Introduction

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The labor market is changing. The work force of the future will need "people skills"—meaning they will need the sophisticated emotional, interpersonal, and cognitive skills necessary for working in teams, managing complex tasks, sifting and sharing information, and collaborating. With decades of accrued knowledge about the importance of these skills to success and growing information about effective practices and interventions, it is now increasingly the role of the education sector to ensure children and youth have them. A cornerstone of that effort is measurement and assessment,[1] and in particular the development and use of tools in classrooms and schools that enable educators to make decisions about how to best cultivate and support such skills among children and youth. This edited volume brings together leaders and innovators in the fields of human development and neuroscience, social and emotional learning (SEL), character development, special education, and behavior and discipline to (1) share their cutting-edge research and development work focusing on designing tools to capture a wide array of noncognitive skills, and (2) reflect on the applicability and use of these tools to improve teaching and learning in school settings. In this Introduction, we begin by briefly addressing the complex issue of what the broad domain of *noncognitive skills* actually means and includes. We then turn to the current state of measurement and assessment in this field, and we present a set of key considerations important to the task of using these tools to improve the conditions for and practice of teaching and learning.

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[1]We operationalize *measuring* as a research-oriented term that refers to capturing a phenomenon and *assessing* as a practice-oriented term referring to the collection of information one might then act on.

● What's Noncognitive?

What are we talking about when it comes to noncognitive skills? Researchers, educators, and policymakers alike have trouble agreeing on exactly what's included in this broad domain—and what isn't (Jones & Doolittle, 2017). The popular press has highlighted a wide array of concepts, such as grit, empathy, growth mindset, social skills, and more. The research and practice communities similarly use a broad set of terms to organize and categorize this body of skills, including *SEL, character education, 21st-century skills, life skills, soft skills,* and *noncognitive skills,* just to name a few. Each label draws from a slightly different theoretical perspective, draws upon a different set of research, and has its own related fields and disciplines (Jones & Doolittle, 2017). In this edited volume, we refer to the domain as "noncognitive skills" for two reasons. First, the term *noncognitive* resonates with stakeholders outside of and across the specific fields noted above, speaking to policymakers, practitioners, and parents alike. Second, it is an umbrella term that covers the wide range of ideas, skills, competencies, and approaches captured in this book. However, we also note there is some discomfort with this name, as we know from decades of research and practice in human development, neuroscience, educational psychology, and teaching and learning that *noncognitive* actually includes a diverse and interrelated set of cognitive, emotional, and social skills as well as a body of beliefs and ideas about the self and the world that are linked to success in the academic domains and to a wide variety of life outcomes well into the future (Jones, McGarrah, & Kahn, 2019).

Generally, the noncognitive domain comprises specific skills and competencies that students need in order to set goals, manage behavior, build relationships, and process and remember information. Importantly, as with other foundational domains of learning and development, this area is fundamentally tied to characteristics of settings that can be intentionally structured to nurture these skills and competencies. Looking across a variety of disciplines, organizing systems, and correlational and evaluation research, the recent Aspen Institute Commission on Social, Emotional, and Academic Development (2019) described the domain as representing three broad areas: (1) social, emotional, and cognitive skills and competencies; (2) attitudes, beliefs, and mindsets; and (3) character and values.

Cognitive skills and competencies underlie the ability to focus and pay attention; set goals, plan, and organize; and persevere and problem solve. Social and interpersonal skills and competencies enable children and youth to read social cues and navigate social situations; negotiate and resolve conflicts with others; demonstrate respect toward others; and cooperate and work effectively on a team. Emotional skills and competencies help children and youth recognize and manage their emotions; understand the emotions

and perspectives of others; and demonstrate empathy. Attitudes, beliefs, and mindsets include children's and youth's attitudes and beliefs about themselves, others, and their own circumstances. Finally, character and values represent ways of thinking and habits that support children and youth to work together as friends, family, and community and encompass understanding, caring about, and acting on core character traits such as integrity, honesty, compassion, diligence, civic and ethical engagement, and responsibility.

While there is growing agreement as to what elements are included in the domain, and there is a robust body of evidence about their role in learning and development as well as effective strategies to promote them, what continues to bedevil the field is how to measure them in a way that captures their depth (from individual to setting), their breadth (from physiological to behavior to beliefs and dispositions), and their relevance to the practical concern of teaching and learning. Measurement is not "simply" a matter of documenting the skills and competencies for research purposes (e.g., the study of human development, the evaluation of key practices), but is also about capturing them in a manner that enables those doing the work of fostering and supporting them to make strategic decisions about what to do, how to do it, and when to do it (e.g., Lesaux, Galloway, & Marietta, 2016).

● The State of Measurement and Assessment

Measurement can be a powerful tool to aid practice—it can inform both moment-to-moment and higher-level decision making about priorities, approaches, and specific directions for a variety of education stakeholders including educators, administrators, and policymakers. In the noncognitive domain, a large body of work over the past 5 years has addressed important, though largely logistical or administrative, questions about measurement including pros and cons of various measure types (e.g., direct assessment, observational tool, survey), reporters (e.g., self, caregiver, teacher report), level of measurement (e.g., individual, setting), and specific skills or features to assess (Assessment Work Group, 2019; Bailey & Jones, 2019; McKown, 2019). What has become apparent in this literature, and is reflected in the chapters in this volume, is that the field of noncognitive skill development, and assessment more broadly across learning domains, is approaching a new frontier that shifts away from debates about logistical or administrative questions to focus on issues of assessment use and responsibility, ethics, and preparedness to assess. However, there remains a wide range of views on *what*, *where*, and *how* the noncognitive domain is assessed. Before turning to key considerations important to the task of using tools in service of improved teaching and learning, we describe some of the variation in the field that ultimately shapes measurement and assessment in this area.

- *What is measured?* Above, we noted the range of perspectives and theoretical approaches captured in this broad domain. But beyond the breadth reflected in terminology, we also see breadth in the disciplines and approaches engaged in the work of developing measurement and assessment tools that can drive teaching and learning. The focus of the chapters included in this book reflects the wide array of noncognitive skills that are important, ranging from executive function and self-regulation, to social skills and relationships, to character and values such as gratitude.

- *Where are skills measured?* In addition to capturing the skills and competencies of individuals, there is a focus in this volume on how to operationalize and foster skills and competencies within and across settings— and on the multiple, often complementary, contexts where children grow, learn, and play (e.g., home, school). Expanding beyond a child's immediate context, authors emphasize the importance of capturing patterns and trends at other levels of the ecosystem and in settings, including the classroom, school, district, and population levels.

- *How are skills measured?* The "what" described above represents a wide range of targets, and the tools presented in this volume reflect the diversity of ways to capture them, from physiological markers (e.g., heart rate) and tablet-based individual assessments to setting (e.g., classroom observation) and population-level measurement approaches (e.g., surveys of whole populations of students and adults).

Grounded in the core idea that measurement and assessment are a key link between what we know and what we do, the chapters in this volume all make connections between the tools presented and teaching, learning, and classroom practice. Broadly, our intention is to bring together research evidence with practical application to provide concrete, actionable solutions to practitioners. There are good examples from other fields where progress at this intersection has been made. In their 2016 volume, *Teaching Advanced Literacy Skills: A Guide for Leaders in Linguistically Diverse Schools*, Lesaux, Galloway, and Marietta, grapple with the challenge of the revolving door literacy-related programs, policies, and initiatives. At the core of their recommendations is the need to use data to both align choices with setting-specific needs and to guide instructional practices. The noncognitive field now faces a similar challenge, with multiple practical options (curricula, standards, initiatives) for schools, districts, and other stakeholders to choose from. What's needed is information about measurement and assessment tools that can guide decisions about approaches and practices that align with the specific needs of a setting or population.

• Key Considerations for Measurement and Assessment in Service of Teaching and Learning

Measurement and assessment are complicated and depending on their purpose require different things. Below are a set of features to consider when thinking about measuring and assessing noncognitive skills in a manner that supports teaching and learning.

1. *Relevant*. Measurement and assessment should capture the child or youth in the relevant context. This means that the child deserves to be understood in relation to their ecological system, and measurement and assessment should be tied to the distinct demands of a particular setting.

2. *Contextual*. Measurement and assessment should capture aspects of the ecology. There is a tendency to focus exclusively on measurement of the child and what he or she can do, but it is equally important to consider contexts and experiences. In education, measures that provide more information about the setting can provide another point of intervention and help us better understand the child's behavior in context.

3. *Actionable*. Measurement and assessment should be tied to actionable, evidence-based practices and strategies that schools and educators can adopt and implement in their setting, and these should include actions that are directed to features of the setting itself.

4. *Developmentally salient*. Measurement and assessment should align with what is realistic to expect of children and youth at specific ages and should represent features of developmentally salient contexts.

5. *Sensitive and nuanced*. Measurement and assessment must be both sensitive and nuanced enough to capture variation that exists within and between children and youth over time as well as meaningful variation that exists within and between contexts, such as different classrooms within the same school.

6. *Psychometrically sound*. Importantly, psychometric soundness is not a property of a measure itself, rather it reflects the reliability and validity of a measure for a specific purpose. Psychometric issues in measurement tend to fall into two big categories:

   a. The first is *reliability,* or the internal consistency of the scores.
   b. The second is *validity,* which primarily focuses on whether the measure captures what it is designed to measure, evidence for the use of a measure in a certain way or context, and inferences that can be responsibly drawn from the findings.

To effectively drive change, measurement and assessment efforts cannot address only one or two of the criteria listed above. Doing so may result in measures that are not used properly, that neglect important conceptual or psychometric features, or importantly are not actionable or relevant to practitioners.

● This Volume

This book focuses on the myriad ways that measuring and assessing noncognitive skills can improve teaching and learning. We chose this focus for several reasons. First, we bring together a diverse set of tools, approaches, and perspectives that often exist primarily in their own disciplines (e.g., developmental and school psychology, ambulatory technology, special education, measurement and assessment). By putting these perspectives in conversation with one another, we highlight that across disciplines and measurement types, a core set of issues, questions, and considerations exist (see above). Second, measurement and assessment in the noncognitive domain is experiencing rapid growth and implementation in school contexts. Matching the excitement of stakeholders who are eager to employ these measures in practice, this volume provides guidance around using these tools with care, rigor, and alignment with the goals and features of the setting.

We've brought together a group of scholars who represent the frontiers of measurement and assessment in this broad domain. Across the chapters, authors raise and grapple with complex issues of the purpose of measurement and assessment, ecological and contextual variation and validity, developmental growth and change, and the challenge of designing tools that link research to practice and drive change in the settings where children and youth learn and grow. The chapters are organized into broad substantive and conceptual categories. The book begins with individual measurement approaches, moves to chapters focused on settings and behaviors, then novel physiological measurement approaches, broader settings—districts and populations—and finally, global perspectives on measurement and assessment. Also included are chapters that address cross-cutting policy and methodological challenges and opportunities.

The chapters in Part I address creative and thought-provoking ways to approach individual measurement, while keeping context in mind. The first three chapters cover assessments at scale. Jelena Obradović and Lily Steyer propose a new approach to direct assessment using a group-based scalable approach. Clark McKown discusses the possibility of using high-quality assessment to sustain and scale the use of evidence-based SEL programs, and Dana McCoy addresses scalable measurement in a global context.

The next two chapters focus on children's physiology. Keira Leneman and Daniel Berry explore the multiple physiological systems in the body that influence and support children as they navigate their ever-changing worlds. Oliver Wilder and Richard Palumbo discuss practical considerations and examples of measuring psychophysiology in real-world educational settings to capture noncognitive skills in young children. Finally, Paul Chase and colleagues explore a person-centered approach to measuring character that examines variability in individual pathways of development over time based on context and experiences.

The chapters in Part II emphasize setting- and behavior-focused measurement approaches. Measures of child behavior are used in the chapters by Sandra Chafouleas and Amy Briesch (Direct Behavior Ratings) and by Lise Fox, Myrna Veguilla, and Mary Louise Hemmeter (the Behavior Incident Report System) with an eye toward using data to reduce exclusionary discipline practices and policies and to look carefully at setting-level features that influence children's behavior. Abbie Raikes explores noncognitive measurement and assessment at a global level and addresses a number of key challenges with operationalizing and measuring noncognitive skills to drive improvements in teaching, learning, and child development, many of which parallel key challenges in U.S. settings related to deciding what to measure and how, and the responsible use of findings. In their chapter, Sophie Barnes, Rachel Abenavoli, and Stephanie Jones make the case that setting-level measurement is critical for understanding the social processes (i.e., teacher practice) that shape children's development.

The chapters in Part III present novel measurement tools that focus on broader settings. Rachel Gordon and Laura Davidson address cross-cutting issues related to measurement in district contexts, using a self-report measure developed in a research-practice partnership as an illustration. Kimberly Schonert-Reichl applies these ideas to an even broader context, focusing on population-level measurement to gain a better understanding of broad trends and patterns in middle childhood development at the population level.

Part IV addresses cross-cutting methodological and policy issues. In their chapters, both Laura Hamilton (on methodological considerations) and Jessica Newman and colleagues (on policies and assessment that foster equity and thriving) highlight the promise of measurement tools as well as the need for careful, clear, and responsible use.

● What's Next for Measurement and Assessment in the Noncognitive Domain?

The chapters in this volume bring to light novel measurement approaches, and also cautions for the future as we seek to build on the momentum

around capturing noncognitive skills to improve teaching and learning. The emphasis across chapters on responsible use of assessment is promising. At the same time, we acknowledge (and at times, share) the general worry and anxiety related to implications of measurement in this area in particular. However, as measurement is now common practice in educational contexts, what we need is to use our knowledge and experience to approach measurement with care, responsibility, and attention to detail, salience, and scientific rigor.

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