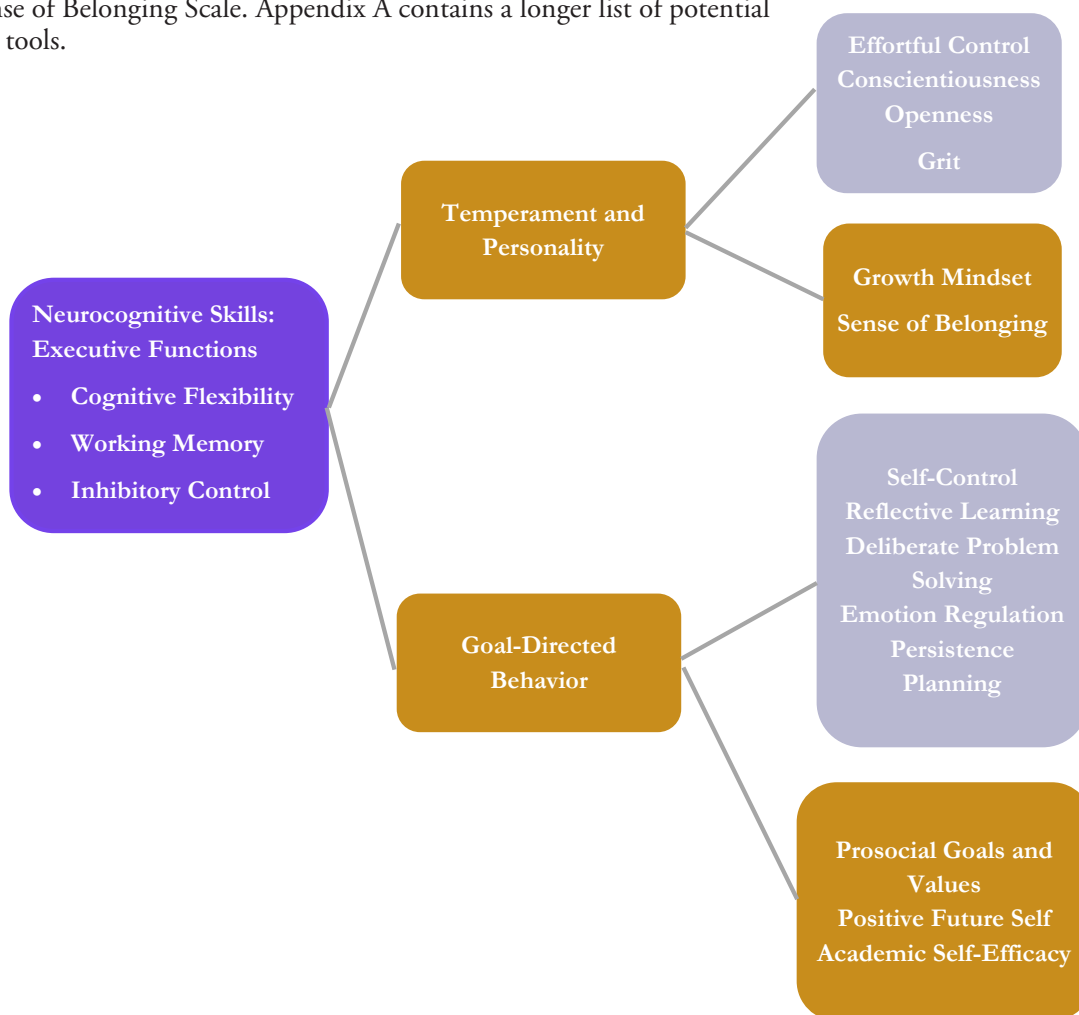
Figure 6: Semantic Map of Executive Functions and Related Terms to Intra- and Inter-Personal Competencies (Adapted from Zelazo, Blair, & Willoughby, 2016 by Bresciani Ludvik, M. J., 2017).

We point to these extant tools to stimulate ideas for how these and allied data collection approaches could be used as part of ePortfolio work. Of special interest is to stimulate efforts that examine how well the HIPs features outlined in Figure 2 are present in students' educational experiences and to what extent the respective HIP features are linked to specific dispositional attributes. As with any quality assessment effort (Kuh, Ikenberry, Jankowski, Cain, Ewell, Hutchings, & Kinzie, 2015), this work must begin with clear, specifically-worded intended outcome statements aligned with a particular attribute or personal development outcome.

For example, a specified outcome of the San Diego State University Seminar Series for first-year commuter students is that students will describe two meaningful connections they made during their first semester. This outcome is related to a university-wide goal to cultivate sense of belonging and foster engagement among all university students. The former is measured by the Hoffman et al. (2002) Sense of Belonging scale and the latter by the National Survey of Student Engagement. The seminar is designed to provide students with crystallized knowledge about where and how to make connections; instructors can add assignments that require students - for example - to meet with their faculty advisor, investigate at least one student organization of interest, or engage in a cultural center activity, activities that encourage students to make meaningful connections among these experiences. To deepen learning, students do reflective journaling (student self-report) and complete pre- and post-seminar inventories to measure well-being, attention and emotion regulation, as well as ethnic belonging to name a few. Course designers and instructors use this information to improve the seminar and student learning. One of the most promising approaches to compiling evidence from such a multifaceted learning experience seminar is the ePortfolio.

Using ePortfolio to Document Dispositional Learning Associated with HIPs

If dispositional attributes in the form of intrapersonal and interpersonal competencies exist "beneath the surface," how might we make them, as well as neurocognitive skills, more accessible for assessment—either internal (self) or external (institutional or employer) assessment? A reflective ePortfolio can make these types of learning associated with participating in a HIP more visible to students, faculty, staff, and external audiences.

The term "ePortfolio" often triggers the image of a technology platform or product. While the technology platform is essential, "ePortfolio" is much more than a technology, much more comprehensive than any particular platform or vendor product. ePortfolio is a coherent set of *effective educational practices* that link reflective, integrative and social pedagogy. ePortfolio practice supports learning across boundaries—inside and outside the classroom, advising pedagogies, and educational and career development. ePortfolio is also a *process* that, when done well, deepens reflection and dispositional and integrative learning, over time and across these boundaries. Together, those practices and processes yield an organic *product*—an evolving multimedia collection of artifacts, reflections, and experiences that form a digital narrative of a student's academic journey.

The term "ePortfolio" often triggers the image of a technology platform or product. While the technology platform is essential, "ePortfolio" is much more than a technology, much more comprehensive than any particular platform or vendor product.

Practitioners often categorize ePortfolio into different types—showcase, assessment, and learning ePortfolios:

- Showcase, or career ePortfolios, are externally facing, used to share one's "best" self, including examples of learning for potential employment or transfer opportunities.
- Assessment ePortfolios provide institutions and other interested parties artifacts of work, and possibly reflections, often tied to programmatic or institutional learning outcomes.
- Learning ePortfolios, the category we will focus on in this paper, provide students the space and structure to focus on *practice* and *process*, enable students to construct knowledge for various audiences, make connections among learning experiences, and - through reflection - understand the ways they are developing as self-directed life-long learners.

The role of reflection in ePortfolios is essential, because the reflective component helps to make the implicit "beneath the surface" learning explicit. Thus, learning ePortfolios are sometimes referred to as reflective ePortfolios.

A common question from those unfamiliar with or new to working with ePortfolios is, "What difference does the 'e' make?" Eynon and Gambino (2017) argue that the "e," the technology platform, is an essential component of a high-impact ePortfolio practice which makes reflective and integrative learning practices and processes visible—to students, to faculty and staff, and to external audiences. Moreover, the ePortfolio is not limited to a single course or learning experience, and when done well, spans the entire student learning experience. Thus, students can see not only their growth over time, but the ways seemingly disparate learning experiences connect into a cohesive whole. ePortfolio technology allows students to involve peers, faculty, staff, and external audiences in understanding and enriching their learning, something a traditional assignment or activity typically does not.

Thus, ePortfolio is not a "plug and play" technology. Building academic skills and developing self-understandings and dispositional attributes do not happen by simply making the technology available to students, faculty, and staff. Professional development is essential for helping faculty and staff implement reflective learning opportunities that take advantage of some of ePortfolio's key features.

ePortfolio, therefore, is a set of reflective practices that, when done well, makes authentic learning and personal development visible, comprehensible, and meaningful, induces students to draw connections between various learning and personal development experiences inside and outside of class on and off the campus, fosters integrative learning, and deepens dispositional attributes.

The Importance of ePortfolio "Done Well"

To discover and advance best ePortfolio practice with an emphasis on reflection and assessment was a goal of the FIPSE-funded Connect to Learning

ePortfolio, therefore, is a set of reflective practices that, when done well, makes authentic learning and personal development visible, comprehensible, and meaningful, induces students to draw connections between various learning and personal development experiences inside and outside of class on and off the campus, fosters integrative learning, and deepens dispositional attributes.

project (C2L) led by the Making Connections National Resource Center at La-Guardia Community College (CUNY). C2L formed a community of practice of ePortfolio practitioners from 24 cross-sector institutions. Its goals were to support and strengthen ePortfolio initiatives at participating institutions, develop a framework for effective ePortfolio practice, and examine the impact of ePortfolio practice at multiple levels of campus life. C2L leaders worked with participating campus teams to gather evidence about the efficacy of effective ePortfolio practice, using a common survey instrument, the C2L Core Survey (http://c2l.mcnrc.org/evidence/evidence-2/) which included questions used with permission from the National Survey of Student Engagement (NSSE). While all teams focused on student learning and success, each institution also developed indicators appropriate to their campus and students. Of particular interest was documenting the relationships between the student ePortfolio experience, learning, and other outcomes such as persistence, along with faculty, staff, and institutional leaders' perceived value of ePortfolio in their own work (Eynon & Gambino, 2017).

The C2L project and its findings summarized by Eynon, Gambino, and Torok (2014) and Eynon and Gambino (2017) concluded that ePortfolio practice done well helps foster student success, as measured by pass rates, GPA, and persistence. At LaGuardia Community College (CUNY), for example, the one semester persistence rate for students in ePortfolio courses averaged 9-11 percentage points higher than peers in other courses.

In addition, ePortfolio students more frequently engaged in deep learning behaviors (Nelson Laird, Shoup, Kuh, & Schwartz, 2008), such as synthesizing and organizing ideas, thinking critically, and applying theoretical concepts to unfamiliar situations. Finally, C2L results suggested that ePortfolio practice helps students build not only academic skills but also the affective understandings of self and the dispositional attributes needed for success in today's workforce.

Features of High-Impact ePortfolio Practice

Why is ePortfolio so well-suited for making these dispositional attributes visible? As mentioned earlier, ongoing reflection is essential and will be explored in detail below. But there are other key features of ePortfolio practice that, when leveraged effectively, with careful attention to structure and process, support these types of learning.

Ownership. While schools provide the technology platform as well as structured templates to guide students in developing their ePortfolio, the student *owns* his/her ePortfolio. But, ownership goes beyond what the terms of any software license state. Student ownership is about having a space, a virtual "studio," to experiment with practice and process and having the ability to customize that space; to leverage multimedia capabilities - color, images, video - in a way that represents who they are at that current moment. This type of ownership can help today's students understand that they are active agents in their learning and capable of constructing knowledge that can be shared with others. Having a "space of their own" to reflect on their learning can encourage students to identify and articulate those "beneath the surface" dispositions such

C2L results suggested that ePortfolio practice helps students build not only academic skills but also the affective understandings of self and the dispositional attributes needed for success in today's workforce.

Making Learning Visible. Through collecting and reflecting on learning artifacts and experiences, ePortfolio practice prompts students to make their learning more visible, to themselves and others. Often, the only audience for student work is a faculty member. Students turn something in, it is reviewed and graded by the instructor, and then returned to the student where it is most likely looked at for a grade and feedback and filed away. ePortfolio provides the structured opportunity for students to share their work more broadly. They are able to look back at previous work in their ePortfolio to see their own learning over time.

ePortfolios can be shared with peers, advisors, other faculty, family members, potential employers, and others, making a student's learning visible in new ways. In this sense, involving external audiences in the process induces students to think differently about what they know and can do. Because an ePortfolio is typically replete with artifacts of authentic learning, these artifacts serve as evidence to assess a range of learning outcomes including dispositional attributes.

Longitudinal Capacity. Developing over time and across boundaries - ePortfolio provides scaffolded opportunities for learning and reflection, enabling and deepening the development of such dispositional attributes as intrapersonal and interpersonal competencies and neurocognitive skills. Because ePortfolio, when done well, is longitudinal in nature, the reflective component of the process helps students make connections among their different learning experiences—in a given academic term as well as the entire student learning experience in and out of the classroom.

Identity Development. ePortfolio emphasizes development of the "whole" person by prompting students to connect and make meaning from diverse learning experiences which helps students develop more purposeful identities as learners. Structured reflection provides an opportunity to synthesize and integrate lived experiences with academic experiences, and for students to consider who they are and who they are becoming as these essential intrapersonal and interpersonal competencies develop. ePortfolio processes put students in situations where they can draw on and deepen dispositional attributes, such as academic self-efficacy, a growth mindset, conscientiousness, and utility and intrinsic goals, all of which are important to identity development and integrative learning.

While these features - ownership, longitudinal capacity, and visibility - are important to the ePortfolio process; reflection is at the heart of a high-impact ePortfolio practice.

Reflective ePortfolio Practice

Reflection is critical to helping students connect and make meaning from diverse learning experiences—in courses, in other high-impact activities, and in educationally purposeful experiences on and off campus. By making reflection a habit of mind and heart, students develop the ability to routinely integrate various learning experiences into a larger framework of personal development and purposeful self-authorship. According to Carol Rodgers (2002), "The function of reflection is to make meaning, to formulate relationships and

ePortfolios can be shared with peers, advisors, other faculty, family members, potential employers, and others, making a student's learning visible in new ways.

what it means to be human. It is what enables us to make sense of and attribute value to the events of our lives" (p. 848).

Reflection provides the opportunity to pause - to step back in a way - and intentionally consider and make-meaning from one or more learning experiences. It can help students articulate their learning, not just of disciplinary knowledge but of the dispositional attributes they need to practice and develop to be successful.

What does meaningful reflection look like? How can faculty and staff use reflection effectively to help students articulate their learning? What types of prompts and practices elicit the competencies and behaviors employers are seeking?

Rodgers identified four principles for meaningful reflection (2002): reflection as connection, reflection as systematic and disciplined, reflection as social pedagogy, and reflection as an attitude towards change (p. 845). These categories (as depicted in Figure 7) are not distinct. One reflective activity may by systematic and disciplined and provide opportunities for connection. Another may use social pedagogy and reflection in community to help students develop a disposition toward change as they make connections between different experiences.

In the sections below, we briefly describe each reflection category and share an example of what this looks like in practice. While a growing number of institutions engage students in high-impact ePortfolio practice, (including Yale, Arizona State University, Elon, Binghamton, and LaGuardia Community College) we use examples from Guttman Community College (CUNY) to illustrate the value of reflective practice. At Guttman, all students create a reflective learning ePortfolio in their required Bridge program. This ePortfolio is then developed across their entire learning experience, providing multiple opportunities for reflection in a range of activities and High-Impact Practices both inside and outside the classroom. Students engage regularly in self-assessment via their reflective practice and also submit their learning ePortfolios for assessment at three milestones: the end of the Guttman's Summer Bridge Program (benchmark ePortfolio), the end of their First-Year Experience (milestone ePortfolio), and at the end of their program of study (capstone ePortfolio).

Reflection provides the opportunity to pause - to step back in a way - and intentionally consider and make-meaning from one or more learning experiences. It can help students articulate their learning, not just of disciplinary knowledge but of the dispositional attributes they need to practice and develop to be successful.
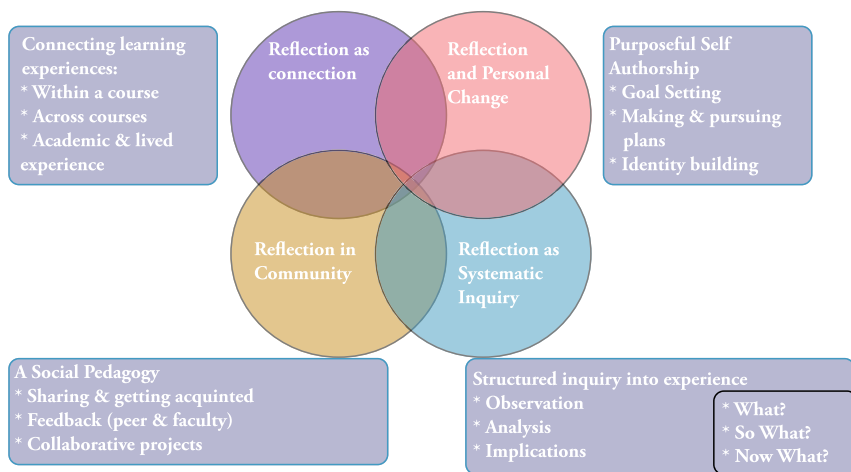
Figure 7: Dewey's Criteria for Reflection.

Reflection as connection is practiced in Arts in New York City, a required First-Year Experience course at Guttman. As their signature assignment, students create an art piece that describes some aspect of their relationship to New York City. The prompt for this activity encourages them to, "Think about the role of the arts in shaping your identities (gender, racial, class, ethnic, religious), your childhood, and your view of your community." As part of their ePortfolio, students complete a project proposal, showcase their piece, and then reflect on the process. As part of that final reflection, students are prompted to engage in self-inquiry:

> Think about what you hoped to create and communicate. Describe the process you undertook to create this project. Were you able to achieve your goals? In what ways did you apply concepts you learned in class to this project? What does this piece say about you and your relationship to New York City? What did you learn about yourself as you developed this piece of art?

In addition to connecting both course-based content knowledge and the experiences they had in the community, students are asked to articulate their "beneath the surface learning" in terms of conscientiousness, academic self-efficacy, a growth mindset, and a positive future self. Their reflections then become a powerful articulation of their learning, as evidenced by this student's response:

> As an African American woman, I felt that my culture was always being whitewashed, meaning that serious aspects of African Americans triumphs were being ignored or under credited. When I would see photographs in the textbooks they always had photos of white men and women, which ultimately left me wondering about my African-American history and our struggle which was going unheard. Jamel Shabazz mainly focused on African Americans in urban areas of New York, you see the pain and happiness of the 80's and how people dressed and lived which I think is the most important part of photography.

In addition to connecting both course-based content knowledge and the experiences they had in the community, students are asked to articulate their "beneath the surface learning" in terms of conscientiousness, academic self-efficacy, a growth mindset, and a positive future self.

I think one of the most important aspects of photography is the cultural impact it can have on people by making us aware of what people went through back then. I think my Arts in New York City class made [me] value my culture and history way more, which I thought was impossible since I really liked educating myself on the tribulations that African American women and men faced and how long we came. If it was not for my Arts in New York City class, I would never know artists like Kehinde Wiley, Awol Erizku, and Diane Arbus and their contribution to society and changing the way I viewed conventional art.

At Guttman this reflective practice provides an opportunity for first-year students to begin to practice these dispositions that they will continue to hone across their future learning experiences.

Reflection as Social Pedagogy: While reflection is often thought of as a solitary activity, there is value in reflecting with others. Dewey (1916) suggests that meaningful learning and reflection often happens in community, in conversation, and in interaction with others. Reflecting in community - sharing and discussing their learning with others - adds depth and power to integrative learning and the cultivation of dispositions and neurocognitive skills. ePortfolio provides an opportunity for what Bass and Elmendorf (n.d.) call social pedagogy—the co-construction of knowledge for authentic audiences. Students can share and receive feedback from their peers via ePortfolio and can work with others to co-create ePortfolios for specific projects or activities. These activities both encourage them to develop and share information with others as well as strengthen individual academic self-efficacy, growth mindsets, and a sense of belonging—foundational to the dispositional learning they need.

Guttman students engage in social pedagogy during the Bridge Program, which requires them to create a personal learning ePortfolio and co-construct a group ePortfolio as part of a research project. The topics for the projects vary but typically involve researching a New York City neighborhood, which is then connected to the Bridge Program's common reading, such as *The Diary of a Part-Time Indian*. Working in teams, students focused on identifying indicators of poverty and privilege, comparing and contrasting their assigned neighborhood to the setting of *Diary*.

This excerpt of an ePortfolio page from a group assigned to University Heights, a neighborhood in upper Manhattan, illustrates how students "constructed" knowledge in their ePortfolio:

Indicators of Poverty: In University Heights we looked for 4 indicators of poverty. They were graffiti, homeless people, litter and food trucks. We saw 6 walls and poles filled with graffiti on them. For the homeless people, we didn't see any, on account of the rain, but we did find their belongings in shopping carts. Also, we saw a lot of over flowing litter around in the streets…
Indicators of Privilege: As we were walking through the neighborhood we saw a lot of different signs of privilege…There were many clinics

Reflecting in community - sharing and discussing their learning with others - adds depth and power to integrative learning and the cultivation of dispositions and neurocognitive skills.

around the neighborhood, also 8-9 pharmacies…Another positive thing about University Heights is that there were lots of transportation options….People around this area seem to feel safe and happy living here…

NYC neighborhood to Reardan, WA: University Heights and Reardan, WA are both different neighborhoods. Reardan is a very privileged neighborhood with one of the best schools. Most of the people there are wealthy and have not experienced poverty. University Heights showed both poverty and privilege.

After completing their ePortfolio, each group presents their work to their faculty, advisor, peers, and occasionally other members of the Guttman community. Students then individually reflect on their Bridge experience in their personal ePortfolio.

Conducting group research, creating an ePortfolio, and sharing that learning with the community fosters and deepens dispositional learning, including the development of conscientiousness, academic self-efficacy, growth mindset, and a sense of belonging. The concepts of belonging and academic self-efficacy are critically important to all students and especially to first generation, minority, and those academically under-prepared. Guttman students begin, early on, to see that they have something to contribute as a member of the Guttman community.

Reflection as Systematic and Disciplined: Some consider reflection to be vague, unstructured musing. But Rodgers (2002) argues that reflection can be a systematic, rigorous, disciplined way of thinking, with its roots in scientific inquiry. She lays out Dewey's structure for an ideal reflective process, moving from experience to observation, then analysis and finally to implications and, possibly, the development of new, experimental actions. In simpler terms, we can think of this as a process of answering three questions: What? So what? Now what? This systematic and disciplined reflection process is common in disciplinary subjects such as science, allied health, and business. But it can also be an important reflective practice in high-impact practices that take place outside the classroom.

Global Guttman is a study abroad program that integrates ePortfolio practice throughout the program. Global Guttman experiences are linked to academic courses in student's program of study usually in the second year; students complete pre-, during, and post-trip reflections, connecting their lived experience to their coursework and considering their emerging global identity and citizenry. While on their trip, students complete daily journal entries, where they reflect in a systematic, disciplined way. Students are asked to consider their sense of belonging in terms of a larger community. They are also encouraged to see a more positive future self and consider their intrinsic, utility, and pro-social goals as demonstrated by this student's reflection. Below she reflects in a daily journal entry on her experience in Belize, the personal difficulties she faced (What?), how she moved past them (So What?), and what she learned from them (Now What?)

> *Conducting group research, creating an ePortfolio, and sharing that learning with the community fosters and deepens dispositional learning, including the development of conscientiousness, academic self-efficacy, growth mindset, and a sense of belonging.*

What? Since it's rainy season in Belize, it rains every single day and because of this, there are many bugs. I disliked his farm because of the bugs.
So What? I learned from this that in some scenarios, there aren't any solutions, but I have to learn to deal with it, especially with the opportunity. The whole experience in Belize overpasses that scenario with the bugs.
Now What? Now that I traveled to Belize, I want to major in Anthropology…I want to be able to travel the world and feel like I made a difference in the world.

The opportunity to reflect helped this student articulate her emerging sense of belonging and place in the global community, her sense of a positive future self, and a growth mindset, all key capacities of dispositional learning.

Reflection as an Attitude toward Change: "Reflection" involves "attitudes that value the personal and intellectual growth of oneself and others" (Rodgers, 2002, p. 845). Thus, reflection induces neurocognitive activity as well as engages the affective domain, thereby shaping such dispositions as openness, curiosity, and a readiness to reconsider long-held ideas about oneself and the world. Hodge et al, (2009) refers to this as self-authorship, where students establish goals, make and pursue plans, and build their identity. Reflective ePortfolio practice can support these goals, helping each student develop his or her inner voice and the intrinsic and utility goals needed to function as an empowered individual.

Learning about Being a Success Student (LaBSS) is a first-year academic support space where first-year students meet weekly as a class with their advisor. The advising curriculum focuses on educational planning and goal setting for students, helping them develop their professional identities. ePortfolio practice is integrated across the curriculum, beginning in Bridge, where students complete a personal SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis. Students, over the course of the academic year, engage in research into the Guttman programs of study, before declaring their major. Lastly, students complete a PROFolio, a page in their ePortfolio which is their first "public" declaration of their professional identity. The PROFolio includes a professional headshot, a short video introduction, a resume, and several personal statements. These statements, along with the other components of the PROFolio, provide students the opportunity to integrate their learning from the previous experiences in and out of the classroom and articulate their future plans and the steps they will take to achieve them. Here is an excerpt from one student's PROFolio reflection:

> I am a first-year student at Guttman College and I am currently majoring in Urban Studies, but I plan on studying environmental sciences in the future. During my first year in Guttman I took a city seminar class, history class, sexuality/gender class, and arts in NYC class. My arts in the city class helped me realize that I have an interest in photography and learning about NYC. I am currently working on developing my analytical skills further. … In the future I would want to be a conservationist/environmentalist. I always had an interest in

"Reflection" involves "attitudes that value the personal and intellectual growth of oneself and others." Thus, reflection induces neurocognitive activity as well as engages the affective domain, thereby shaping such dispositions as openness, curiosity, and a readiness to reconsider long-held ideas about oneself and the world.

I always had an interest in animals and protecting the environment is very important to me.

Through this experience and iterative, reflective ePortfolio practice, students further develop conscientiousness, academic self-efficacy, and goal setting. ePortfolio helps students find their place in a larger academic community and in the world, and induces them to concretize this vision of their positive future self and to share it with others.

These examples demonstrate ways that reflective practice, scaffolded across the breadth of one's collegiate learning experiences, can be a powerful opportunity for a student to further develop intrapersonal and interpersonal competencies and other dispositional attributes. Students are able to look back on prior reflections to see their growth and development. Not only does ePortfolio practice make this learning visible to students, but it allows others to view it as well. ePortfolio, when connected to course, programmatic, or institutional assessment, can be a way for faculty and staff to provide students the opportunities needed to develop these essential skills.

ePortfolio as a Meta-High-Impact Practice

Like any other High-Impact Practice, ePortfolio must be "done well" to foster deep, meaningful learning and bring it to the surface to guide outcome assessment efforts. As the examples above illustrate, ePortfolio practice, when done well, incorporates many of the High-Impact Practice features identified by Kuh, O'Donnell and Reed (2013), such as reflection, peer and faculty feedback, a substantial investment of time and effort over an extended period of time, and public demonstration of competence. It should not be surprising that ePortfolio, therefore, is well-positioned to work in concert with other High-Impact Practices, such as first-year seminars, capstone courses, study abroad, and undergraduate research.

In addition to these features, ePortfolio's longitudinal quality that spans the entire student learning experience is very important. "This longitudinal quality of effective ePortfolio practice can facilitate the integration of multiple HIPs across a student's academic trajectory" (Eynon & Gambino, 2017, p. 202), serving as a "meta" High-Impact Practice. This longitudinal feature allows many opportunities for students to reflect on and integrate learning from these HIPs, to make connections among what are often disparate experiences to form a cohesive whole, and serve as a signature student learning experience.

When ePortfolio serves this "meta" purpose, students are able to both practice and integrate dispositional attributes, and develop a process for continuing to develop them as they move beyond our institutions, positioning them for success in today's and tomorrow's workplace.

ePortfolio helps students find their place in a larger academic community and in the world, and induces them to concretize this vision of their positive future self and to share it with others.

Final Words

The growing concerns about the quality of higher education is a clarion call to collective action. Fortunately, recent research about effective educational practice offers guidance about how student learning can be improved inside and outside the classroom.

Some students begin college with a relatively well-developed set of dispositional attributes, but many do not. To close achievement gaps and prepare students to meet the challenges of the 21st century workplace, ensuring that ALL students participate in multiple well-designed High-Impact Practices early and later during their undergraduate studies in order to help foster further development of dispositional attributes must be priorities.

Included in the constellation of dispositional attributes featured in this paper are neurocognitive skills that represent the malleable learning and development that integrates crystallized intelligence (easily identifiable learning) and fluid intelligence (less easily identified learning and development). At the core of fluid intelligence, are behaviors that can be intentionally cultivated, such as reflection, resilience, deliberate problem solving, emotion regulation, and conscientiousness. These behaviors are foundational to develop crystallized intelligence.

Well-designed ePortfolios are a proven approach for engaging students in effective educational practices and deepening their learning. As demonstrated earlier, the ePortfolio process can help students cultivate dispositional attributes in the form of intrapersonal and interpersonal competencies and neurocognitive skills. In addition, ePortfolio is especially useful for documenting the extent to which students are learning and growing in desired ways.

Key to ePortfolio's effectiveness is the process of combining first-person structured reflections with direct evidence in the form of artifacts representing authentic learning from a range of student experiences such as HIPs and other educationally purposeful activities, both in and out of the classroom. The process allows students to craft an evolving narrative of who they are and who they are becoming that can then be used for self-assessment as well as institutional assessment. To complement the ePortfolio data collection, institutions can also use pre- and post- measures of student learning and development such as those in Appendix A to assess the extent to which participating in HIPs contribute to the development of dispositional attributes. As a result, learning and development that was not so easily visible before can become more readily identifiable as shown in Figure 8.

Research on the effectiveness of HIPs, attention to and assessment of dispositional attributes, and the usefulness of an ePortfolio as an assessment tool emerged independently. However, they are primed for a convergence. And as they converge, college and university faculty and staff will obtain learning-rich evidence of the worth of postsecondary education to individuals and the public, and actionable data to guide continuous improvement. In addition, we expect the convergence and adaptation of these concepts will further higher education's long transition from instruction-centered to learning-centered delivery that Barr and Tagg (1995) called for more than two decades ago.

To close achievement gaps and prepare students to meet the challenges of the 21st century workplace, ensuring that ALL students participate in multiple well-designed High-Impact Practices early and later during their undergraduate studies in order to help foster further development of dispositional attributes must be priorities.
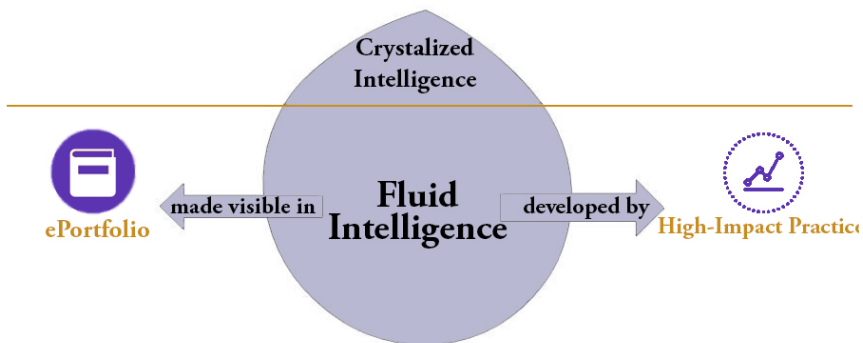
Figure 8: Assuring Dispositional Learning.

Maximizing the impact of HIPs participation on dispositional attributes using ePortfolio will require coordinated action across the institution. Toward that end, we present some questions for institutional leaders, faculty, and staff to consider:

1. What kinds of HIPs does your institution offer?
2. Which students currently participate in one or more HIPs?
3. What can be done to reduce existing inequities in HIPs participation?
4. To what extent do the activities labeled a HIP embody the engaging features characteristic of high quality HIPs and how do you know?
5. How might reflective assignments and ePortfolio design be modified to foster the acquisition of and obtain direct evidence of dispositional attributes such as fluid and crystalized intelligence?
6. What must be done for your institution to leverage the rich data that ePortfolios generate to:
   (a) demonstrate the value of a degree,
   (b) close achievement gaps, and
   (c) document the extent to which graduates have acquired dispositional attributes?

The field is in a nascent stage in discovering the most viable approaches to helping students cultivate what are essential dispositional attributes in the form of intrapersonal and interpersonal competencies and neurocognitive skills. We are optimistic that the combination of HIPs and ePortfolio will advance this important work and invite you and your colleagues to join us in this endeavor.

The field is in a nascent stage in discovering the most viable approaches to helping students cultivate what are essential dispositional attributes in the form of intrapersonal and interpersonal competencies and neurocognitive skills. We are optimistic that the combination of HIPs and ePortfolio will advance this important work and invite you and your colleagues to join us in this endeavor.

References

American Academy of Arts and Sciences Commission on the Future of Undergraduate Education (2017). *The future of undergraduate education, the future of America.* Washington, DC: American Academy of Arts and Sciences.

American College Personnel Association. (1996). *The student learning imperative: Implications for student affairs.* Washington DC: Author.

Association of American Colleges and Universities. (2007). *College learning for the new global century.* Washington, DC: Association of American Colleges and Universities.

Association of American Colleges and Universities. (2015). *The LEAP challenge: Education for a world of unscripted problems.* Washington, DC: Association of American Colleges and Universities.

Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., Walsh, E., Duggan, D., & Williams, J. M. G. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment, 15*(3), 329–34.

Barr, R. B. & Tagg, J. (1995). From teaching to learning – a new paradigm for undergraduate undergraduate education. *Change, 27*(6), 12-26.

Bass, B. R., & Elmendorf, H. (undated). *Designing for difficulty: Social pedagogies as a framework for course design.* Teagle Foundation White Paper. https://blogs.commons.georgetown.edu/bassr/social-pedagogies/#_ftn1

Bresciani Ludvik, M. J. (Ed.) (2016). *The neuroscience of learning and development: Enhancing creativity, compassion, critical thinking, and peace in higher education.* Sterling, VA: Stylus.

Bresciani Ludvik, M. J. (2017). Leveraging neuroscience and education to prevent youth aggression and violence. *US-China Education Review B, 7*(9). 401-433.

Bresciani Ludvik, M. J. (in press). *How neuroscience research can influence desired student learning and development outcomes.* New Delhi, India: UNESCO MGIEP Scoping Paper.

Brownell, J. E. & Swaner, L. E. (2010). *Five high impact practices: Research on learning outcomes, completion, and quality.* Washington, DC: Association of American Colleges and Universities.

Chatterjee Singh, N., Gupta, A., Kuany, S., & Bresciani Ludvik, M. J. (2017). *LIBRE: An integrated brain approach to education.* UNESCO MGIEP Blue Dot. http://mgiep.unesco.org/bluedot/cover-story-dr-nandini-chatterjee-singh-anamika-gupta-simon-kuany-and-dr-marilee-bresciani-ludvik/

Chemers, M. M., Hu, L., & Garcia, B. F. (2001). Academic self-efficacy and first-year college student performance and adjustment. *Journal of Educational Psychology, 93*, 55- 64. doi: 10.1037//0022-0663.93.1.55

Dewey, J. (1916). *Democracy and education: An introduction to the philosophy of education.* New York, NY: Macmillan.

Duckworth, S. (2016). *Sketches for educators.* Irvine, CA: Ed Tech Team Press.

Duckworth, A. L., & Quinn, P. D. (2009). Development and validation of the short grit scale (Grit-S). *Journal of Personality Assessment, 91*, 166-174.

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 9*, 1087-1101.

Dweck, C. S. (1999). *Self-Theories: Their role in motivation, personality and development.* Philadelphia, PA: Taylor and Francis/Psychology Press.

Dweck, C. S. (2006). *Mindset.* New York, NY: Random House

Eynon, B. & Gambino, L. M. (2017). *High-impact ePortfolio practice: A catalyst for student, faculty, and institutional learning.* Washington, DC: Stylus.

Eynon, B., Gambino, L. M., & Torok, J. (2014). What difference can ePortfolio make? A field report from the Connect to Learning project. *International Journal of ePortfolio, 4*(1), 95-114. Retrieved from http://www.theijep.com/pdf/ijep127.pdf.

Finley, A. & McNair, T. (2013). *Assessing underserved students' engagement in high-impact practices.* Washington, DC: Association of American Colleges and Universities.

Green, J. A., O'Connor, D. B., Gartland, N., & Roberts, B. W. (2015). The Chernyshnko Conscientiousness Scales: A new facet measure of conscientiousness. *Assessment, 23*(3), 374 – 385.

Herman, J. & Hilton, M. (Eds). (2017). *Supporting students' college success: The role of assessment of intrapersonal and interpersonal competencies.* Washington, DC: The National Academies Press. doi: https://doi.org/10.17226/24697

Hodge, D. C., Baxter-Magolda, M., & Haynes, C. (2009). Engaged learning: Enabling self-authorship and effective practice. *Liberal Education, 95*(4), 16-23.

Hoffman, M., Richmond, J., Morrow, J., & Salomone, K. (2002). Investigating sense of belonging in first year college students. *Journal of College Student Retention, 4*(3), 227-256.

Hubert, D., Pickavance, J., & Hyberger, A. (2015). Reflective E-portfolios: One HIP to rule them all? *Peer Review, 17*(4), 15-18.

Jankowski, N. A., Timmer, J. D., Kinzie, J., & Kuh, G. D. (2018). *Assessment that matters: Trending toward practices that document authentic student learning.* Urbana, IL: University of Illinois and Indiana University, National Institute for Learning Outcomes Assessment (NILOA).

Jazaieri, H., McGonigal, K., Jinpa, T., Doty, J. R., Gross, J. J., & Goldin, P. R. (2014). A randomized controlled trial of compassion cultivation training: Effects on mindfulness, affect, and emotion regulation. *Motivation and Emotion, 38*(1), 23–35.

Kahn, S. (2014). E-Portfolios: A look at where we've been, where we are now, and where we're (possibly) going. *Peer Review, 16*(1), 4-7.

Kuh, G.D. (2006, November). Director's message: Engagement – the bridge from here to there. In National Survey of Student Engagement, Engaged learning: Fostering success of all students. Bloomington, IN: Indiana University Center for Postsecondary Research. http://nsse.indiana.edu/NSSE_2006_Annual_Report/docs/NSSE_2006_Annual_Report.pdf

Kuh, G. D. (2008). *High-impact educational practices: What they are, who has access to them, and why they matter*. Washington D.C. Association of American Colleges and Universities.

Kuh, G. D. (2017). Foreword: And now there are 11. In B. Eynon and L. M. Gambino, *High impact ePortfolio practice: A catalyst for student, faculty and institutional learning*. Sterling, VA: Stylus.

Kuh, G. D., Ikenberry, S. O., Jankowski, N., Cain, T. R., Ewell, P. T., Hutchings, P., & Kinzie, J. (2015). *Using evidence of student learning to improve higher education.* San Francisco, CA: Jossey-Bass.

Kuh, G. D, O'Donnell, K., & Reed, S. (2013). *Ensuring quality and taking high-impact practices to scale.* Washington, DC: Association of American Colleges and Universities.

Kuh, G. D., O'Donnell, K., & Schneider, C. G. (2017). HIPs at ten. *Change, 49*(5), 8-16.

Lumina Foundation for Education. (2014). *The degree qualifications profile 2.0.* Indianapolis, IN: Author.

Manyika, J., Lund, S., Chui, M., Bughin, J., Woetzel, J., Batra, P., Ko, R., & Sanghvi, S. (2017, December). *Jobs lost, jobs gained: Workforce transitions in a time of automation.* Oak Lawn, IL" McKinsey & Company. Retrieved from https://www.mckinsey.com/global-themes/future-of-organizations-and-work/what-the-future-of-work-will-mean-for-jobs-skills-and-wages

National Survey of Student Engagement (2007). *Experiences that matter: Enhancing student learning and success—annual results 2007.* Bloomington, IN: Indiana University Center for Postsecondary Research. http://nsse.indiana.edu/NSSE_2007_Annual_Report/indexcfm

National Survey of Student Engagement (2013). *A fresh look at student engagement—annual results 2013.* Bloomington, IN: Indiana University Center for Postsecondary Research. http://nsse.indiana.edu/NSSE_2013_Results/index.cfm

National Survey of Student Engagement (2017). *Engagement insights: Survey findings on the quality of undergraduate education—annual results 2017.* Bloomington, IN: Indiana University Center for Postsecondary Research. http://nsse.indiana.edu/NSSE_2017_Results/index.cfm

Nelson Laird, T. F., Shoup, R., Kuh, G. D., & Schwarz, M. J. (2008). The effects of discipline on deep approaches to student learning and college outcomes. *Research in Higher Education, 49*, 469-494.

Public Agenda. (2016, September 12). *Public opinion on higher education.* Brooklyn, NY: Author. Retrieved from https://www.publicagenda.org/pages/public-opinion-higher-education-2016#finding1

Reason, R. (2013). *Creating and Accessing Campus Climates Support Personal and Social Responsibility.* (https://aacu.org/publications-research/periodicals/creating-and-assessing-campus-climates-support-personal-andsocial) Liberal Education.

Rodgers, C. (2002). Defining reflection: Another look at John Dewey and reflective thinking. *Teachers College Record, 104*(4), 842-866.

Ryff, C. D. & Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychological Well-being revisited, 69*(4), 719-727.

Scharmer, C. O. (2009). *Theory U: Leading from the future as it emerges: The social technology of presencing.* San Francisco, CA: Berrett-Koehler.

Schwarzer, R., Diehl, M., & Schmitz G. S. (1999). *Self-Regulation Scale.* Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2442651/#R32 on December 17, 2017.

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., Bernard, J. (2008). The brief resilience scale: Assessing the ability to bounce back. *International Journal of Behavioural Medicine, 15*, 194–200.

Tsukayama, E., Duckworth, A. L., & Kim, B. E. (2013). Domain-specific impulsivity in school-age children. *Developmental Science, 16*(6), 879–893.

Warwick-Edinburgh Mental Well-being Scale (WEMWBS) (2006). NHS Health Scotland, University of Warwick and University of Edinburgh. https://warwick.ac.uk/fac/med/research/platform/wemwbs/

Watson, C. E., Kuh, G. D., Rhodes, T., Penny Light, T., & Chen, H. (2016). Editorial: ePortfolios - The eleventh high impact practice. *International Journal of ePortfolio, 6*(2), 65-69.

Zelazo, P. D., Blair, C. B., & Willoughby, M. T. (2016). *Executive Function: Implications for Education* (NCER 2017-2000). Washington, DC: National Center for Education Research, Institute of Education Sciences, U.S. Department of Education.

Appendix A: Selective Pre- and Post-Measures of Dispositional Learning

Dispositional Learning Outcome	Data Collection Instrument	Purpose
Academic Self-Efficacy	Academic Self-Efficacy Scale (Chemers, Hu, & Garcia, 2001)	Measures confidence in abilities.
Attention and Emotion Regulation	Five Facet Mindfulness Questionnaire (FFMQ) (Baer et al, 2008)	Measures five facets of mindfulness: observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience.
Compassion/Pro-Social Behavior	Multidimensional Compassion Scale (MCS) (Jazaieri et at., 2014)	Measures four components (awareness of suffering (cognitive component); sympathetic concern (empathy) triggered by suffering (affective component); desire to relieve suffering (intentional component); and readiness to help relieve suffering (action component).
Conscientiousness	Chernyshenko Conscientiousness Scales (CCS) (Green et al, 2015)	Measures industriousness, order, self-control, traditionalism, virtue, and responsibility.
Engagement	National Survey of Student Engagement (NSSE)	Measures engagement of higher-order learning, reflective and integrative learning, learning strategies, quantitative reasoning, collaborative learning, discussions with diverse others, student-faculty interactions, effective teaching practices, quality of interactions, and supportive environment.
Grit	Grit Scale (Duckworth & Quinn, 2009)	Measures perseverance in achieving goals and consistency of interests over time.
Growth Mindset	Growth Mindset Intelligence Scale (Dweck, 1999)	Measures self-perceptions of abilities.

Mental Well-Being	Warwick-Edinburgh Mental Well-being Scale (WEMWBS) (2006).	Measures overall mental well-being and the effects of participation in programs and projects on mental well-being.
Personal and Social Responsibility	Personal and Social Responsibility Inventory (Reason, 2013)	Measures five dimensions: striving for excellence; cultivating academic integrity; contributing to larger community; taking seriously the perspectives of others; and ethical and moral reasoning.
Psychological Well-Being	Psychological Well-Being (Ryff, C.D. & Keyes, C.L.M., 1995)	Measures autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance
Resilience	Brief Resilience Scale (Smith et al, 2008)	Measures ability to "bounce-back" following an adverse experience.
Self-Control	Self-Control Scale (Tsukayama, Duckworth & Kim, 2013)	Measures ability to regulate interpersonal and social impulsivity.
Self-Regulation	Self-Regulation Scale (Schwarzer, Diehl, & Schmitz, 1999)	Measures attentional control in goal pursuit.
Sense of Belonging	Sense of Belonging Scale (Hoffman et al., 2002)	Measures perceived peer support, faculty support/comfort, classroom comfort, isolation, and empathetic faculty understanding.

About NILOA

- The National Institute for Learning Outcomes Assessment (NILOA) was established in December 2008.
- NILOA is co-located at the University of Illinois and Indiana University.
- The NILOA website contains free assessment resources and can be found at http://www.learningoutcomesassessment.org/.
- The NILOA research team has scanned institutional websites, surveyed chief academic officers, and commissioned a series of occasional papers.
- NILOA's Founding Director, George Kuh, founded the National Survey for Student Engagement (NSSE).
- The other co-principal investigator for NILOA, Stanley Ikenberry, was president of the University of Illinois from 1979 to 1995 and of the American Council of Education from 1996 to 2001.

NILOA Staff

NATIONAL INSTITUTE FOR LEARNING OUTCOMES ASSESSMENT

George Kuh, *Founding Director, Senior Scholar, and Co-Principal Investigator*

Natasha Jankowski, *Director, Co-Principal Investigator*

Gianina Baker, *Assistant Director*

Katie Schultz, *Project Manager*

Filip Przybysz, *Communications Coordinator*

Peter Ewell, *Senior Scholar*

Pat Hutchings, *Senior Scholar*

Jillian Kinzie, *Senior Scholar*

Paul Lingenfelter, *Senior Scholar*

David Marshall, *Senior Scholar*

Stanley Ikenberry, *Emeritus*

Erick Montenegro, *Research Analyst*

Verna F. Orr, *Research Analyst*

Karie Brown-Tess, *Research Analyst*

Theopolies John Moton III, *Research Analyst*

NILOA Sponsors

Lumina Foundation for Education

National Institute for Learning Outcomes Assessment