How Next Level Learning Enables A More Powerful Vision for Transfer
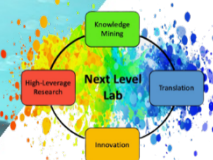
Applying Learning Sciences Research to Learning and Workforce Development for Next Level Learning Brief Series

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How Next Level Learning Enables
A More Powerful Vision for Transfer

Human minds seek out patterns—
setting up the possibility of transfer and connection-making.

Transfer often assumes learning that is separate from the context where it will be applied.
Learning in context, i.e., putting the fish in water, allows for a richer conception
of learning and transfer in workforce development.

Executive Summary

Workforce development programs have, at their core, conceptions of human beings and what they are capable of. The first three briefs in this series draw upon research in the learning sciences, neuroscience, and cognitive science to introduce a new view of learners referred to as *Next Level Learners.* The first brief considered an agentive notion of learners in which they behave like *fast fish* to create contexts that best support their learning. The second expanded beyond abilities-based notions to position learners as dispositional—developing awareness, abilities, and inclinations to support effective reasoning. The third introduced adaptive expertise, the ability to think flexibly and to repurpose existing resources to build new capacity and connections across domains like a *spider casting web* into new terrain. Here, we build upon this broadened vision of learners and what accounts for thriving in a workforce context to consider how it interacts with the role of transfer in workforce development.

Transfer is the ability to use skills and knowledge from one context in another context. It is essential to mobility in the workforce today and to maintaining economic inclusion in the future of work. However, we argue that focusing only on transporting skills and knowledge between contexts is inherently limited and that the broadened, asset-based notion of learners outlined in the first three briefs enables a powerful new vision for transfer. This brief explains transfer, considers past efforts to support transfer, and introduces a new model—one with an agentive, dispositional, and adaptive learner at the core—that affords greater attention to the contexts in which learning and work performance occurs. Like fast fish that create eddies and vortices to push off from to propel performance, we suggest that humans must be able to learn and transfer knowledge within *malleable contexts that they can actively adjust to be supportive of their growth.* We argue that putting the *fish in water so that context can be actively leveraged* allows for better transfer possibilities. The brief presents the cognitive science behind why this version of transfer presents a more powerful workforce development vision to adopt.

Framing Questions:

- What is transfer and why is talking about it important?
- What are the most common assumptions made about transfer and are they warranted?
- What are typical ways of thinking about transfer?
- What about forms of transfer that put the learner in the performance context?
- How might we reconceptualize learning and transfer in Workforce Development for Next Level Learners?
- What comes next for developing and implementing a "fast fish in water" vision of transfer?

Introduction

Davida is an airline pilot who flies the Boeing 787 around the world. However, she wasn't always a pilot; she was a fashion designer who ran her own small business for most of her twenties. On the surface, these two jobs sound worlds apart. One involves coming up with creative designs, selecting fabric, talking to customers, and sewing. The other involves algebraic and physics calculations, flight computer programing, and getting 560,000lb of aircraft, people, cargo, and fuel into the air.

Despite the many surface-level differences, Davida can see countless similarities between these jobs. Both involve complex technical manipulation of a machine to achieve your outcome. Both require awareness of how the machine interacts with the environment, i.e., a fine silk fabric or a weather pattern, and adjusting one's approach based on those factors. Advancing in both roles required Davida to find mentors who were willing to share their knowledge and ask good questions to extract what they knew from understandings that had become so familiar to them that they took them for granted. As a result, Davida has been able to apply things she learned in the context of sewing forward to help her to be successful in the context of flying. To quote her, "sewing influenced her philosophical conception of how to fly."

Latasha is a Public Works Operations Manager for a medium-sized city in the Northeast. She didn't start her career in public works. As a teenager, she began waiting tables at a local diner and spent nearly a decade in that job. While it may seem like she had to start over when she left the diner, looking back, she sees that what she learned in that job still helps her today. On any given day, she juggles a hundred different tasks at once and depends upon relationships with a whole team to support her—not unlike the relationships that she built with the cook, busser, and head waitperson. As the lead in public works, Latasha mentors and guides the employees in her department just like the new waitstaff she mentored at the diner. She never forgets that she works for the people of the city and puts her clients first, just as she did with the patrons at the diner.

Latasha learned something else at the diner—in order to do her job well, she had to figure out how to get the support that she needed to learn and to do her best work. This included, for instance, establishing a signal with the line chef when an order needed to come up quickly for a particularly demanding customer, the gentle prod at the right time to remind her boss to show her how to create the work schedule instead of doing it herself so that Latasha could learn, and making sure that her most talkative customer left happy and talking up the diner. Latasha used these skills forward to advance quickly in public works and still uses them each day to get the most from her staff, get the guidance she needs from others in city government, and keep the community informed and content.

Davida and Latasha's experiences illustrate how we can foundationally conceive of transfer in the context of workforce development in the face of job transition. *Transfer of learning occurs when past experiences or things learned in a prior context affect how a learner performs in a new situation.* Looking past the surface differences and examining the deep structure of their earlier and later jobs, you can see that there are important similarities that they leveraged forward. One can imagine transfer possibilities between a variety of jobs, such as those between military learning environments and civilian careers or a mine shuttle cart operator and a software engineer.

Davida and Latasha also learned to attend to important features in the specific work context and used those to support their learning and work performance. Just like fast fish that create eddies and vortices from which to propel, as in the quotation above, Davida and Latasha *make adjustments to their work contexts and push off of those—relationships, agreements, physical changes, and so forth—to do their best work.* While the specific adjustments in each context do not likely transfer, the agentive approach that they have adopted towards how they view and adjust their workplace is one of the most important aspects that they can transfer.

What Is Transfer and Why Is Talking About it Important?

The idea of making the most of previous learning to meet new challenges is broadly termed transfer. Transfer is a concept that has been well-researched over many decades. Since 1901, educational researchers have been exploring what transfer is, how it should be conceptualized, what strategies can be employed to prompt it, and what role the learner, teacher, and context play in its success.

The core conception of transfer involves using knowledge or skills learned in one context and applying them in another. The research literature provides several conceptualizations of how transfer works. The word context is used broadly here and can include transfer between topics, tasks, cultures, physical contexts, and so forth. For instance, learning a concept in one subject or topic may be applied to another—such as learning in science that density means how packed the molecules in materials are and using that learning to understanding population density in social studies. Or applying what one learns about the task of organizing their taxes to organizing a survey form. Or using what one knows about the culture of sports to develop the culture of a fund-raising group. Or applying what was learned in the physical context or school to the real world or in a course to one's work, and so forth.

How we envision the nature of people in the workforce has deep implications for how we support the ability to transfer knowledge and skills from one context to another. Traditional conceptions of

transfer typically *do* view the learner as having assets to bring to the new context in terms of content knowledge and other skills to apply. This is a key element of transfer. However, if learners are viewed as passive recipients of information during the learning process, research shows that they will not be well-positioned for transferring knowledge and skills.

Effective learners focus on what they can do with their skills and abilities. They are less interested in badging or micro-credentials, even as they see the value of those in demonstrating knowledge and skill than they are in what they can achieve with their capabilities.[1] In turn, this leads to accomplishments that speak for themselves and documenting achievements and experiences. Martin Holguin, an employee at a DNA sequencing biotech company who came from the military, emphasized how important accomplishments that led to "mini portfolios" were in his transition process.[2]

> *Transfer of learning occurs when past experiences or things learned in a prior context affect how a learner performs in a new situation.*

The promise of school, college, credentials, and other formalized workforce education hinges upon our ability to use information in real world contexts. If we can't transfer our skills and knowledge, they have no use beyond the specific contexts in which they were learned. While this might work for some limited, highly specialized on-the-job training, it is not a scalable model for workforce development. More importantly, it does not set learners up for success in the dynamic and uncertain future of work. Furthermore, misunderstandings of transfer are prevalent in the education, training, and workforce development sector—impacting the design of programs, allocation of funding, belief in over credentialing, and economic inclusion of learners. When employers and employees do not understand the rich possibilities for transfer, it can result in emphasizing credentials over transferrable knowledge and mini portfolios of achievements.

Fortunately, with the well-designed transfer conditions and learning experiences, effective learners can apply what they know from previous learning experiences to new contexts. Rather than needing yet another credential or an intensive brand-new career training program, with the right support from the workforce development sector, learners can see how their experiences apply in new contexts.

Repositioning the learner as a Next Level Learner, in an asset-based way that recognizes them as proactive, dispositional, and adaptive agents as outlined in the first three briefs, sets them up for success. Broadly defined, enabling learners to be agentive or to have agency means encouraging them to take a proactive role in setting learning goals, in actively pursuing learning opportunities, and in shaping the contexts of their learning. This includes managing their social and emotional needs, their abilities and those of others within and across the contexts, broadly construed, around them.[3] As considered in the first brief and explored further below, just like "fast fish" acting upon the water, *expert learners adjust their physical, emotional, social and cognitive environment for peak performance—managing up, down, and across the social context.* They must be active processors who

Next Level Learners build connections from familiar to unfamiliar and uncertain terrain like a spider casting out web.

use skills related to adaptive expertise such as metacognition to plan forward in their learning. They are dispositional in their approach, with the sensitivity, abilities, and inclinations to support effective reasoning. They actively seek new capacity and connections across domains like a *spider casting web* into new terrain.

Next, we step back to look at typical assumptions about transfer and whether they are warranted. Then we consider typical transfer models and the promise of reconceptualizing transfer with a Next Level Learner at the core.

Table 1: What Does the Research Tell Us About Next Level Learners and Transfer?

Being an agentive learner is essential to transfer because educators can't follow learners through their careers. Ultimately, learners are the ones to put their skills and knowledge to use or not.

1. Agentive learners bring their whole selves—emotional, social, physical, and cognitive—to learning opportunities and manage those aspects of the context. This invites many possibilities and aspects of one's learning for transfer.

2. Dispositional learners are sensitive to occasions to use their knowledge and skills, have the requisite abilities, and the inclination to follow through. Sensitivity helps them to see opportunities for transfer and ability and inclination supports follow through.

3. Learners who have adaptive expertise actively and flexibly seek connections between domains, contexts, and knowledge. This primes them to attend to transfer opportunities.

4. In order to support the best learning and work performance, the social, emotional, physical, and cognitive contexts should be malleable and invite learner agency.

What Are the Most Common Assumptions About Transfer and Are They Warranted?

The word "transfer" is often heard in commentary about workforce development. It serves as a catchall for a collection of assumptions about teaching and learning. Here we give voice to some of these assumptions and briefly address misconceptions about them.

True or False? "If two jobs are similar enough, people will use what they know from one in the other."

This assumption is often seen in the labor economics view of workforce development that considers workers as a supply vector in an equilibrium equation.[4] It also underlies notions of skill and job *adjacency* or *proximity*. It is true that people are likely to look for opportunities for transfer if the surface characteristics of two jobs or skills are very similar. For example, a PhP Programmer or someone who writes general purpose scripts in web development, might look at jobs requiring writing in JavaScript, or Project Managers might think about Product Management. However, as the opening examples of Davida and Latasha suggest, *the possibilities for transfer are far greater than adjacency or proximity suggest.*

Unfortunately, research shows that with similar jobs, people often stop at the level of transferring surface level similarities. For instance, they would detect enough similarity between working in a diner to running a four-star restaurant that they would apply food and preparation-related skills forward. They would be less likely to mine deeper level skills such as managing the complex web of relationships in the diner to managing the complex supply chain of vendors in the restaurant.

One of the puzzles about similarities is that without adequate attention to the differences between contexts, transfer is not likely to result in enhanced performance. Transfer is as much about differences as it is about similarities.[5] Food preparation in a four-star restaurant has similarities and important differences from food handling in a diner. Familiar connections are easily "fired" or traveled in our brain networks, so it is hard to leave behind connections that don't fit. Thus, unlearning is required.[6] If learners are alert to attending to similarities with attention to differences, they can enhance the positive aspects of prior knowledge networks and mitigate the downside risks.

Contrasting Terms and Examples:

Surface Level Features refer to apparent characteristics that are easy to see. There can be surface level *similarities*, such as working as a cashier in a department store or a grocery store where both involve working a cash register and helping customers check out. The common features are important cues to transfer and help people to realize that possibilities exist. There can be surface level differences that make two jobs seem very different such as being a seamstress or a pilot where one involves sewing and one involves flying a large aircraft.

Deep Level Features refer to hidden characteristics that are hard to see. Often these features are at a more abstract level, such as managing complex interactions or facilitating the relationship between a machine and its environment. Commonalities at the deep level can lead to some of the most powerful transfer but it is less often realized.

True or False? "If jobs seem very different, it is unlikely that skills will transfer between them."

This is the other side of the prior assumption. If on the surface, a job or skill looks quite different, learners may not perceive an opportunity to transfer knowledge. Without surface level similarities to cue them to the possibility for transfer, they often don't consider transfer a possibility. Employers and employees are less likely to detect the deep underlying similarities that can be most important—such as those capabilities that Latasha applied forward to her career in public works. [7] Yet, these deep similarities, despite surface level differences, can be some of the most meaningful. Without a highly reflective stance or explicit support to learn about the nature of deep level transfer, many opportunities to leverage skills forward are lost. For example, unfortunately, it is quite common for transitioning Service Members and Veterans not to see how their skills and experiences apply in a civilian context. This is because the surface features, context, and language used to describe work are often quite different. However, often Military roles have similar underlying deep structures to civilian careers.

On the surface, a job such as a Navy Avionics Technician might feel quite remote to civilian jobs – or proximal only to things such as a vehicle mechanic. However, when the deep structures of the skills required are analyzed, we can see that troubleshooting, analyzing performance, prototyping, testing, and an engagement with iteration are central to the role and skills. In a civilian context, this is also true of Business Systems Managers. The challenge is in making sure that learners have the abilities or support for extracting those deep level similarities so that they can transfer the relevant aspects forward and leave behind those which are not applicable.

True or False? "Transfer is the responsibility of the learner."

As explored further below, most educational contexts put the responsibility for transfer on the learner. For instance, K-12 education typically hinges on the promise that students will transfer their knowledge to the real world on their own and often only after their formal education is complete. Yet, research is clear that this leap of faith is typically unwarranted. One might argue that we expect transfer too often and not enough. Research shows that there is nothing automatic about transfer and that it needs considerable support. [8] On the other hand, unless we hold an asset-based notion of learners, one that views them as bringing important knowledge and skills (including learning skills) to the context, we may not think deeply enough about understandings that they may be able to transfer forward. Here we argue that transfer benefits from an asset-based and agentive view of learners and from a supporting context that facilitates it. In the next section, we explore conceptions of transfer from the transfer research and consider how they inform the design of workforce development programming and work-based learning.

Table 2: What Does the Research Say About Transfer?

1. Transfer doesn't usually just happen. It typically *needs support or routines to invoke it.*

2. Knowledge and skills must be *learned well to transfer meaningfully*.

3. Knowledge and skills *must be extracted from the original learning* context in order to be available and flexible enough so that learners can transfer it.

4. Effective learning happens best *within contexts* because learners can see nuances and can learn *to adjust the contexts* to enhance their subsequent learning and performance.

5. However, learning within context often gets stuck there. *This can put understanding and transferability at odds.*

What Are Some Typical Ways of Conceptualizing Transfer?

 The most common conceptions of transfer involve learning in a formal context and then applying the learning to a new context. Traditional SAT Prep courses exemplify this notion in that they involve deep learning of routines and strategies that are expected to be used in the examination context. The target to transfer the learning to is very specific in this example—the SAT exam. Some conceptions of transfer include a focus on reaching backwards[9] to pull knowledge and cases from prior experience and existing knowledge into the current learning context, for instance, standard math classrooms across America that purposely build on math learning from the prior year. This prior knowledge supports rich construction of the new concepts that one is learning and connects current learning to past learning. It can also be seen in workforce development programs that ask learners to "connect-back" or think about relevant experiences from their past that apply to current learning. For instance, the YouthBuild Program model identifies transferable skills related to 21st Century Learning and works to transfer those into their work-based learning model.[10] The SAT example is very specific and targeted. What is transferred can be much broader than this or even than content specific to a particular context. *Preparation for Future Learning (PFL)* is a conception of transfer that is based on the idea that in any learning opportunity, learners are gaining knowledge about *how to learn* either implicitly as in taking notes in a class or explicitly, as in learning Executive Function skills.

How learning is framed can impact whether learners seek out or expect transfer.[11] Seeding their expectation that transfer is likely, increases the likelihood that learners will attend to the aspects of their learning that might be transferable and will engage in a process of actively seeking contexts to which they can map it.[1] Looking for possible connections engages them in extensive comparison of possible transfer targets to the original learning, thus enhancing learning. Self-help or growth-mindset training programs that seek to change how one views the world are an example.

The above framing of transfer characterizes it as a process where learning happens in one context and then is used in another context. Imagine that Carlos is taking a course in hotel management. He learns content in the course with the assumption that he will apply it to his later career in hotel management. Some of what happens in the course build upon his previous experience. The instructor might ask him to connect back to experiences where he has worked in hotels, held service jobs, or even life knowledge such as his own room preferences. The teacher might seed the expectation of transfer expansively so that Carlos assumes that it will be broadly helpful to him. He might be encouraged to see that the skills he is developing to learn in the course—for instance, learning to ask questions of clarification, realizing that recall without looking back at the book helps learning stick, and so forth—will help him in learning new things in the future.

Notice how the above descriptions of transfer all involve a learning context that is different from the performance context such that learning needs to be transported into the contexts where it is needed. This creates some puzzles because there are ways that learning gets stuck.

What Is Involved in Transfer?

All forms of transfer involve four primary tasks: learning, cueing, mapping, and applying. Learning refers to the learning that is to be transferred. In the forms of transfer above, it comes first and then gets transferred forward. The thing that is learned must be deeply understood in order to potentially transfer. The learning also must have some flexibility so that the learner can dis-embed it. If it is very rigidly connected to the initial context, it will be stuck there. Often it is assumed that effective initial learning occurs that prepares the learner to use the knowledge in multiple contexts. For example, classroom learning is expected to help people in many aspects of real life. However, research shows that learning is typically wedded to the contexts where it initially occurs. Without a focus on dis-embedding the learning from the context, learners may not know what aspects of a concept have the potential for transfer.

Even if people can discern what might transfer and have support in dis-embedding it, they would still need to know how to detect the cues that suggest that the knowledge is useful in a new context and then would need to be able to map it forward. *Cueing* refers to noticing opportunities beyond the initial context where the learning might apply. One needs to notice features in the new task or context that trigger awareness that transfer might be possible. This is a common point of failure for transfer; people just don't notice the possibilities. *Mapping* involves taking the learning from the old context and fitting it to the new context by finding the relationships and points of connection that make it fit. People find it easier to map surface level connections than deep ones; this is why it is so important for the initial learning to be deep. *Applying* the knowledge requires being inclined to follow through on using it in the new context.
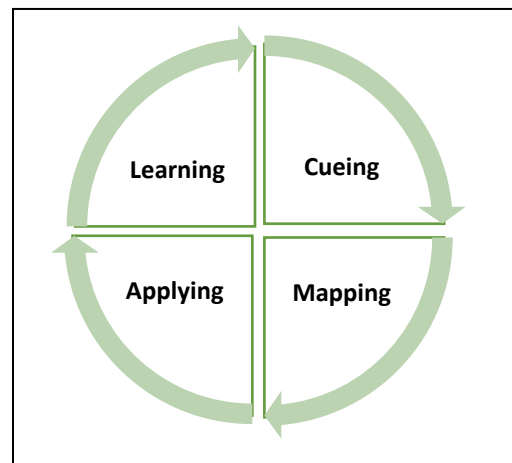
The forms of transfer above separate the learner from the performance context. What happens when we change how learning happens to put the learner back into context—to put the fish back in the water, so to speak? As we shall see below, it creates shifts in emphasis for the tasks above that open new ways to think about the possibilities and promise of transfer and how it informs workforce development programming.

What About Forms of Transfer That Put the Learner in the Performance Context?

We can shift the way that we think about transfer to put the learner into the performance context. This type of situated learning is very common in Mentorship Programs. Learning takes place in the performance context under the guidance of a mentor. The applicability of the learning is evident. The scaffolding is immediately relevant to the task at hand. Learners witness the nuances of how knowledge is applied—emerging with a textured understanding as opposed to ritualistic or stereotyped notions of what to do when. The trade-off is high level performance in the context of interest for ability that is specific to the role and context in which it was learned. These contexts allow

for the development of trust and reciprocity between mentor and learner—supporting social-emotional development specific to the context.[12] On the other hand, learning can get stuck in the mentorship context.

It is also possible to build experiences that turn transfer inside out by placing learning in more than one valued contexts of application and performance,[13] for instance, in programs where students are paid workers and are learning transfer skills within an applied work context.[14] This conception includes explicit attention to helping learners to dis-embed the concepts that they are learning to apply them forward and support for detecting new contexts for transfer—including ones that are very different from the original learning context or "far transfer"—and helping learners map to those new contexts. Through extensive comparison of the examples, learning is deepened in the far transfer contexts and on the initial performance/application context.

The framing for these kinds of experiences is sometimes a part of outreach for formal programs. For example, Worcester Polytechnic Institute (WPI) has established extensive internships for their students to enable contextualized learning.[15] Towards this goal, WPI has co-located academic, research, and commercial enterprises adjacent to their campus by renovating and developing an area now called Gateway Park. In a Cognex Program, WPI graduates had the opportunity to learn within the company and cycle through a set of approximately six internships over the course of a year.[16] Such collaborative efforts are not unique to WPI and are a model that some forward-thinking institutions are exploring. However, explicit strategies that support transfer between each internship have the potential to make this promising program even more effective and are an important target for research and development. Further, studying what the most effective design features of such a program might be would help us to learn more about the value of these designs.

How Might We Reconceptualize Learning and Transfer in Workforce Development for *Next Level Learners*?

The first brief introduced the concept of agentive learners. These learners behave like fast fish that form eddies or vortices to push off from to increase their speed beyond what scientists thought was possible. This is an apt metaphor for the possibilities of recognizing the untapped promise of proactive, self-regulating humans in situated contexts for transfer opportunities. Situated learning in contexts of interest with specific attention to behaving like a fast fish can raise learning and transfer to the next level.

We propose a transfer model that has at its core a self-actualizing human being who proactively manages the social, emotional, physical, and cognitive contexts in which they engage towards more expert performance. This Agentive, Leveraged Contexts Model employs situated learning to make it possible for learners to gain textured, nuanced understandings. It combines this with strategic efforts to extract generalizable elements of learning towards transferring knowledge and skills. It puts the agentive behaviors of the learner at the center using features of Preparation for Future Learning to highlight what learners *learn about how to learn* in each context that informs their future learning, their ability to get up speed in new contexts and to think about the broader contexts themselves—not just immediate task performance. Thinking about future contexts is becoming especially critical for workforce development programs to consider in their conceptualization of transfer. Work in the next several decades will involve reacting to disruptions and transformations and thriving in contexts not yet considered today.

How might it work? Imagine a Work-Based Learning Program that invites learners to work in a certain job for long enough to get to know the job well. The employee/learner is given explicit messages about the importance of being agentive in their learning and is given supporting instruction and mentoring to help them know what that means and ways that they might adjust their work contexts to support their learning. Their employer establishes (possibly with support for doing so) a malleable work environment and has learned specific techniques to support learners in transferring their knowledge to new contexts within the work environment.

Figure 1. Agentive Leveraged Contexts Model: Situated Opportunities

Employees in context bring their whole selves and like "fast fish" adjust contextual features in service of learning and performance
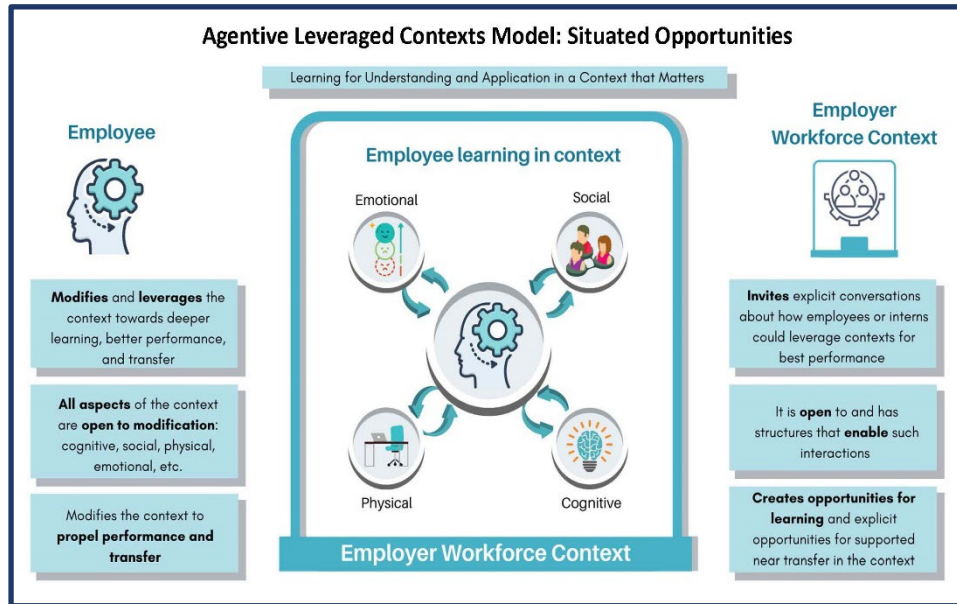
Figure 2. Agentive Leveraged Contexts Model: Supported Transfer

New possibilities are presented for transfer including support for noticing and mapping opportunities and transfer of "whole self"
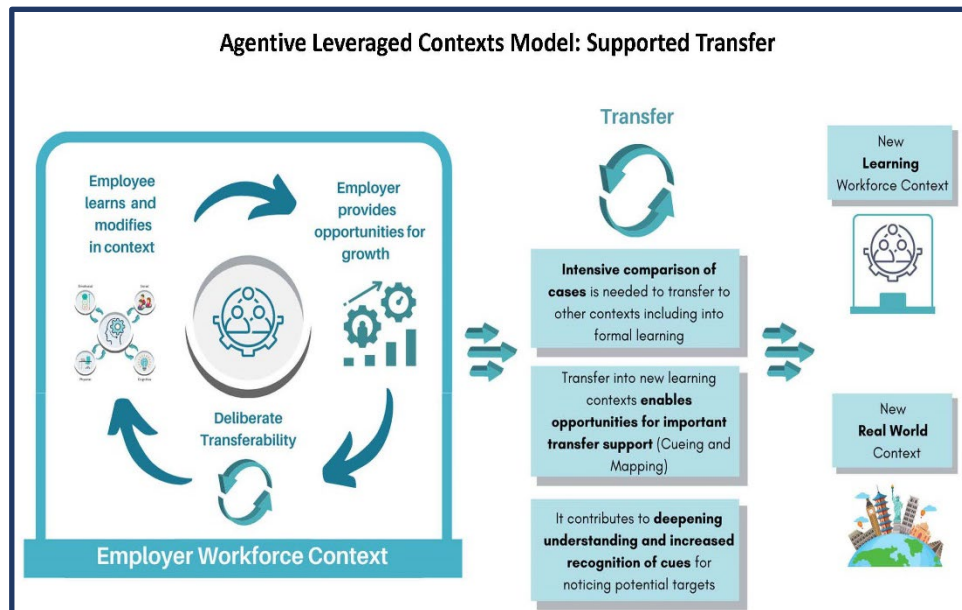
Table 3. Reconceptualizing Transfer for Next Level Learning: Agentive Learners in Contexts That They Can Leverage

An Active, Mastery-Oriented Learner Who:

- attends to the nature of tasks and looks for relationships that can be leveraged forward.
- attends to the social, emotional, cognitive and physical aspects of the environment and seeks out ways to modify it towards better performance.
- adopts a reflective stance about what is and is not working and pursues strategies that result from prior learning to use this learning forward.
- attends to the nature of varied contexts and considers how applying knowledge across contexts deepens the knowledge.
- holds a mastery stance towards self-actualization.

Learning and Performance Environments That:

- are situated and deep to provide for nuanced scaffolded application.
- are intentionally varied to offer opportunities to extract principles and analogical task knowledge within and beyond specific contexts.
- are designed to support reflection practices and rituals that invite advances in strategy knowledge related to high level performance and transfer.
- have employers who are accepting of, invested in developing, and enabling of active leveraging employees who have the flexibility to modify work contexts for maximum performance and learning.
- are cognizant that cognitive, social, emotional, and physical knowledge is essential to success and needs to be integrated into work contexts.
- create multiple opportunities for the development of task knowledge and offers a progression from more novice towards more expert.
- structure working relationships so that employees are exposed regularly to performance at different levels and can envision what increasingly expert performance looks like and even what it means to go beyond our existing capacities.
- create opportunities for creative, out of the box approaches.

What might this look like? Trevon recently lost his job in the Hotel Security Office given a downturn in travel. He has joined a program that uses rotating internships to offer experience in multiple contexts. During the first three weeks he participated in course-based activities that communicated the importance of active learning, helped him learn that transfer needs attention and taught him specific transfer strategies, such as looking for similarities and differences between concepts. As discussed in the first brief, he also learned that he needs to be agentive and behave like a fast fish—to actively look for opportunities to adjust the learning contexts around him. For instance, he needs to recognize the best times to ask questions and ways to ask them that help him to get useful feedback. He also realized the importance of finding ways to adjust the behaviors of his supervisors to help him learn, for instance, that it helps him to step back from high stress demands for a moment in order to absorb new information, or that a visual reminder helps him recall detailed verbal instructions. As Trevon begins his rotating internships, he meets many different co-workers and supervisors and attempts to apply his learning. He learns what works and figures out specifics of how to approach learning and transfer in each internship. He also continues meeting occasionally with his instructor for coaching and to learn further techniques to transfer between the internships. As Trevon continues in the program, he develops contextualized and generalized knowledge that holds promise for transfer across a variety of positions.

The rotating internships aspect of the design is a critical component. A lot can be learned by swimming in new waters. Shifting contexts reveals more about the context that one has been swimming in and how the variations in context affect the variables. For instance, we live in a sea of air, but few of us ever really think about the fluid dynamics of what surrounds us until we spend time in another fluid—such as water—or we read about what it means to move about in space. The tension here is that deep context is important for expert learning and for leveraging all dimensions of a workplace environment, but that shifting contexts can deepen understanding considerably and aids in transfer. Therefore, such a program might be designed to support transfer outside of the initial work context, such as in the Cognex program described above.[17]

What Comes Next for Developing and Implementing a Fast Fish in Water Vision of Transfer?

Looking across the research on the nature of transfer of learning invites us to reposition how we think about transfer in workforce development. It raises a critical set of questions:

> *Can we have it both ways? Is it possible to create models that support opportunities for deep, nuanced learning that doesn't get stuck in the context—that learners can flexibly transfer?*

In this brief, we have suggested re-envisioning the problem space as one that treats workforce contexts as places for learning and application. It trades a vision of preparation as something that occurs prior to engagement in the workforce for one that is, at least in some respects, embedded in the workforce but that requires explicit attention to transfer to multiple and varied contexts. This does not rule out prior preparation, but it necessitates a focus on learning in the contexts of work. Transfer needs to be envisioned in terms of workforce tasks but also in terms of the learning strategies needed to become an effective learner.

This model of the learner in context holds considerable promise. However, it also introduces puzzles about transfer and what is needed to extract principles from contexts. Further research is needed to study the possibilities for a vision of transfer with an agentive learner who leverages contexts. It raises many issues and invites possibilities for helping workers and managers to envision their roles differently. We anticipate that some important next steps will be to further articulate what is involved, at a finer level of grain, in developing and refining the model and to study it in action.

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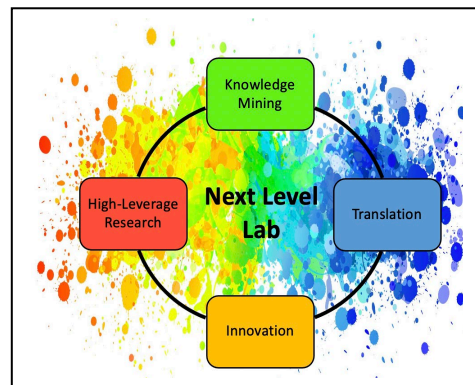
We are a small research lab. We view our mission as one of providing purpose and guidance to the field. Buckminster Fuller talked about the power of small influences in his description of a trimtab in this quote.

> *"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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How To Cite This Brief

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