RIGOR BY DESIGN NOT CHANCE

Deeper Thinking Through Actionable Instruction and Assessment

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Foreword

Great learning is like great love—of relationships, sports, music, and food. We return to our best friends, favorite teams, and musical artists who jibe with our passions and interests. And just like those experiences, every time we go back to significant learning, we glean a new understanding, insight, or perspective, making learning both additive and generative. This is one of the most important contributions that Karin Hess makes in *Rigor by Design, Not Chance.*

Hess invites us to think about instructional planning as a journey that enables students to experience *far transfer*. And wouldn't it be wonderful if every time we learned something new, it felt like an invitation? It would not be information we *must* learn for compliance or tests, but an offer to take part in an experience that includes choice in a partnership between teachers and students.

This book provides a concrete roadmap for intentional planning for instruction that is student centered; if well implemented, this approach will help learners retain information for a lifetime. We all eventually realize that the memories that stay with us are connected to something personally relevant; the rest we forget because the lack of anchors for new information means it's not encoded in long-term memory. Hess emphasizes how the brain functions as it seeks patterns and makes connections to deeper learning. Thus, explicit instruction is not just planning from a textbook, but also requires building scaffolds and schemas for learning. Without scaffolds, without taking those steps that support the process of cognition, students can get lost when content increases in complexity. It's also noteworthy to point out that Hess defines cognition not just in terms of increasing complexity, but also as including affective (social and emotional) engagement.

The Hess Cognitive Rigor Matrices (created in 2009) now provide a standard methodology for increasing complexity in three arenas: standards, instruction, and assessment. Using the intersection of Bloom's cognitive taxonomy and Webb's Depth of Knowledge

Framework, the matrices not only exemplify how to increase cognitive complexity, but also show teachers how to build scaffolds into the learning process. By using the matrices to build scaffolds for instruction and assessment, teachers can help students achieve greater levels of success with new content as they transfer surface knowledge to more complex contexts. And by building schemas—by helping students create mental folders where they can place and retrieve specific content knowledge—teachers help students build file cabinets in their minds.

Hess's model of planning for instruction helps students grow, digest, and retain new knowledge. So often curricula focus on the totality of textbook content rather than on the needs of learners. Although we have become better at the latter over the years, teachers are still conversing around the globe about what page or chapter they have "covered." When we decide that the only information worth teaching is retainable knowledge, however, the path is clearer.

Hess makes this case while providing a treasure trove of resources and instructional strategies throughout this book. Chapters 2–7 provide multiple strategies to use in lesson planning that convey the purpose and intended outcome of the lesson. With this information in hand, students will be able to replicate these structures later in life.

Hess also advises us to engage students in self-assessment and self-reflection. Just as teachers create plans before, during, and after instructional processes, Hess suggests building in metacognition at each step of the learning. This is probably the most innovative part of this book. Although teaching for metacognition is not a new tenet of learning, building it into the lesson cycle certainly is. When students own their learning—when they understand the instructional strategies, how to back up and move forward in cognition, and when to use prior knowledge as an anchor—they become autonomous learners. This is the basis for equitable instruction; it clarifies the difference between differentiation and scaffolding and between solid Tier 1 instruction and intervention.

Hess also asserts that by first prioritizing learning goals and then building success criteria for learning outcomes, teachers may lead students to deeper learning by focusing on the highest priorities for instruction and assessment. To this end, she synthesizes work by Wiggins and McTighe on backward design and authentic learning tasks.

Hess is an assessment specialist. Although she clarifies the qualities of authentic performance assessments, she also promotes the use of short-cycle formative assessments within simple or complex performance tasks. This is the only way teachers can see where students are in their learning; these data are therefore crucial in knowing how to monitor and adjust instruction daily.

Rigor by Design, Not Chance challenges the very nature of school itself while emphasizing the most salient points of college and career readiness. This work reframes our thoughts on how to provide deeper, more meaningful learning for all students in an equitable manner, and it brings engagement into greater focus as a means of achieving the highest potential for student success.

—Brandon Doubek, EdD, author and chief executive officer, Evolution Alliance, LLC

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Introduction

Now, more than at any other time in education, teachers have had to rethink not only what is most important to teach and assess, but also what to let go of when challenged by limited instructional time—all while ensuring all students' equitable access to instruction. Also, as a result of the COVID-19 disruptions, they have had to transform their delivery of instruction to maximize student engagement while meeting a variety of needs in face-to-face, remote, and hybrid classrooms.

The good news is that educators—including consultants like me—have had to investigate more effective ways to engage with students to make learning both equitable and personally meaningful. The bad news is that rigor has sometimes suffered in the process in the form of lowered expectations for all or some students. Many of the successful blended learning strategies that came about as a result of the pandemic will continue to be part of school as we now know it. But I hope we don't lose sight of the goal—for each student to achieve deeper learning—as we reimagine more equitable classrooms of the future.

Elsewhere (Hess, 2018a), I have identified three guiding principles for creating learning and assessment tasks that support deeper learning:

- **Deep learning is an essential goal for each student.** We see deep learning when students begin as novices, develop expertise over time, and are able to transfer knowledge and skills to new learning situations in each content area. For example, they might move from formulaic writing to seeing themselves as authors or from following teacher-designed investigations to designing investigations that answer their own curious questions. Deeper learning goes beyond acquiring and applying facts, concepts, and skills. It requires students to know themselves better as learners; they begin to see themselves as problem solvers and as critical, creative thinkers. Students accelerate the learning progress and boost their motivation when they understand the expectations for learning (success criteria); know what they must do to meet a

learning target (goal setting and planning); and can self-assess, track progress, and reflect on their own learning.

- **Assessment quality matters.** High-quality assessments—whether formative, interim, or summative—are clearly aligned to rigorous expectations for learning. Teachers design them to be "actionable" in the sense that they uncover both what students know and what still confuses them so that everyone better understands what actions will move learning forward.
- **Learning is at the heart of assessment design and system coherence.** When teachers design assessments to uncover student thinking—not merely what students may have memorized—they can interpret the evidence in student work products to answer the question, *What's next or where to next for this student?* Educators need to understand how the brain processes information during learning and how learning typically develops over time to determine the next optimal steps for learning. This is different from following a prescribed teacher-driven scope and sequence or curriculum guide.

The goal of this book is to provide teachers with practical ways to deepen student engagement, promote a growth mindset, and, ultimately, give students more ownership of their learning. Five essential, evidence-based teacher moves work in conjunction with one another to build a supportive classroom culture for thinking and learning. An easy way to remember them is to use the ABCs:

1. **A**sk a series of probing questions of increasing complexity.
2. **B**uild schemas in each content area.
3. **C**onsider ways to strategically scaffold learning.
4. **D**esign complex tasks that emphasize transfer and evidence-based solutions.
5. **E**ngage students in metacognition and reflection throughout the learning process.

Surely, some readers may be thinking that they already use some or all of these teacher moves. However, implementing them in the way I describe will maximize their effect on student learning and promote deeper engagement.

Why Ask a Series of Probing Questions of Increasing Complexity?

Asking a series of probing questions that increase in depth and complexity is different from asking a single question for students to answer. This approach provides multiple entry points for students to make personal connections with what they already know; it

also models for students how they can delve deeper by asking and answering their own questions.

For example, I might begin a math lesson for younger students by showing them photos of two different piles of coins and asking them which group of coins they would rather have. Students have a choice, and there isn't just one correct answer. I want to know more than what they chose. I want to know *why* they chose pile A over pile B and *what thinking they used* to make that determination. (I recall that when my grandson, Tristan, was 4 years old, he told me he didn't want any quarters because they took up too much room in his bank. So he kept the smaller dimes, nickels, and pennies and gave away the quarters so that he could fit in more coins.) After hearing students share their reasoning concerning which pile they chose, I might ask them if they wanted to change their minds based on what they heard, or I might ask pairs of students to make a number sentence or story problem using the coins in the photos.

Instead of focusing on one higher-order question for a lesson, asking a series of open-ended probing questions layers the learning for all students to gradually dig in deeper as they construct meaning for themselves. This approach helps them solidify today's learning and makes it stick beyond tomorrow because students use their own questions to drive the learning.

Why Build Schemas in Each Content Domain?

Mental schemas—also called *mind maps*—are essential to learning because they lay a conceptual foundation for connecting new content and skills with prior learning and experience. Unlike simply reconstructing a concept map provided by the teacher, creating personalized mental maps activates several different areas of the brain, thus building on prior knowledge and simultaneously storing information in many different areas for later retrieval or refinement (Byrne, 2021).

Every content domain has its own schema, meaning the way a given discipline organizes information. Mental schemas help students better understand how the "parts" of a discipline interact to create the whole. For example, these might include analyzing or composing the parts of an essay or a musical piece, designing a mathematical model, or detecting potential design flaws in a science investigation. Building on and using domain-specific schemas to deepen and expand understanding over time are at the heart of all critical and creative thinking.

Why Consider Ways to Strategically Scaffold Learning?

Although most teachers use scaffolding as part of the instructional process, the chosen strategy doesn't always match the intended learning target or support the learning needs of particular students. When engaging students with complex tasks or open-ended problems to solve, considering how and why to use scaffolding will aid in promoting high levels of engagement, and therefore learning.

For example, do students need a complex task broken into smaller steps with frequent checkpoints to support their executive functioning? Or do they need strategies that will help them build language and communication skills? For students who do not need such supports, what are the best ways to strategically move them from foundational to conceptual understanding and then to deeper strategic thinking, planning, and product design? All students can benefit from scaffolding when the purpose matches the demands of the task and supports students' specific learning needs.

Why Design Complex Tasks for All Students?

Complex tasks pose open-ended challenges and provide opportunities for students to decide which tools and processes to use to solve a problem; how they will transfer and demonstrate learning; and how they will support the solutions or connections they've made, from citing sources to analyzing the relevance and accuracy of evidence. Taking on complex tasks prepares students for the authentic problems they will surely face in the real world throughout their lives. When students learn to set goals, struggle productively to find solutions, and learn from earlier mistakes while solving complex problems, they build on their collaboration and self-direction skills.

A high-quality complex task can incorporate all five teacher moves. For example, teachers can begin with a driving question; frame activities to build conceptual schemas; scaffold to support diverse learning needs; build in differentiation by offering choices of content, processes, or products; and ask students to reflect not only on what content they've learned, but also on what they've learned about themselves as learners.

Why Engage Students in Metacognition and Reflection Throughout the Learning Process?

Many teachers use exit cards at the end of a lesson to help students recall something they were just taught. However, the human brain needs time *throughout* the learning cycle to solidify new learning by connecting it to prior, stored learning and then finding a way to

make the new information personally relevant (Hess, 2018a). Because the teacher embeds metacognitive strategies in instruction, these strategies don't take time away from teaching.

For example, student-guided instruction should include a self-monitoring process and discussions with peers at certain points during a lesson. Stopping every 10–15 minutes during a lesson to let pairs of students use a turn-and-talk frame with a probing question or conference with a peer is an effective metacognitive strategy that addresses learning *while it is happening*. The other side of the same coin is reflection. Students might reflect on what they have learned in the past that could be useful in solving a new problem or think back on a completed task to figure out how the decisions they made during the problem-solving process led to a new insight or deeper understanding.

Assignments requiring self-reflection and peer-critique activities are also effective ways to encourage reflection on learning *after it has happened*. For example, after completing a task, students might reflect on and evaluate how effectively their group supported group members and worked through conflicts. Engaging students in metacognition and self-reflection before, during, and after each learning opportunity is essential in supporting all students in becoming independent learners.

How the Book Is Organized

Chapter 1 lays a research-based foundation for understanding the meaning of "rigor by design." The following questions frame this first chapter:

- What is deeper learning?
- Why does every student need access to learning that is deep and rigorous?
- How are mental schemas, productive struggle, and neuroscience related?
- What is the connection between cognitive rigor and depth of knowledge?
- How can depth-of-knowledge levels shift teacher–student roles during learning?
- How do the five essential teacher moves work together to create an Actionable Assessment Cycle?

Chapters 2–6 unpack the five essential teacher moves. They define and describe the underlying research that serves as a rationale for using the moves. They offer a variety of teacher-tested strategies to support implementation for both in-person and virtual learning environments. And they conclude with observable student "look for" behaviors that show the move is working.

Chapter 7 provides three views of rigor-by-design implementation. **The student's perspective** refers to rigorous expectations that support students in driving their own

learning. **The teacher's perspective** looks at how lesson planning and assessment planning incorporate the five essential teacher moves to build coherence and rigor across the school year. And **the system perspective** refers to teacher-friendly supports that school leaders and instructional coaches can offer when observing in classrooms as they assess teacher questioning strategies, the quality of classroom discourse, the levels of cognitive engagement, and the teacher's actionable uses of assessment.

Teachers need to think of themselves as coaches, guiding students to build a solid foundation, raise their own questions, work more independently, and develop more authentic products to demonstrate their learning. In the end, it's all about students owning and driving their learning.

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The letter *f* following a page locator denotes a figure. Tools and activities are capitalized.

About the Author

Karin Hess, EdD, is founder and president of Educational Research in Action and author of the Hess Cognitive Rigor Matrices. She is a former classroom teacher and school administrator with more than 40 years of experience in curriculum, instruction, and assessment. She is an internationally recognized leader in applying the concepts of cognitive rigor, depth of knowledge, and learning progressions to the design and development of state and school-based curriculum and assessment systems. An expert in multiple content areas, she specializes in the design and use of performance-based assessments for preK–12 students.

At the Center for Assessment in Dover, New Hampshire, Hess led the development of multistate K–12 standards and designed general and special education large-scale state assessments. Previously, she worked as New Jersey's state director for gifted education, a program evaluator for the Vermont Mathematics Project, and a developer and editor of K–8 performance tasks for *Science Exemplars* (www.exemplars.com). She has provided technical expertise to EL Education, Renaissance Learning, the Mathematics Advisory Team for Achieve3000, the Critical Thinking Advisory Team for Mentoring Minds, and the World-Class Instructional Design and Assessment (WIDA) consortium in revising the 2020 English Language Development Standards Framework.

Hess has authored or coauthored more than a dozen books in the field of education. Her most recent work includes *A Local Assessment Toolkit to Promote Deeper Learning: Transforming Research into Practice* (Corwin, 2018); codeveloping Benchmark Education's *Ready to Advance* curriculum for prekindergarten (2019); and coauthoring, with Rose Colby and Dan Joseph, *Deeper Competency-Based Learning: Making Equitable, Student-Centered, Sustainable Shifts* (Corwin, 2020).

In her work with schools, Hess provides practical, classroom-tested tools and in-depth guidance for implementing competency-based educational systems and strategies to enhance deeper learning for every student.