Why Dispositions Matter for the Workforce in Turbulent, Uncertain Times

Applying Learning Sciences Research to Learning and Workforce Development for Next Level Learning Brief Series

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Macroeconomic forecasts indicate the next half-century will be characterized by turbulence, uncertainty, threats — and opportunities for transformation. In particular, COVID-19 has introduced extensive, enduring turbulence and uncertainty in all workplaces. Some workers have stepped up to these challenges, exhibiting resilience, innovation, initiative, and leadership. Other workers whose managers might have considered to be equally or more capable in these abilities have floundered, exhibiting confusion and paralysis. Research is needed on whether the difference between these two types of workers is — in part — not their abilities and life circumstances, but their tendencies (known as "dispositions") to leverage abilities under conditions of turbulence and uncertainty. COVID-19 illustrates the importance of workforce capacity building in both skills and dispositions to handle unexpected, discontinuous change over the coming decades.

Executive Summary

Fostering dispositions in occupational capacity building can be enhanced by reconceptualizing the nature of work across the lifespan. New conceptions of lifelong learning emphasize moving job training away from exclusively inculcating narrow skills for a specific role, as if that would be one's occupation over decades and as if skills are the sole predictor of professional success. Instead, in the next half-century, workforce capacity building should center on developing suites of skills—and dispositions that encourage using these skills under conditions of uncertainty and rapid change—to enable high performance in rapidly changing jobs, shifts in roles, and preparation for careers that do not yet exist. This second brief contributes to our broadened conception of a Next Level Learner by focusing on these important tendencies or dispositions and their role in success in the workplace.

Though a focus on disposition training has already begun, the shift is still nascent. In recent years, workforce development has begun to include dispositions like growth mindset (a belief that anyone can change and grow through application and experience), and mindfulness (paying particular attention to the present experience in order to deeply understand its uniqueness). Dispositional framing of concepts explored in later briefs, such as transfer and adaptive expertise, has yet to be thoroughly addressed on a grander scale.

Framing Questions

- What are dispositions and how do they impact workforce performance?
- Why should workforce capacity building routinely emphasize dispositions useful in turbulent uncertain times?
- How are dispositions different from abilities, and can they be altered through education?
- Which dispositions are associated with the capacity to handle change, uncertainty, and turbulence, and to what extent are these a part of current workforce training?
- In what types of occupational roles might these dispositions be important?
- What research is needed to foster dispositions related to change, uncertainty, and turbulence?
- How might we reposition workforce development to enable fostering dispositions?

Introduction: What Are Dispositions and How Do They Impact Workforce Performance?

Beyond first-time workers, workforce capacity building focuses almost exclusively on *abilities*:

An ability is a competency to perform a certain type of task, physical or mental, at a certain level of proficiency. The critical thinking ability to assess accurately the reliability of evidence for a claim is an example.[1]

A complex role, such as that of a warehouse manager, involves a suite of skills that combine to produce sophisticated behaviors. One of these skills might be to plan complex logistical operations. Some forepersons might be good at developing logistics for supplies, but struggle to make the same types of decisions about personnel. Workforce capacity building often assumes that, once someone has attained the desired skills, such as managing logistics, the individual will be able to conjure those skills in any occupational setting necessitating them and that no further training is necessary.

However, this misses a crucial aspect of actual behavior. The capacity to perform a task does not guarantee performance in every situation. The missing dimension is *dispositions.* In order to use an ability, one must realize occasions to employ it (related to the brief on transfer) and be inclined to follow through. As evident from the definition, abilities and dispositions are interconnected; an individual needs both the ability or skill and the disposition to manifest the skill. In addition to the appropriate skills, dispositions require *inclination*, the intention to engage in the behavior, and *sensitivity*, the probability of noticing occasions to engage in the behavior.[2]

Research shows that dispositions are malleable and can help workers and managers make the most of the skills they have. In the foreperson example above, in order to have the disposition to apply complex logistical decision making to all aspects of the job, the foreperson must develop the requisite skills, recognize the value of accurate logistics to the organization, and actively pick up on situations where these skills can and should be leveraged whether they apply to materials (where there is no affective component) or people (which can involve ethical and emotional dimensions as discussed in the brief on intelligence augmentation).

In this brief, we describe the importance of dispositions in workforce development, explain the features of dispositions and their attainment, and outline critical, underemphasized dispositions for dealing with turbulence and uncertainty. Reports predict a turbulent next half-century as domestic and global shifts in trade, economics, politics, and technology affect jobs, education, and peoples' wellbeing. Some of these shifts will come in the form of opportunities and others as threats. While workers' skills might facilitate their ability to adjust in a current role or to find a new one, their dispositions may in part determine their response to these challenges. For these reasons, workforce development activities should address dispositions that will enable workers to respond to and shape the tides of change in the coming years. To train for these dispositions, special considerations concerning their unique features and assessment methods should be made, drawing on research from cognitive science, neuroscience, and the learning sciences.

There are three main caveats related to dispositions and training for them. First, dispositions can be useful or problematic depending on the degree to which they are held and the situation in which they are applied. Being tenacious about ideas or strategies for which there is not firm grounding can become dogma. Being open-minded about possibilities beyond the point where a decision is needed can lead to wavering, indecision and inaction. Understanding when and how much to act on a disposition is important.

Second, while dispositions may have emotional and social dimensions, they are not the same as "soft skills" or "social-emotional skills" that involve getting along well with fellow workers. These skills are abilities (as defined above) whereas dispositions are the tendencies to manifest those soft and social-emotional abilities. A person may have a soft skill such as collaboration, but a disposition to collaborate only with people one personally likes. Or a person may have skills in conflict resolution, but a disposition to apply those only when neutral about the conflict, rather than when having a strong inclination one way or the other. Soft skills training typically ignores the dispositional aspect of how these skills are manifested in the workplace.

Third, while dispositions take time to inculcate (further described in the "How Are Dispositions Different From Abilities and Can They be Altered Through Education?" section), they are just as vital in short-term as in long-term job performance. Workforce training that only targets skills and omits the associated dispositions can undermine workers' preparedness in landing and maintaining employment. The question of what "dosage" in training is needed to inculcate various dispositions is an important issue for research.

Table 1: An Example of a Disposition

Resilience is the ability to persist in the face of challenges and to bounce back from adversity.[3] Resilient people share three notable characteristics:[4]

- *Optimistic* - They are optimistic, having a positive, realistic outlook. Negative information and setbacks do not hold them back, as they typically describe these as 'temporary, local, and changeable.' They accept what they cannot change, focus energy on what they can change, and thus look for new opportunities even in bleak situations.[5]
- *Committed* - Feeling committed to a meaningful mission or purpose fuels their life, gives them courage, and arms them with strength against challenges.
- *Connected* - They have a strong social support system, networks, and connections. Nurturing relationships can be critical in developing resilience and overcoming difficult life episodes.[6]

The story of Alfonso, based on real-life events, illustrates the equal importance of skills and dispositions in workforce performance. Alfonso is a contracted programming coach at an education services company, where he has traditionally worked with students in-person at the school's physical location in Chicago. When COVID-19 resulted in a campus shutdown and a shift to online courses, coaching students remotely required new skills: building relationships virtually, learning to organize and manage his schedule to attend to different conversations throughout the day, and explaining programming concepts via written communication. While other, more seasoned programming coaches were grappling with the stress of uncertainty, Alfonso went beyond the responsibilities stipulated by his role and launched a virtual "Algorithm Club" to train students for algorithm questions in future job interviews. Moreover, after one of the lead instructors resigned, Alfonso stepped up to take on the instructor responsibilities for his cohort. As the circumstances around him shifted, Alfonso demonstrated the dispositions of resilience and initiative, which helped him to overcome obstacles and to make the most of his opportunities.

It is important to note that unjust organizational, societal and structural conditions have made adjustments to turbulence and uncertainty more required, yet also more difficult for some workers than others, which can contribute to differences between the ways in which workers react during times of great volatility. The institutional environment and culture can also lead to dispositions that undercut using one's skills. Our recommendation to focus on developing individual dispositions must not ignore the institutional injustices these workers have faced, nor the biases that pervade many situations in the workplace. As research indicates, the environment is a key contributor to disposition attainment and expression. That said, it's still valuable to help workers develop dispositions useful in the workplace, as well as to help them transfer helpful dispositions from their personal to occupational lives. As discussed in the first brief on agentive learners and later in the brief on transfer, agentive workers who also have dispositions that enable using their abilities can shape their work and learning environments in ways that benefit both themselves and their organization.

Open-mindedness and closed-mindedness, for example, are "umbrella" dispositions that cover the tendency, or lack of, to use many abilities. Two workers with similar abilities might be dramatically different in their performance and what they contribute because of these and other dispositions.[7] For example, some faculty members struggled in the transition to online teaching because they attempted to transfer face-to-face teaching strategies to remote learning and resisted innovation, while others were excited by the opportunity to experiment with new instructional approaches that took advantage of the affordances online learning provides.

In summary, some people have an ability and will exercise it when the context is appropriate, but other individuals who have the same ability will generally not use it.[8] A person's disposition does not

predict their every action, but instead reflects what tends to happen or is liable to happen.[9] In preparing and evaluating workers, considering their dispositions in behavior and thinking, as well as the environments in which they are making decisions, is as important as developing and assessing their abilities.

Why Should Workforce Capacity Building Routinely Emphasize Dispositions Useful in Turbulent Uncertain Times?

Experts in trends do not see COVID-19 as an isolated disruption in an era expected to be stable. On the contrary, forecasts indicate the next half-century will be characterized by turbulence, uncertainty, threats, and opportunities for transformation. Over this period, globalization, threats to sustainability, climate change, and technologies such as artificial intelligence and data mining will repeatedly disrupt and transform the education and workforce sectors.[10]

Professor Klaus Schwab, Founder and Executive Chairman of the World Economic Forum, terms this period "The Fourth Industrial Revolution"[11] (Figure 1). It is characterized by the combination of technologies that blur the lines between the biological, physical and digital worlds. For example, watches can track our heart rate and sleep cycles and then provide a report about our health. Moreover, self-driving cars, genetic editing, and intelligent robots challenge what has been defined as truly human capabilities. Compared with previous industrial revolutions, the Fourth is evolving at a faster rate and disrupting almost every industry and discipline in every country.[12]

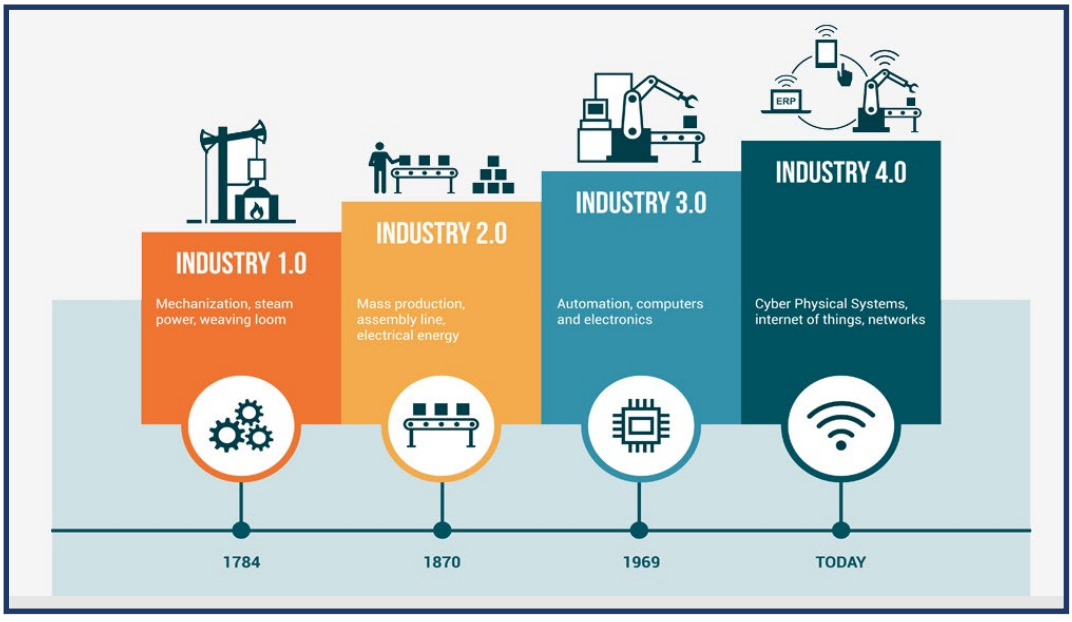


Figure 1. The Four Industrial Revolutions[13]

Transformations such as the Fourth Industrial Revolution loosen the grip of the past and create new opportunities. In any system, there are inefficiencies and areas for improvement, but organizational cultures and policies that emphasize tradition can make systems' feedback loops very resistant, so they do not readily correct or break free from ingrained practices. During times of great change, systems become vulnerable. Under heightened stress, areas that have not been working well are exposed, creating opportune times to seize the moment and disrupt the dysfunctional. Obsolete policies are abandoned while new ones are drafted; new processes and technologies replace inefficient, legacy practices. In the wake of COVID-19, for instance, we saw tertiary educational institutions that had previously banned distance learning shift to offer their degree programs fully online.[14] As a result, some populations historically denied further educational opportunities have now been able to access them.

In progressing through decades of employment, workers will face evolving jobs requiring expanding skillsets and multiple careers, as some occupations vanish and new roles appear.[15] Dr. Gary Matlin at the University of California, Irvine coined the term the "60-Year Curriculum" (60YC) to refer to the continuing education centered on lifelong learning as a result of occupational changes and transitions.[16] This means that workers must be equipped with transferable abilities and dispositions instead of solely job-specific skills that will eventually become outdated.

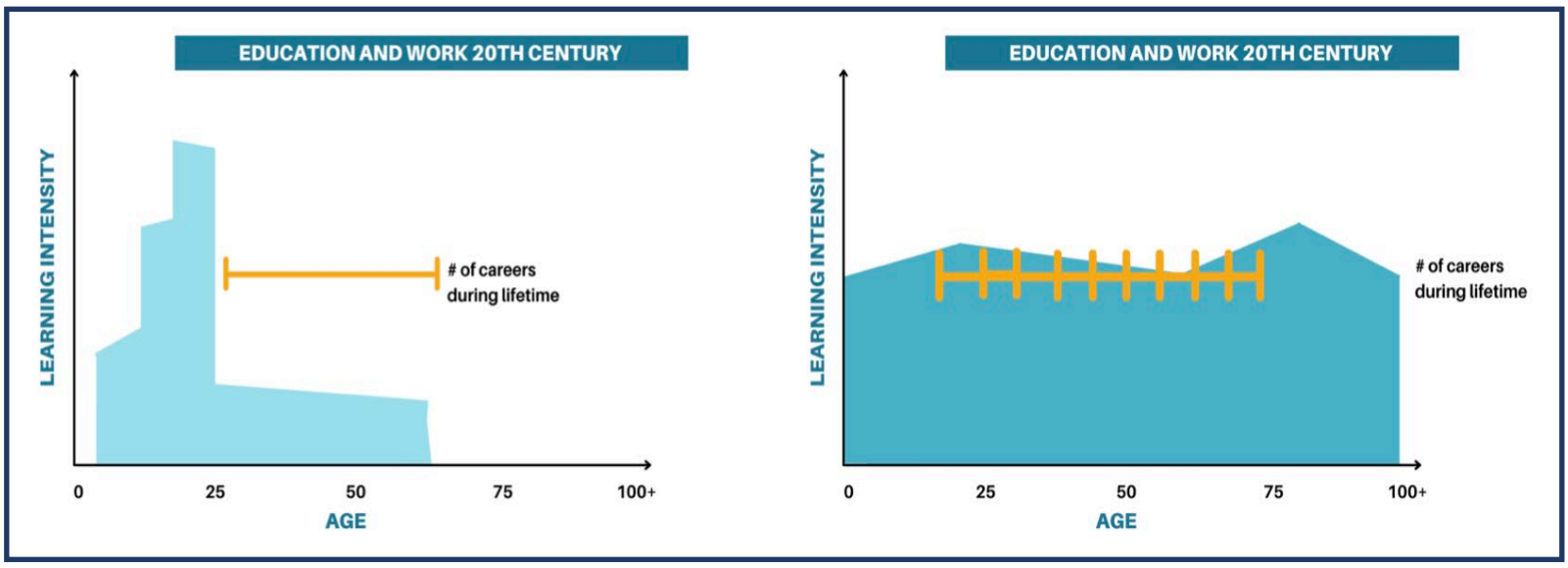


Figure 2. Lifelong Learning in the 21st Century[17]

Just in the last few months, COVID-19 has brought entire industries to a standstill, with economists estimating that more than 40 percent of layoffs may result in permanent job losses.[18] Changes of this nature, combined with longer life spans, will require everyone in the workforce to prepare for unstable conditions and lifelong learning. Educators at every level are faced with the increasing challenge of developing people's capacity for continuous reinvention to face an uncertain and changing workplace and to take on occupations that do not yet exist.[19] Traditional educational goals of knowledge and content attainment are no longer effective in preparing individuals for the evolving conditions of a globalized, networked world that has quickly devalued remembering information.[20]

Given this rate of change, the role of education and workforce development must be to go beyond basic skills and address long-term capacity building, enhancing people's interpersonal and intrapersonal skills—and dispositions—for a lifetime of flexible adaptation and creative innovation.[21] A report from the UK-based innovation foundation Nesta stressed that current educational objectives, even in workforce training, overemphasize the acquisition of knowledge and underemphasize the mastery of generalizable skills for lifelong employability, such as social perceptiveness, judgment, and decision-making.[22] Like the Nesta report, a 2012 publication from the U.S. National Research Council (NRC), *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century,* states that flexibility, creativity, initiative, innovation, intellectual openness, collaboration, leadership, and conflict resolution are essential for each person.[23] Finally, a recent Organization for Economic Co-operation and Development (OECD) report (2018) corroborated both the Nesta and NRC reports, describing knowledge and skills people need for lifelong employability.[24] Its list of what students need has a greater emphasis on attitudes and values (including moral and ethical dimensions) as well as interpersonal capabilities.

COVID-19 illustrated the value of dispositions in influencing workers' responses to uncertainty and novel conditions. During COVID-19, 42% of the US labor force suddenly began working remotely full-time,[25] and in this shift, some workers reported feeling more productive, balanced, and happy, while others in similar positions expressed feelings of alienation and floundered to complete any work.[26] While many factors, including job security and social support networks, influence these responses, prior research indicates that workers' dispositions could play an instrumental role. Studies conducted on workers pre-COVID-19 suggest that dispositions contribute to an individual's ease of transition to virtual collaboration.[27] Though future disruptions will probably not as be drastic, changes like these will become more commonplace in the future and the dispositions to handle them more valuable.

How Are Dispositions Different From Abilities and Can They Be Altered Through Education?

Skills, or abilities, are the capacities to perform tasks, while dispositions explain how abilities are manifested.[28] Some characteristics distinguish dispositions from abilities; three of these are particularly relevant to this brief, as reflected by the *comments in italics*:[29]

- Behavioral expression – While an ability can remain latent indefinitely, meaning it can potentially stay unexpressed, a disposition must be displayed in an actual situation.[30] As mentioned above, to have a critical thinking disposition, a person must possess the underlying critical thinking skills and exercise the skills when called for by the context. *The intermittent nature of these behaviors makes the measurement of a disposition challenging.*
- Malleability - The demonstration of dispositions can be influenced by conditions external to the person. Even if a person has the innate capacity for some dispositions, their expression is contingent upon the contextual elements that entail their use. Contrary to abilities, which are developed and controlled from within, dispositions can be triggered, obstructed, enhanced, and hindered by environmental factors. *Dispositions can be altered by educational interventions*.
- Continuity - Dispositions are non-episodic. This means that they can be possessed for shorter and longer periods of time but cannot come into and go out of being very rapidly—even as their expression can be intermittent. Unlike some abilities, they are not limited to quick learning and forgetting. They take time and practice to develop, and once developed, they cannot easily disappear. *This means that changing an adult's disposition requires repeated learning experiences over time.*

Another unique characteristic of dispositions is the way in which they are inculcated. Developing a disposition involves a systematic, multi-pronged approach that relies on surfacing and reflecting on the diverse contexts in which the disposition could appear. For a disposition to be attained and deepened, learners need to not only develop the requisite skills, but also understand the meaning of the skills and dispositions, be motivated to use the skills, have the situational awareness to deploy their skills, and be able to reflect on their efficacy in using their skills (Table 2).[31, 32]Through skill-building, practice under varied circumstances, and repeated reflection, an individual can deepen the targeted disposition.[33]

Learning experiences that build up these dimensions can enhance a person's dispositions. An instructor can help facilitate the development of dispositions by explaining what the disposition means and its associated skills, setting up examples, encouraging that the example be followed, justifying the exemplified behavior, and then by creating scenarios and exercises for practical application and prompting student reflection.[34] To emphasize the relevance and increase transfer, these dispositional learning experiences should be embedded in the training workers receive on occupational knowledge and skills.

Table 2: Dimensions of Internalization and Disposition Attainment[30]

1. **Meaning** - The individual should have a conceptual understanding of the meaning of the disposition (persisting, for example - what does it mean?). Moreover, they or she should be able to articulate what it looks like, sounds like, and feels like. In the case of "persisting," this would imply an understanding of the sub-elements that constitute persistence and of what it looks or feels like when a person is persisting. The individual can give some examples and non-examples of the persistence disposition and can identify situations in which the disposition is or should have been exercised.

2. **Situational awareness** - Training is conducted to build awareness of the myriad of situations in which the disposition might serve useful, so that the individual is alert to the contextual cues signaling when to employ or not employ a disposition. Equipped with a foundation, an individual can use the disposition appropriately and consistently across diverse situations, akin to cueing in transfer.

3. **Spontaneity** - The disposition appears autonomously without prompting or reminding by others. In other words, the motivation and inclination to apply the disposition emanate from within - without a desire for reward, recognition, or approval from others.

4. **Tradeoffs** - The person recognizes the benefits, costs, and values associated with electing and utilizing the disposition. Moreover, they can predict the potential consequences of choosing to use or not use the disposition.

5. **Reflection** - Reflection is critical for internalizing and resurrecting dispositions. Contemplating their skillfulness in using the disposition and making a commitment to constantly improve the performance and application of the disposition prepares the individual for an ever-widening set of circumstances. Directing enough attention to a particular experience over a specific period of time can make an individual's thoughts and acts of the mind an integral part of the individual's identity - who they are, how they perceive the world, and how their brain works; neuroscientists term this capacity 'self-directed neuroplasticity'.[34]

6. **Intentionality** - Use of the disposition is conscious, proactive, and intentional. The individual knows when, how and why to deploy the disposition.

7. **Action** - Lastly, there is the will and motivation to act on the disposition. While a person may display the first six dimensions, in order for the disposition to be deepened, it must be thoughtfully acted on, carried out, and fulfilled when relevant.

As illustrated by this process, disposition attainment is incremental and takes time.[35] Costa and Kallick, as well as Tishman and colleagues, lay out some strategies that instructors can use to promote the internalization of certain dispositions among students as in Table 3.

Before inculcating or deepening a person's dispositions, determining the extent to which they have these tendencies in their lives outside of work is important. It is also crucial to assess the professional environment's preparation to prime existing dispositions; someone may already have the desired disposition that only their personal life or specific spaces cue. The brief on transfer describes ways tendencies such as this can be actuated in occupational settings.

How Is the Extent of a Disposition Assessed?

Measuring dispositions allows us to gauge the efficacy of disposition attainment efforts for formative and summative purposes. With assessment tools, described below, we can determine the extent to which a disposition is internalized along the dimensions described above and can make appropriate instructional and environmental adjustments to training efforts in order to ensure the intended dispositional outcomes in students.

Currently, dispositional attainment and internalization are appraised through frequent, ongoing self-assessment. Though instructor feedback serves as a rich data source in disposition measurement, self-report instruments such as surveys and reflections are the main mechanism for assessment.[36] Because dispositions need to be conjured in situations beyond the original context in which they are learned or practiced, it is the instructor’s responsibility to thoroughly prepare the student for self-evaluative and metacognitive (the process of thinking about one’s thinking) analysis of his or her disposition performance and growth.[37] To this end, an instructor might create rich and challenging learning activities to provide opportunities for building the necessary monitoring and self-assessing skills. Self-assessment, however, is a weak and imperfect indicator of actual performance. Studies show that even though a generally positive relationship exists between self-assessment and actual performance, the predictive validity of self-reporting is low.[38]

Ultimately, the true measure of a disposition is a person's actions—or lack of actions— so the best predictor of current performance tends to be placing the individual in an authentic situation, which we can now do at scale through immersive environments like virtual reality (VR). The contextual nature of dispositions makes it especially difficult to evaluate in a contrived classroom test. Immersive spaces allow us to assess dispositions by recreating real-life circumstances, putting individuals in the scenarios, and seeing first-hand if they display the disposition(s). The simulated settings can vary in context and complexity to more closely depict the diversity experienced in real life. Assessing students in wide-ranging experiences improves our ability to evaluate whether they will react appropriately when a similar set of circumstances present themselves beyond the simulation. Moreover, through immersive technology, we can craft these interactions at scale, so any student can access these evaluative experiences at any time, anywhere.

Mixed-reality simulations from companies such as Mursion® provide an interface that combines virtual and real, in which the virtual environment presents a detailed digital context with realistic avatars controlled by a human puppeteer.[39] Mixed-reality interactions include realistic verbal and non-verbal capabilities; trainees can respond freeform with the full range of verbal and non-verbal communication. Termed mixed-reality digital puppeteering,[40] such simulations have become more practical and affordable in the past decade, creating rich opportunities for learning and assessing dispositions. Research is needed to establish the value of these learning environments for attaining and measuring dispositions.

Table 3: Strategies Instructors Use to Promote the Internalization of Dispositions

Pre-instruction context setting:

- Develop a common and consistent vocabulary throughout the culture of the organization, program, and class. A standardization of names and labels of dispositions equips students and staff with the appropriate terminology and tools to communicate, operationalize, define, and categorize behaviors.
- Model behavior and establish expectations so that students are aware of the thoughts and behaviors consistent with the disposition.
- Discuss disposition's meaning and benefits, and create activities where students create lists of attributes and mental models of what a disposition looks and sounds like.

Key instructional elements:

- Deliver repeated and frequent instruction and opportunities for practice of dispositions over time. Instructors must continuously discuss dispositions of interest and encourage students to evoke them.
- Pose questions designed to deliberately engage the mind and invite thinking rather than behavior (e.g., "What were you thinking when you did that?", "What cues were you aware of?", "What criteria did you have in mind when you made that choice?"). Encourage students to reflect on the use of the disposition and to monitor and make explicit the internal dialogue associated with the disposition.
- Draw attention to and trigger thinking about the disposition in varied settings, circumstances, contexts, and situations to familiarize students with other occasions where they might leverage the disposition.
- Give positive, descriptive feedback to recognize and reinforce the desired dispositions when students express them.

Which Dispositions Are Associated With the Capacity to Handle Change, Uncertainty, and Turbulence, and To What Extent Are These Part of Current Workforce Training?

The research-backed dispositions and attitudes that serve adults during times of volatility, uncertainty, complexity, and ambiguity include resilience, agility, growth mindset, vulnerability, mindfulness, and curiosity (Table 4). For instance, research has established the existence of an exploratory drive,[41] and Berlyne argued for the existence of a knowledge-seeking, curiosity drive,[42] implying that certain individuals are actively attracted to change because change enables them to learn, grow, and in turn, get closer to achieving their desired goals.[43]

Table 4. Definitions for Some Dispositions That Serve Adults During Turbulent Times

Disposition	Example Definition
Agility	"Learning to learn" disposition in which learners not only continually seek opportunities for learning, but can also make judgments about their own learning[45]
Curiosity	Drive to seek out novel stimuli; aimed not only at obtaining access to information-bearing stimulation, capable of dispelling uncertainties of the moment, but also at acquiring knowledge"[46]
Growth mindset	People believe that their most basic abilities can be developed through dedication and hard work[47]
Mindfulness	Mental mode characterized by full attention to the present-moment experience without judgment, elaboration, or emotional reactivity[48]
Resilience	The ability to persist in the face of challenges and to bounce back from adversity[49]

Growth mindset, the belief that human capacities can be developed over time,[49] is an example of a well-defined disposition that is already being inculcated through workforce development initiatives. New Sector Alliance's Designing Your Success (DYS) Program, an example of these initiatives, seeks to leverage a research-based pedagogy that builds a growth mindset so as to prepare workers at risk of displacement for a rapidly changing world. Mindsets targeted by DYS include learning curiously, embracing ambiguity, reframing interpretation, valuing feedback and experimenting to fail. Through their interventions, they have achieved a 67% reduction in sadness tones, 26% reduction in anger and frustrated tones, and 43% increase in confidence-related tones between the collective "I Used to Think" to the "Now I Think" statements they track. Their outcomes imply that workforce training can intervene and mold key dispositions.

Table 5: Examples of Dispositions

Thinking dispositions, "tendencies toward patterns of intellectual activity that condition and guide cognitive behavior specifically,"[51] also equip individuals to maneuver workplace challenges and uncertainty. While some thinking dispositions, such as easily giving up when confused, are counterproductive in turbulent times, others can support good thinking – the flexible, insightful, productive thinking which follows policies that help people fulfill their goals.[52] Perkins et al. (2018) identifies seven broad thinking dispositions characteristic of good thinking:

1. **To be broad and adventurous** - The tendency to be open-minded, question assumptions, examine alternative perspectives and interpretations, consider new and diverse ideas, and generate various potential paths forward.
2. **To sustain intellectual curiosity -** The tendency to detect unasked questions, anomalies, inexplicit facets, gaps in understanding, and unclear ideas.
3. **To clarify and seek understanding** - The desire to understand concepts clearly, seek connections to prior knowledge, and sharpen conceptions.
4. **To be playful and strategic** - The urge to sets goals, plan ahead, and approach matters in a calculated manner.
5. **To be intellectually careful** - The desire to be precise, orderly/organized, and thorough.
6. **To seek and evaluate reasons** - Alertness to evidence and sensitivity to superficiality and over-generalization.
7. **To be metacognitive -** A drive to be self-challenging, self-regulatory, and cognitively self-aware.

These thinking dispositions are acquired through institutional and interpersonal levels of social contact. At the institutional level, political and educational cultures promote and cultivate particular thinking dispositions, and from the interpersonal perspective, modeling and social interaction are influential drivers of the dispositions, behaviors, and rigorous thinking ideal for a given setting.[53]

In What Types of Occupational Roles Might These Dispositions Be Important?

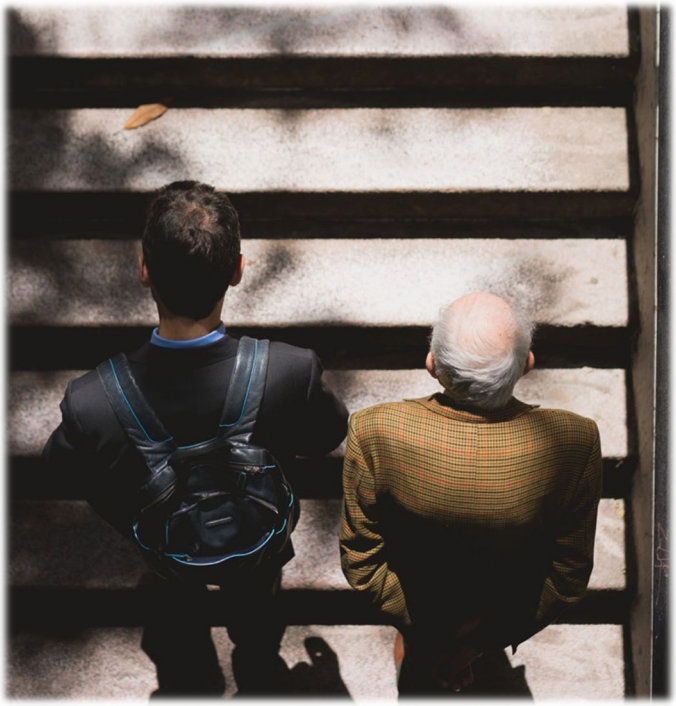
In 2017, Pearson partnered with the British think tank NESTA to provide an analysis about the future of occupational skills.[53] As part of their findings, NESTA generated descriptions of six job roles in 2030, highlighting how current trends would reshape these occupations as they were in 2017. This section of the brief builds on that foundational work to discuss how capacity building for one of these roles might include enhancing dispositions related to handling change, uncertainty, and turbulence.

Faisal is a careworker who accomplishes a variety of tasks in caring for the elderly:

- **2030 age**: 32 (19 in 2017)
- **Location**: Daytona Beach, Florida
- **Job**: Careworker
- **Sector**: Health and social care

After finishing school, Faisal had to support his elderly parents, navigating care offers and supporting them emotionally. Through a government-supported vocational course in health and social care, he built on this experience to become a certified personal care assistant.

While key skills requirements have not changed much over the past 15 years, the tools and scope of the job have. He is not just a care assistant: he is a cook, a dog walker, a cleaner, a companion, a health and wellbeing monitoring assistant, and sometimes the first responder in case of emergencies.



The care profession has continued to boom, in part because robots do not possess the traits which make humans good caregivers. These include compassion, humor, patience, and flexibility. However, pay, working conditions, and the status of the profession have not necessarily kept pace.

To differentiate his services, Faisal performs various technical tasks. At-home aging care means that one of his first roles is helping clients physically adapt to their homes, decide on what kinds of home assistive technology systems they will need, and determine how that data will be used. This includes giving advice on wearable technology to measure blood pressure, blood-glucose, and sleep patterns, for which Faisal has taken advantage of free training in biology.

This information is available to him 24/7, helping catch potential issues before they lead to a hospital trip, but equally, if not more importantly, it frees him to spend more time as a companion during home visits.

Faisal is also increasingly finding supplemental work outside of elderly care. A wider industry has risen, demanding many of the same skills to support working families in managing their homes and lives. He does this on a freelance basis for the more affluent families of the older clients he has come to know and is also exploring other opportunities.

Analyzing this hypothetical situation representing trends in caregiver services, the shifts NESTA forecast have come about more quickly because of COVID-19. To respond, Faisal will need capacity building, particularly in dispositions related to unexpected disruption and risk. As discussed in the brief on artificial intelligence, machines will increasingly do the predictable parts of occupational roles, freeing humans to focus their energy on socio-emotional support and on dealing with crises.

Being a caregiver requires tolerance for uncertainty, confidence in the face of risk, a can-do attitude based on a growth mindset, and tenacity and resilience in the face of long hours. Medicine has long used simulations as a way of building both skills and dispositions in doctors, nurses, and paraprofessionals of various types.[54] Recently, digital puppeteering and virtual reality are being used to heighten emotional impact (so that caregivers and first responders remain focused despite affect-laden crises), and to increase transfer from training environments to real-world settings.[55] Beyond skills, these systems offer promise in building dispositions that can survive high levels of stress and uncertainty on a long-term basis, and identify opportunities in the face of chaos.

In a sense, most occupational roles are moving towards the features outlined in caregiving: helping other workers cope with unanticipated challenges, sustaining organizational systems brought to the edge of collapse by discontinuous change, taking risks to innovate knowing that the odds of failure are high. The dispositional capacity building Faisal needs is mirrored in many other types of occupational roles.

What Research Is Needed To Foster Dispositions Related to Change, Uncertainty, and Turbulence?

Prior research has defined some disposition constructs and specified the value of each in promoting desirable behaviors. To a lesser extent, scholars have studied methods for effective inculcation and enhancement of these dispositions. Dispositions that research evidence relates to adults effectively coping with change and uncertainty include growth mindset, mindfulness, curiosity, and resilience. For dispositions like growth mindset and mindfulness, the existing body of knowledge has been translated into successful workforce programs applied to varying contexts.

In the case of mindfulness, qualitative findings show that mindfulness meditation improves healthcare personnel in terms of well-being, responses to work-related stress, and team functioning in intense clinical environments.[56] In turn, hospitals and healthcare institutions like UMass Memorial Medical Center, Penn Medicine, and the University of Virginia Health System offer programs to develop and enhance mindfulness skills for fostering resilience in their healthcare trainees and workers. Programs of this nature became very valuable during COVID-19, as healthcare professionals faced increasingly overwhelming pressures, leading to an increase in mindfulness training offerings for workers in the health services industry, broadly defined to include caregivers like Faisal.

Similarly, growth mindset programs in workforce and professional development, such as New Sector Alliance's Designing Your Success (DYS) Program and Mindset Works training, have leveraged the research literature to deliver interventions for workers in diverse fields, particularly in education (broadly defined to include Alfonso from the Introduction).

Workforce development initiatives in growth mindset and mindfulness have revealed the benefits of these dispositions for workers. Some organizations are now exploring the potential value of resilience in helping workers smoothly adjust to change and ambiguity. Research indicates that resilience can reduce both small daily stresses and larger, more overpowering obstacles;[57] large companies like Banco Santander have already pinpointed employee resilience as a capability requiring attention in the coming years. However, few initiatives exist to train resilience among those outside of a corporate setting, and it is unclear whether existing corporate and leadership resilience training would be applicable for those with alternative backgrounds. Further research can shed light on these and related issues.

Another important opportunity for research lies in the development and testing of scalable measurement strategies for dispositions related to vulnerability and turbulence. Current assessment methods (e.g., self-reported surveys) and approaches fall short of assessing the transfer of disposition attainment across circumstances and situations. Either due to the environment or the learner, trained students who appear to possess a disposition like resilience in one context might not express that disposition in another, a disconnect that cannot be captured by current evaluation methods. By replicating diverse environments and scenarios that closely resemble real-life situations and that

adhere to the Agentive Leveraged Contexts Model, as described in the brief on transfer, immersive media can potentially bridge this gap. Virtual and mixed reality, for example, shows promise not only in measuring attainment effectively, but also in supporting the inculcation of dispositions, though additional research is needed to verify this potentiality.

How Might We Reposition Workforce Development to Enable Fostering Dispositions?

Fostering dispositions in occupational capacity building can be enhanced by reconceptualizing the nature of work. The outcomes of high-quality performance should be seen by workers, organizations, and consultants/contractors as important; and the collective accomplishment should be honored, with rewards shared. Leadership should be distributed, with each person having some responsibility and authority, sometimes command-and-control, when coordinated action is essential. This allows workers to have choices about what they do so that they can exercise their dispositions, such as those related to innovation. The literature on organizational culture and change leadership discusses these issues in more detail.

New conceptions of lifelong learning[58] emphasize moving job training away from inculcating narrow skills for a specific role as if that would be one's occupation over decades. Instead, in the next half-century workforce capacity building should center on developing a suite of skills—and dispositions—to enable high performance in rapidly changing jobs, shifts in roles, and preparation for careers that do not yet exist.

What Tensions and Questions Are Related to This Approach?

Illustrative issues involved in fostering dispositions as part of workforce development include:

- By what mechanisms can society invest in lifelong learning for workers unaffiliated with an organization?
- What threats to the organizational culture of command-and-control institutions are posed by employee dispositions emphasizing resilience and initiative?
- How can we build on the fact that front-line workers often take pride in their work and care about outcomes, even though front-line roles often have little opportunity for promotion through accomplishment?

These and other macroeconomic issues will require top-down policies and priorities as part of their successful resolution.

Possible Next Steps and Approaches to the Problem Space

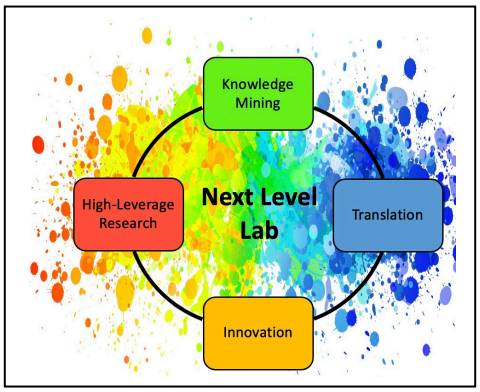
Types of learning science research needed include:

- What "dosage" is needed in length and timing of learning experiences to build a disposition such as intellectual curiosity and to transfer attainment from the learning environment to new or dissimilar situations?
- Will alternative, immersive forms of assessment be more effective in measuring disposition attainment and transfer?

Summary

COVID-19 has introduced extensive, extended turbulence and uncertainty into all workplaces. Some workers have stepped up to these challenges, exhibiting resilience, innovation, initiative, and leadership. Other workers whose managers might have considered to be equally or more capable in these abilities have exhibited confusion and paralysis. Research is needed on whether the difference between these two types of workers is, in part, not their abilities and life circumstances, but their tendencies (known as “dispositions") to leverage abilities and attitudes related to turbulence and uncertainty. In the next half-century, workforce capacity building should center on developing a suite of skills—and dispositions— as well as nurturing environments to enable high performance in rapidly changing jobs, shifts in roles, and preparation for careers that do not yet exist.

About the Next Level Lab:



This work was developed through the Next Level Lab: Applying Cognitive Science for Access, Innovation, and Mastery (AIM) at the Harvard Graduate School of Education (HGSE) with funding from Accenture Corporate Giving (ACC). Any opinions, findings and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the funder. The Next Level Lab is pursuing this work as we articulate the findings from research in cognitive science, neuroscience, and learning sciences that inform approaches to education and workforce development. Our work sits at the intersection of mining extant research of promise; conducting research questions with the potential for high-leverage impact; translating research on learning and the mind for public use; and innovating in the space of technology and learning to develop new visions for what is possible in developing human potential.

We are a small research lab. We view our mission as one of providing purpose and guidance to the field. Buckminster Fuller talked about the power of small influences in his description of a trimtab in this quote.

> *“Something hit me very hard once, thinking about what one little [person] could do. Think of the Queen Elizabeth again: The whole ship goes by and then comes the rudder. And there’s a tiny thing on the edge of the rudder called a trim tab. It’s a miniature rudder. Just moving that little trim tab builds a low pressure that pulls the rudder around. It takes almost no effort at all. So I said that the individual can be a trim tab. Society thinks it’s going right by you, that it’s left you altogether. But if you’re doing dynamic things mentally, the fact is that you can just put your foot out like that and the whole ship of state is going to turn around….”* -Buckminster Fuller.

It is our hope that our small lab can function as a trimtab to create better outcomes for humankind.

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