What Your Colleagues Are Saying . . .

"Everyone tells teachers to innovate, but Richard Cox, Jr., and Brandy Howard invite them into a strengths-based, interactive journey. This book is a sandbox of provocations, stories, and reflection tools where teachers can explore, experiment, and make meaning of innovation on their own terms. It's a space to understand yourself more deeply while learning from the practices of other educators and the structures of innovative workplaces."

Sujata Bhatt
Founder & CEO, Incubate Learning
Santa Monica, CA

"Cox and Howard's guide bridges the gap between boardroom vision and classroom reality for transformative change. More than a book, it's an essential resource providing tools empowering educators to cultivate innovation, creativity, and problem-solving skills our future workforce demands. A must-read for anyone serious about preparing students for tomorrow's challenges."

Adrienne Usher
Assistant Superintendent, Bullitt County Public Schools
Shepherdsville, KY

"This book is the key to a reimagined education that connects students to humanizing and mutually beneficial outcomes. The authors chart a clear and integrated pathway to educational ecosystems that did not previously (before this!) systematically exist. Through individualized reflective opportunities, profiles of successful educational innovators, and a plethora of classroom examples, this book empowers K–8 teachers to create accessible, future-forward innovation opportunities for all learners."

April L. Mustian
Professor of Special Education, Winthrop University
Belmont, NC

"While many recognize the urgent need to reimagine school for today's learners, what's often missing is the how. In *Sparking Innovation in Children Through STEM Exploration,* highly respected educators and leaders Richard Cox, Jr., and Brandy Howard deliver exactly that—practical, inspiring, and deeply grounded guidance. This book is a must-read for educators ready to move from intention to action, creating learning ecosystems where curiosity, creativity, and authentic learning are the norm."

Carmen Coleman
Chief of Transformational Learning and Leading,
ElevatED Studios,the Ohio Valley Education Cooperative
Louisville, KY

"This book is a force for good. It is an inspiring and empowering platform for educators to create an ecosystem that centralizes creativity, curiosity, and collaboration among our young learners. This text humanizes innovation and reminds us that it flourishes in a community's embrace. Transforming classrooms into innovation districts is and must be the 'spark' we educators use to uplift our next generation of changemakers."

Micah Deer
School Impact Manager, Blumenthal Arts
Charlotte, NC

"This book is an outstanding resource for educators seeking to create innovative and engaging classrooms. It is thoughtfully organized, with a clear structure that introduces the 'why,' provides actionable steps for implementation, and concludes with a practical action plan."

Cheryl Robertson
Facilitator & Instructor, UT-PLAYS Initial Licensure Program
University of Tennessee
Knoxville, TN

"This book is a thought-provoking guide for educators looking to ignite curiosity, cultivate creativity, and lead innovation in their classrooms and beyond. With a blend of actionable strategies, compelling stories, and reflective moments, the authors inspire educators to reimagine learning in ways that are both practical and transformative. A must-read for teachers, school leaders, and anyone committed to creating engaging, future-ready learning experiences for all learners."

Lu S. Young
Chief Leadership Officer, UK Center for Next Generation Leadership
Lexington, KY

Sparking Innovation in Children Through STEM Exploration

A K–8 Teacher's Guide to Inspiring Future Problem Solvers

Richard Cox, Jr.

Brandy Howard

Foreword by
Sarah B. Bush and
Kristin L. Cook

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for downloadable resources.

FOREWORD

BY SARAH B. BUSH AND KRISTIN L. COOK

The world is changing at an unprecedented pace. As educators, it is our responsibility to ensure K–8 learners are equipped to iteratively adapt and grow throughout their lives. At the foundation of this is an indispensable energy toward innovation. The world needs learners who are, as Drs. Cox and Howard explain, producers, connectors, doers, thinkers, makers, collaborators, and innovators. Although learners absolutely need strong content knowledge across disciplines and the ability to integrate what they know, that alone is insufficient to meet the needs of the present and future. As a society, we cannot fully imagine where advances in technology such as through artificial intelligence, data science, personalized medicine, advanced air mobility, and cybersecurity will take us. We also cannot fathom how we will all adapt to such changes even in our daily personal lives. In today's world, it's impossible for educators to fully identify and prepare learners for all they will need to know because so much of it does not yet exist. However, we can foster learners' ability to be innovators. By embedding an innovation energy in all that we do with learners, we are giving learners the gift to be adaptable, nimble, and the spark of innovation leading to transformative change and thriving communities.

Dr. Richard Cox, Jr., represents the pinnacle of educational innovation and leadership in science, technology, engineering, and mathematics (STEM) education. His multifaceted approach to learning

transcends traditional boundaries, weaving together academic rigor, practical experience, and a visionary commitment to learner development. As a STEM Program Coordinator at Advocate Health and a distinguished educator, Dr. Cox has demonstrated an extraordinary ability to transform educational landscapes. His work across multiple states and diverse educational settings reveals a profound understanding of how integrated learning can unlock learners' potential, particularly for K–8 learners who are at a critical stage of intellectual discovery. What truly sets Dr. Cox apart is his holistic perspective. From classroom teaching to university-level instruction, from instructional coaching to leading innovation districts, he has cultivated a comprehensive understanding of educational ecosystems.

Coauthor Dr. Brandy Howard brings a rare combination of strategic vision and ground-level educational expertise. As a Chief Academic Officer, she represents the very best of modern educational leadership—a visionary who doesn't just imagine change but actively creates it. Her work transcends traditional administrative roles, demonstrating a profound commitment to reimagining what learning can and should be. Her leadership exemplifies a deep understanding that meaningful education is about more than curriculum—it's about creating interconnected learning experiences that prepare learners for real-world challenges. Her strategic partnerships with community stakeholders and participation in state and national educational initiatives demonstrate a commitment to collaborative, systemic change. Dr. Howard is not merely improving educational systems but fundamentally redesigning them to meet the complex demands of 21st century learning.

At the heart of the book is the Innov8 Framework, which can be viewed as a continuous and iterative cycle and includes eight phases: spark, design, collaborate, empower, convene, measure, model, and sustain. There are many features throughout the book to help you feel comfortable with the content from the outset. Drs. Cox and Howard include a wide collection of ready-to-use practical tools, many real-world stories and examples, reflection prompts that would be great for personal reflection or book study discourse, and insightful tips. They also include compelling profiles of innovative educators and their stories. Finally, we would be remiss if we didn't mention the brilliant way that Drs. Cox and Howard examine and explore different roles that learners can lean into within a broader Innovation Ecosystem. These are Visionary, Architect, Connector, Navigator, Builder, Evaluator, Mentor, and Lifelong Learner.

There are several unique aspects of this book. First, its **Inclusive and Empowering Approach:** The authors have crafted a truly unique resource that goes beyond traditional educational guides. They deliberately use inclusive language to create a

welcoming space that challenges conventional thinking about education. The book isn't just about teaching; it's about creating a collaborative learning ecosystem that values every participant's potential. Second, its **Broad and Flexible Framework:** Unlike prescriptive educational texts, this book deliberately avoids a single, rigid definition of *innovation.* Instead, it offers a flexible framework that recognizes the diverse needs of different learning environments. Third, its **Holistic Vision of Learning:** This book transcends subject-specific boundaries. Although it speaks directly to K–8 educators, its principles are universally applicable across disciplines. It's not just about STEM or a particular subject area but about fundamentally reimagining how learning happens. Fourth and finally, its **Future-Oriented Mindset:** What truly sets this book apart is its forward-looking perspective. It doesn't just teach about the present—it prepares educators to nurture learners who can thrive in an unpredictable future. The authors emphasize creating "producers, connectors, doers, thinkers, makers, collaborators, and innovators" rather than passive knowledge consumers. This book is more than an instructional guide—it challenges educators to be courageous, curious, and committed to creating dynamic, inclusive learning environments that prepare young learners for a complex, rapidly changing world.

Sparking Innovation in Children! is unlike any book we've read. Drs. Cox and Howard push the field into the current day and into the future, by reimagining that learning is built on a foundation of sparking innovation. This book provides glimmers of hope and endless inspiration. As a call to action, we invite you to take three steps (1) read the book with your team, (2) determine ways to get started on *Sparking Innovation* in your setting, (3) engage in your own cycle of Innov8 and watch innovation unfold! Together with our learners, we can cultivate a more resilient and adaptive society where individuals and communities thrive and look toward a positive future.

Sarah B. Bush
Professor of K–12 STEM Education, University of Central Florida
Lockheed Martin Eminent Scholar Chair
Director, Lockheed Martin/UCF Mathematics and Science Academy
Coauthor, *Step Into STEAM* (Corwin 2025)

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PREFACE

Adventure awaits.

We're calling on K–8 educators everywhere to embrace the unknown, celebrate questions over answers, and codesign learning environments where curiosity thrives. We're calling on you to innovate.

Your learners will thrive and so will you.

In this book, we'll join you on a mission to transform your classroom and school. We'll introduce action items, inspiring stories, and pause to reflect—all this aimed at reimagining education broadly and in your classroom proper, and all aimed at positioning you as the one to lead the change and charge. After all, in any innovation ecosystem, educators like you are the keystone species.

This book is primarily written for K–8 educators who are passionate about fostering innovation in their classrooms—that means those who teach STEM, or any separate subject area—this book is not limited to standalone STEM courses. The principles and strategies presented can also be valuable for school administrators, educational leaders, and **anyone** interested in cultivating more innovative and engaging learning environments. You'll explore how to encourage critical thinking, collaborate across disciplines and spaces, and connect learning to "real-world" challenges. Most importantly, you'll discover how to make curiosity the cornerstone of each and every educational experience as you work to define and discover what innovation means to your learners and you.

This book does not provide a singular definition of *innovation* but rather explores its multifaceted nature and offers a framework for incorporating it into K–8 education. We recognize that innovation can and should manifest differently depending on the unique strengths, needs, and goals of each learning environment. So, consider this book a resource and a jumping-off point for you. If you're ready to challenge the status quo and imagine what's possible for learners, classrooms, communities, and yourselves, we hope you'll continue reading.

Language Use

In this book, you'll read the words *learners*, *folx*, *we*, and *us* a lot. Here's why:

Innovation, we believe, is a shared journey. We think the term *learners* better reflects the active and ongoing nature of learning. It emphasizes that everyone is always learning and growing, regardless of age or lived experience. The term *student* can feel more passive, suggesting that learning is something that happens only in a classroom setting. We want to encourage a mindset of lifelong learning (you'll see that's our end goal), and we believe that the term *learners* better embodies that idea and spirit.

We also use the term *folx* as a more inclusive alternative to *people*. It is often used to explicitly signal a commitment to inclusivity and diversity, particularly in educational settings. We want to create space where everyone feels welcome and valued, and we believe that using inclusive language is an important part of that effort.

Throughout the book, we use the pronouns *we* and *us* to emphasize that you are on this adventure with us. We believe that everyone is on the path to innovation together, and we want to create a sense of community and collaboration. We hope this helps to encourage a sense of belonging and shared purpose.

We recognize that language is powerful and that the words we choose can shape our thinking and our actions. Throughout the book, we encourage you to reflect on your language, too, and how it might be perceived by others. By using inclusive and empowering language, we can create more welcoming and supporting learning environments for all. Innovation is about meeting folx where they're at and recognizing that everyone has something valuable to offer.

After all, innovation rarely happens alone.

Thank you for joining us on the journey!

ACKNOWLEDGMENTS

From Richard

Though many young people are drawn to realms of fantasy, I remember being enamored with a particular experience that promised a peek into the future, one filled with promise, hope, connection, and innovation. Back in the late 1980s, our family saved money for a once-in-a lifetime visit to Walt Disney World's Epcot Center in Florida. Beneath gleaming pyramids and near a waterfall that seemed to flow against gravity, we journeyed through the worlds of literature, art, science, mathematics, and technology guided by an imagined purple dragon named Figment. We were told that with a simple "dash of childish delight" we would find inspiration even if we were "stumbling in the dark"—musical notes, sunbeams, colors, sounds could "inspire amazing and marvelous new ideas." The memory of that attraction is as vivid as anything from my childhood. As I carried that memory with me, eventually into my career as a teacher, I made a promise to myself that I would craft each experience in my classroom in ways that honored the imaginative spirit in each child. I have dedicated my work to the idea that "imagination is something that belongs to all of us."

So, too, does innovation.

To little kids who believe in what is possible who become educators who do the same, this book, deeply rooted in dreaming of what could be, is dedicated to you.

From Brandy

From the moment I stepped into a classroom as a learner, I found a world where I could thrive—a place filled with stories, connection, and the endless possibility of learning. But as I grew, as an educator and as a mom, I came to realize that school, as it has existed for generations, does not work for every child. Education should be more than a system; it should be an open door, a path forward that meets each learner where they are and dares them to dream beyond what they believe is possible.

I have seen this firsthand—not just in my work but in my home. Every child deserves an education that inspires, challenges, and honors their unique journey.

To God—thank you for your unending grace, guidance, strength, and the opportunities that have brought me here. This would not be possible without you.

To Jeff—my steady anchor, my greatest champion. Your love, your sacrifices, and belief in me remind me daily that no dream is too big when we stand together.

To Jeffrey and Kate—may you always know that faith and hard work pave the way for endless possibilities. Never be afraid to ask bold questions, take courageous steps, and embrace the spark that drives you.

To my parents, John and Michelle Ledger—your relentless love and encouragement have shaped every part of who I am. Thank you for teaching me the value of persistence, purpose, and faith.

To those who believe in what education could be—who refuse to accept that "this is just the way it is"—this book is for you. May we never stop reimagining, rebuilding, and relentlessly pursuing what is possible for every learner.

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ABOUT THE AUTHORS

Dr. Richard Cox, Jr., is the STEM Program Coordinator at Advocate Health, based in Charlotte, North Carolina. In this role, he supports STE(A)M education initiatives for the enterprise, focusing on programming and outcomes for K–8 learners through work at The Pearl Innovation District in Charlotte (www.thepearlclt.com) and Innovation Quarter in Winston-Salem. With more than 15 years of

research and hands-on experience in transdisciplinary and integrated learning, Dr. Cox has championed STEAM education across diverse settings, from Kentucky to Chicago to North and South Carolina, engaging learners of all ages. Dr. Cox holds a doctorate in education and social change, specializing in mathematics, science, and transdisciplinary STEAM approaches. His academic career includes a pivotal role as assistant professor at Winthrop University, where he helped redefine teacher preparation by blending innovative methods with strategic curriculum development. This work is complemented by his experience as a classroom teacher, K–12 Instructional Coach, and STEAM Lab Coordinator, enabling him to bridge traditional teaching with imaginative approaches. Dr. Cox's expertise is reflected in his extensive contributions to the field, including 15+ peer-reviewed publications, 30+ presentations, and numerous awards and accolades. His research focuses on imaginative learning, STEAM career pathway development, and workforce readiness, making him a thought leader in preparing learners for dynamic futures. His unique combination of practical experience, academic research, and leadership in professional development ensures that his contributions to this book are deeply insightful and broadly impactful.

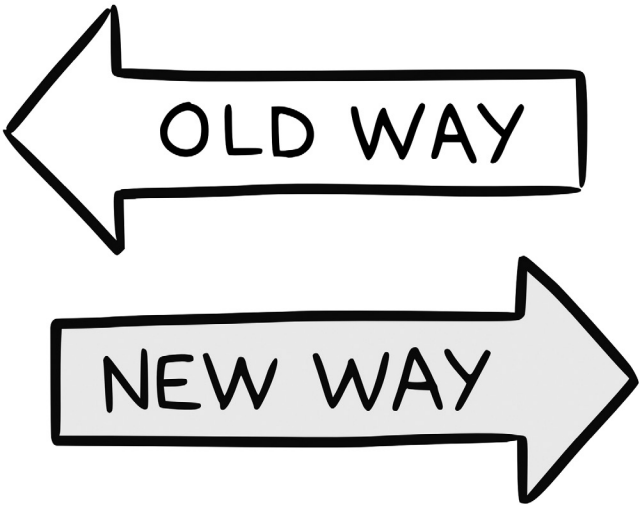
Dr. Brandy Howard serves as Chief Academic Officer for Bullitt County Public Schools in Kentucky, where her visionary leadership transforms educational practices at the district level. She oversees instructional coaching, professional development, and assessment strategies while championing her district's Graduate Profile and authentic learning initiatives. As a coleader of the Transformational Learning Cohort and the Graduate Profile Cohort, Dr. Howard works closely with educators to integrate meaningful, real-world experiences into classroom instruction.

Her influence extends beyond the district through her participation in national and statewide initiatives, such as the National Association of Elementary School Principals Innovative Principal Circle Cohort and the Kentucky United We Learn Innovative Assessment team. Dr. Howard also coleads the Community Contributors of Innovative Learning Team, fostering partnerships between schools and local stakeholders to reshape accountability systems and create a comprehensive learning ecosystem.

Dr. Howard's academic background includes research on the impact of year-round education, underscoring her commitment to evidence-based practices and data-driven decision making. Her involvement with the Kentucky Department of Education Blended Learning Module Team and her induction into the Kentucky Association of School Administrators Kentucky Women's Educational Leadership Cohort further demonstrate her dedication to progressive educational reform.

INTRODUCTION

It's clear that education is at a crossroads. As technology reshapes our lives, local and global challenges grow more complex, and workforce demands evolve at an unprecedented pace, our systems, structures, and strategies must become more resilient. We as educators must change as well. Our K–8 learners deserve nothing less than our full commitment to embracing and pushing for what's next. Learners need more than information exchange; they need invitations, access, and then support to think critically, collaborate effectively, curate content, and creatively solve problems we, and they, can't yet foresee. The future demands more than consuming knowledge. The future calls for producers, connectors, doers, thinkers, makers, collaborators, and innovators.



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We can and we must answer that call.

Schools have a unique role in helping learners imagine what's possible, but traditional approaches to teaching can shrink those possibilities. Too often, we focus on narrow, convergent thinking—memorizing facts, and following rote procedures—rather than embracing the kind of innovative thinking learners need to tackle complex problems. Eisner (1997) argued that education is most effective when it expands, rather than limits, what learners believe they can achieve. However, research reveals that instructional models often prioritize predictability over creativity, even in subjects as

ripe for exploration as integrated science, technology, engineering, and mathematics (STEM) and their individual disciplines (Horizon Research, 2013, 2019). For example, many teachers feel compelled by pacing guides, standardized testing, and district mandates to explain concepts *before* learners have a chance to investigate them. Hands-on activities are frequently used to reinforce content, rather than as invitations and opportunities for discovery despite what's encouraged in national and state standards (i.e., Next Generation Science Standards; National Research Council, 2012).

These practices may feel safe to us or may even be required. They can even be efficient and at times effective, but they certainly limit K–8 learners' ability to think independently and explore new possibilities. This is why moving toward innovative thinking is so essential. When learners are encouraged to ask questions, experiment, and take risks, they develop the skills and dispositions they need to solve problems that don't yet have answers and navigate problems that have yet to emerge. Innovative thinking isn't about abandoning structures that have served us in the past—it's about reimagining how we approach existing structures, leveraging them in more holistic ways to more intentionally benefit learners, and inviting learners to engage deeply and meaningfully with the world around them now and in (and for) the future.

This book is built around a potentially transformative idea: **the most innovative classrooms can and do mirror innovation ecosystems we see and experience in the world around us**. These innovation ecosystems—physical innovation districts, research hubs, and entrepreneurial networks—function and thrive on principles of intentional design, risk, curiosity, creativity, collaboration, and adaptability. In these spaces, learning never stops. Why shouldn't our schools work in the same way?

Defining Innovation . . . Sort of

The word *innovation* is thrown around in education and often hovers in an ambiguous and unclear space: somewhere between a hollow buzzword and a genuinely actionable concept. You might hear or read, "Our school is dedicated to innovation," "We need more innovative lesson plans," or "Let's innovate our approach to . . ." A caveat as we move forward: as we shared in the preface, we won't attempt to provide a single definition for "innovation" in this book—it would be nearly impossible to do and we'd argue that no one is equipped to do so. Still, to ground our journey and move us forward together, let's take a moment to establish some more shared language. We'll start with a balcony view and "big picture." *Innovation*, in most every definition out there, is fundamentally about reimagining what is possible. It's more mindset than materials. It can be the ability to think beyond existing realities, to envision new opportunities, and to visualize, then create, the uncreated.

At its core, innovation involves

- envisioning a future where individuals and communities thrive. It's about first understanding that everyone deserves the chance to thrive. Then, it's about identifying potential where others see obstacles, anticipating future trends and needs, and actually taking action to pave the way for groundbreaking transformations across various fields, industries, disciplines, and spaces. This future-resilient thinking requires navigating (and often silencing) the inner voice of doubt—you may know it as the voice that's long played the role of overly cautious, overzealous guardian and naysayer of our individual and collective imaginations. It requires acknowledging our shared past, critiquing the present, and looking ahead.
- the ability to combine existing concepts, systems, and structures in novel ways; think laterally; and devise new solutions to old problems. This creativity fuels the creation of original ideas and approaches.
- bold, experimental mindset. Innovation demands taking risks, trying new things, and embracing failure as a learning opportunity. This iterative approach is essential for solving complex problems and exploring uncharted territories.
- collaboration. Shared vision and goals unite diverse perspectives, fostering an environment where individuals build on each other's ideas, leading to more comprehensive and impactful solutions in the short and long term.
- challenging the status quo and expanding the boundaries of what technology can achieve. From space travel to the internet to artificial intelligence (AI), innovative thinking has been crucial in turning science fiction into science fact.
- cultivating resilience and adaptability. Innovation enables people and organizations to envision alternative pathways and solutions, ensuring progress even in the face of unexpected challenges.

Understanding, at large, the mindsets, attitudes, and dispositions innovation entails sets the stage for its specific potential in and for education and the action steps we can take to make innovation happen. This is the focus of our shared adventure. Just as innovative thinking catalyzes change and progress in various fields, it holds tremendous potential in transforming the landscape of our schools, classrooms, and pedagogies.

Grounding Innovation in Purpose: The SDGs and ISPs

As we shift from bigger picture to a narrower focus on ourselves and our classrooms, embracing innovation in education today can feel like a balancing act—how, if at all, can we prepare learners for

an uncertain future, while staying anchored to academic expectations and standards today? How do we navigate the big picture *and* the day to day? The answers, we believe, lie in leveraging broader frameworks that provide structure *and* flexibility. This book intentionally draws on two sets of comprehensive standards/goals and practices: the UN Sustainable Development Goals (SDGs; United Nations, n.d.) and the Integrated STEM Practices (ISPs; Jackson et al., 2024a, 2024b; Roberts et al., 2022). Separately they are powerful and compelling. However, when considered together, they create a clearer road map for innovative teaching that meets academic goals while cultivating global awareness and practical problem-solving skills.

THE UN SUSTAINABLE DEVELOPMENT GOALS (SDGs)

Figure Intro.1

Each Symbol Represents a Different SDG Goal, Described Above the Symbol, From Clean Energy to Health and Wellness

Source: istock.com/arucom

The UN SDGs are a set of 17 interconnected goals aimed at solving some of humanity's greatest challenges (a noble and worthy, but obviously difficult, task), from eradicating poverty and hunger to combating climate change and ensuring quality education for all (Figure Intro.1). Although these goals were created with policymakers and global leaders in mind, their relevance in the classroom cannot be overstated. When learners design solutions to local challenges, such as reducing waste or conserving energy, they are contributing to broader goals like SDG 12: Responsible Consumption and Production or SDG 7: Affordable and Clean Energy. The SDGs empower learners to see their work as meaningful on a personal and global scale, connecting everyday learning to the larger landscape.

THE INTEGRATED STEM PRACTICES (ISPs)

The ISPs provide a framework for how learners approach problem solving. These practices are grounded in the principles of STEM but extend far beyond. They emphasize the essential skills learners need to think critically, work collaboratively, and design solutions that are innovative and effective.

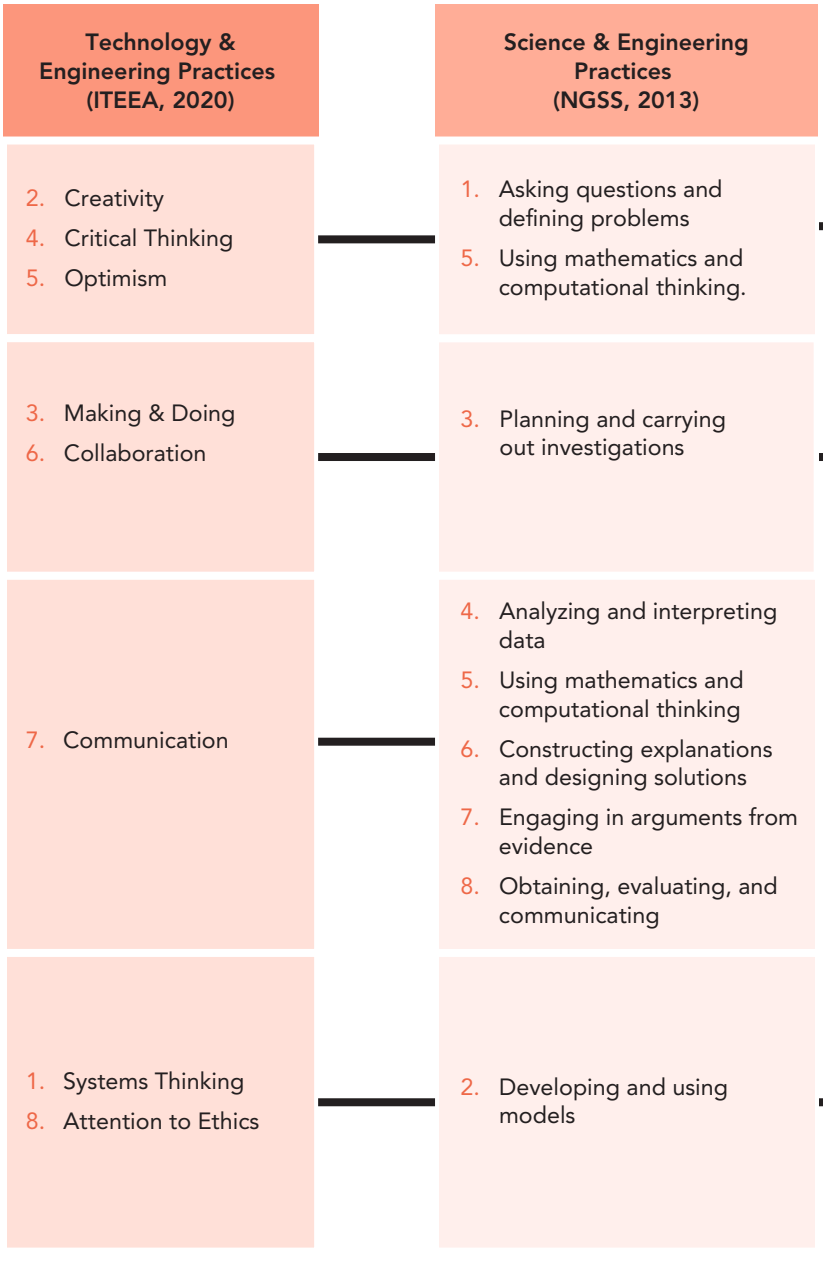
The four ISPs include the following:

1. **Critical and creative thinking to seek solutions:** Helping learners analyze problems, brainstorm possibilities, and evaluate evidence
2. **Collaboration and iterative design:** Encouraging learners to work together, build prototypes, and refine their ideas through feedback
3. **Communicating solutions based on evidence:** Teaching learners to share their findings clearly and persuasively
4. **Recognizing and using real-world structures:** Guiding learners to understand systems and apply that knowledge to solve problems

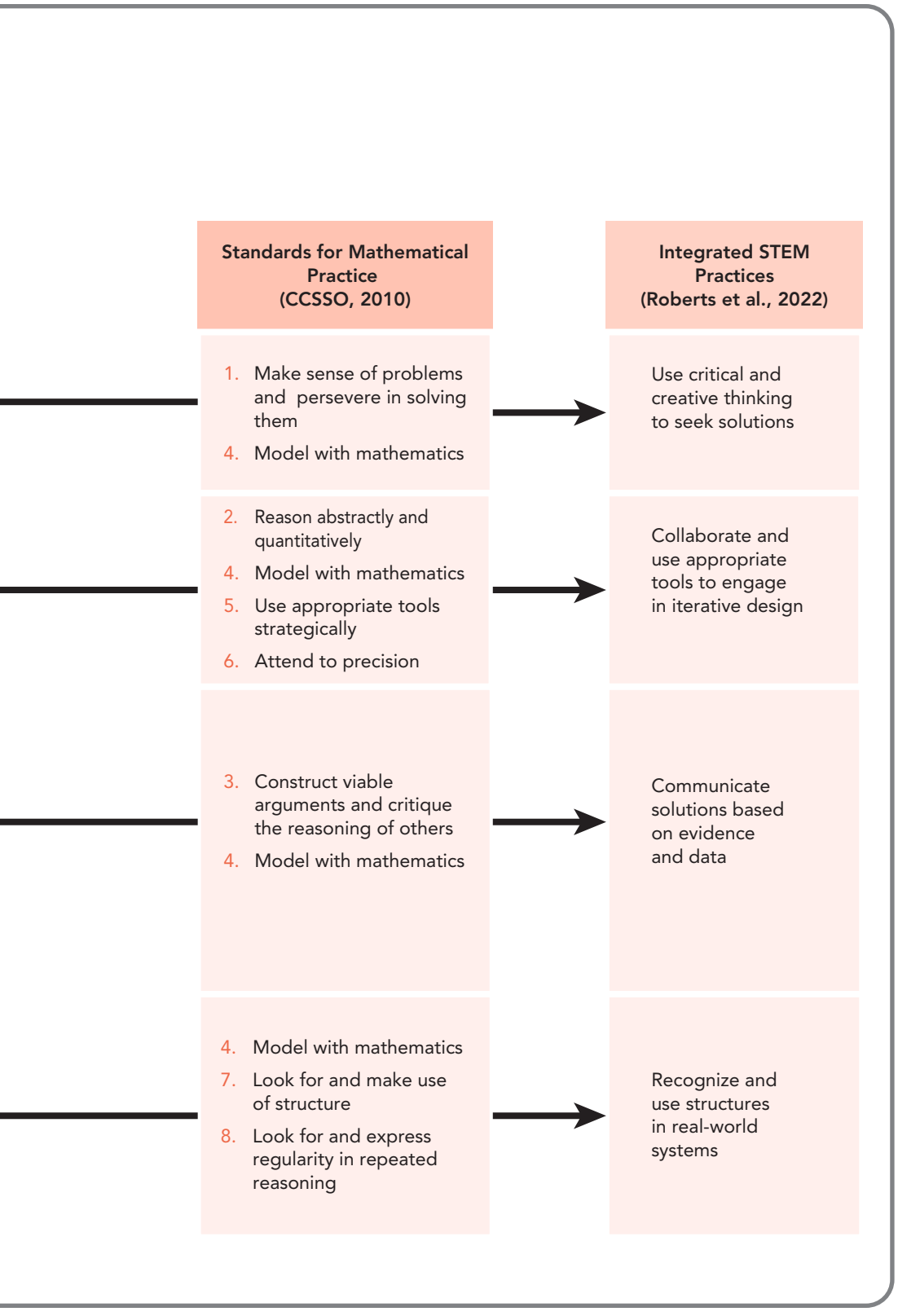
The ISPs (Figure Intro.2) broadly prepare learners for STEM careers and STEM challenges while shaping mindsets for navigating complexity and embracing lifelong learning within and across any discipline (Jackson et al., 2024a; Roberts et al., 2022).

Figure Intro.2

ISPs and Their Connections to Other Standards and Practices



Source: Jackson et al. (2024)



THE CONNECTION BETWEEN THE SDGs AND THE ISPs

Although the SDGs offer a grander vision for a better world, the ISPs provide the tools to help K–8 learners contribute to that vision. Here are some quick examples of how the two sets of ideas might work together in a classroom:

- Designing a water filtration system (ISP: iterative design) aligns with SDG 6: Clean Water and Sanitation by addressing global water access challenges.
- Presenting data on energy-efficient devices (ISP: communicate with evidence) connects to SDG 7: Affordable and Clean Energy, inspiring action on renewable energy solutions.
- Brainstorming solutions to reduce waste in the school cafeteria (ISP: critical thinking) ties directly to SDG 12: Responsible Consumption and Production.

Pairing the SDGs with the ISPs is a way educators can ensure that learning is globally relevant and personally meaningful, which is often the perfect combo for innovation. This alignment shows that innovation doesn't come at the expense of academic standards, but we can reframe standards in ways that inspire creativity and purpose rather than only the passive acquisition of knowledge.

Why This Book Uses Broader Standards

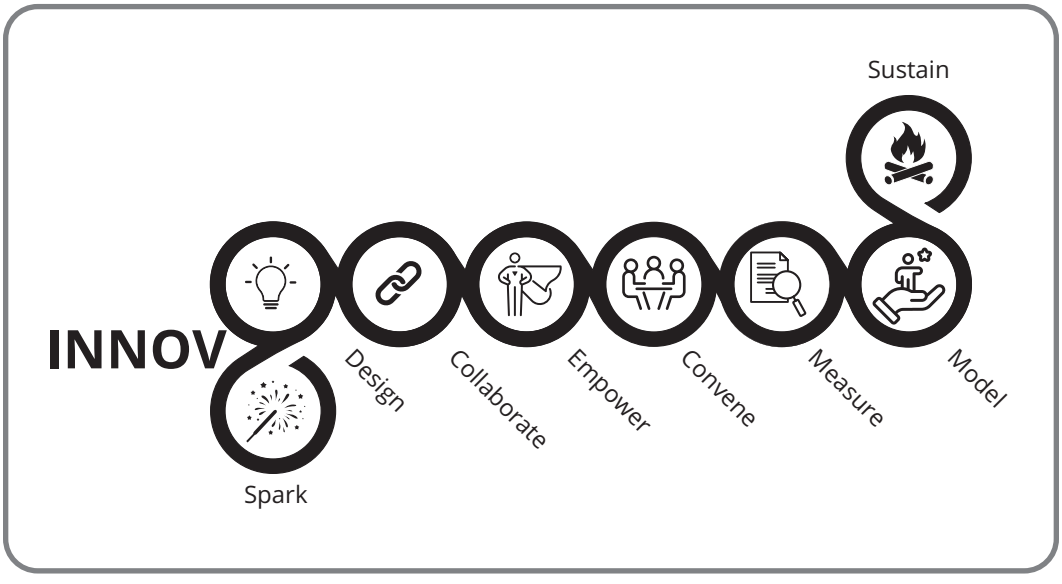
The choice to focus on broader frameworks like the SDGs and ISPs is deliberate. Broader standards provide leverage. They guide the way without dictating the steps. They give educators the flexibility to adapt lessons to their unique classrooms while still encouraging the critical thinking, collaboration, and problem-solving skills learners need to thrive. They also appeal across geographies and resource differences, removing barriers to collaboration and access to innovation.

Broad frameworks also highlight then lift potentially powerful connections. When learners see how their daily classroom activities address global goals or mirror real-world practices, their learning gains a sense of purpose. For example, solving local challenges makes standards like the ISPs tangible and achievable and connecting those solutions to the SDGs shows learners their work matters beyond the classroom.

This book is designed to equip you with tools, ideas, and inspiration to use these flexible frameworks to meet academic requirements and create learning experiences that your learners may find transformative.

Introducing the Innov8 Framework

The Innov8 Framework is at the heart of this book. It's an eight-part guide designed to encourage then equip educators to reimagine their classrooms into innovation ecosystems. The Innov8 Framework is not a linear checklist but rather a continuous and iterative cycle. Each phase informs and builds upon the others, creating a dynamic process of growth and refinement. As you progress through the book, you'll discover how these phases connect and how you can revisit and adapt them to meet the unique needs of your learners, your classroom, or your school. It bridges the gap between "traditional" education, the systems and structures that make up the most common approaches in education today, and the demands of a future outside the classroom space shaped by topics like AI, climate challenges, rapidly shifting industries, and more.



The work is urgent. Today's learners will inherit challenges that demand bold solutions. Innov8 equips educators to prepare learners not just to meet those challenges but to thrive within them and persist through them. What makes Innov8 unique in the landscape of other "how-to," STEM, or innovation/"what's next" books is its general accessibility. Innovation can feel abstract and unattainable (remember, it can live in that ambiguous space) and seems tied to high-tech tools or well-funded or -resourced programs. Innov8 flips this narrative.

The primary misconception is that innovation is synonymous with gadgets and gizmos. Although technology can be a powerful tool for supporting and enhancing innovation, it's not the sole driver of transformative change in education. Admittedly a gadget or two is nice and having access to a 3D printer, for instance, is awesome, but it's only one piece of the puzzle. That 3D printer is certainly a window into what's "next"—rapid prototyping, material science, biomedical engineering, bioprinting, and more. However, innovation isn't the 3D printer—innovation is what you do with the 3D printer . . . how it works . . . who created it . . . for whom . . . why . . . the ethical implications of the tool . . . all the possibilities.

We all must work harder to position our learners to consider these questions and see beyond the shiny. We, too, should resist the urge to become enamored by what's trendy. Within that, we should also acknowledge how hard we work to figure out who *we* are in the story and in the educational landscape. Each phase of the framework corresponds to a role that educators might play (and often do) when innovation calls, from a Visionary to a Lifelong Learner. You'll explore these roles, already found in nonclassroom innovation ecosystems around the world, in-depth throughout the book and uncover how they connect and evolve to support innovative teaching and learning.

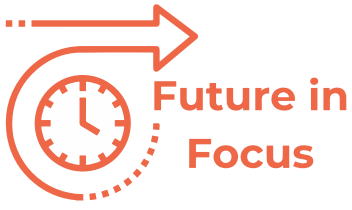
Inspirational Callouts

Here's what you can expect as you engage with the book:

- **Practical Tools:** K–8 step-by-step strategies, rubrics, and frameworks you can apply immediately.
- **Real-World Examples:** Within the chapters, you'll find examples of real-world innovation ecosystems, from which we can pull inspiration or information as we consider the idea that schools themselves can be innovation districts.

- **Reflection Prompts:** Questions to help you connect the content to your own K–8 practice and identify opportunities for growth. We call these moments "Pause with Purpose." You can access digital copies of the prompts through the online companion, available for printing or digital reflection.

- Motivating insights or tips to encourage bold thinking and experimentation K–8—"A Little Spark" that you can try tomorrow. These represent practical, immediate, and classroom-focused ideas that you can apply as soon as possible using your current resources. These focus on igniting curiosity and providing actionable steps within your existing constraints.



- Visionary, future-focused, and aspirational "Future in Focus" callouts paint a picture of how classrooms might evolve in the next decade informed by the educational spaces of today. These inspire you to think big and align your current practices with emerging possibilities. Here's where you'll find an explicit connection to the ISPs and SDGs.

- **Profiles of Innovators:** Stories (and pictures!) of educators who exemplify the principles of innovation in action, folx who have managed to figure out some part of the work and are willing to share with the rest of us. We call these "People in Practice"—*practice* because they continue to do the work and acknowledge the work is constantly evolving.
    - ***Why pictures?*** *Innovation* is a broad term, and often, the people who discover, experiment, design, and innovate are more interesting than the innovations themselves. Throughout this book, you'll notice something unique to our work—pictures of the individuals we profile, as children and as adults. These images are not just for nostalgia; they serve as a powerful reminder of a simple truth: as children, we are often naturally curious, constantly exploring and learning without fear. The individuals profiled in this book have tried to hold onto that childhood curiosity and have allowed it to evolve, using it to fuel their innovative practices today. We share these photos to invite you to reflect on your curiosity journey and how it has shaped and may continue to shape your practice and who you are today.

      We hope these images inspire you to nurture and protect that natural sense of wonder in yourself and the learners around you. Plus, it's fun (sometimes) to look back at the style choices we made as kids!

How to Use This Book

This book isn't meant to be read passively. We invite you to engage, reflect, and act and interact with our companion website—alone or alongside peers, colleagues, or instructional leaders. We suspect you may dog-ear and write in the book—please do! In science and math, for instance, we have the tendency to highlight the neat and tidy product without showing the messy process it took to get there. Innovation is a little chaotic and not so tidy sometimes; a well-worn book is a good thing. You can start at the beginning and follow the parts of the Innov8 Framework in order, or dive into the chapters that resonate most with your current goals and challenges. Throughout the book, you'll find reflective prompts and tools, described before, to help you apply any new or refined learning. Take your time with these. They're designed to spark new ideas and insights. Remember, though each chapter focuses on a specific part, that part is just one phase in the ongoing cycle of innovation. As you work through each chapter, consider how the featured topic connects to the other phases of the Innov8 Framework.

Your Invitation to Innov8

Encouraging innovative thinking isn't just a best practice; it's an ethical responsibility. Fleming (2014) suggested the lack of opportunities for imagination and innovation in education is a crisis, arguing that current approaches often prioritize predictability over creativity and measurable outcomes over meaningful learning. Restoring innovation to the heart of education means shifting from rigid rules and rote memorization to principles and practices that inspire learners to think critically and creatively. This shift doesn't require reinventing the wheel. It starts with small, intentional choices: designing lessons that spark curiosity, creating opportunities for connection and collaboration, and encouraging learners to see challenges as opportunities. By making innovation central to our work, we can help learners not only master content but also see the limitless possibilities of what they can achieve.

As you read, we invite you to think about your own role in shaping the future of education. Where are you now? Where do you want to grow? And how can you use the ideas in this book to create a lasting impact on your learners and your community?

The journey ahead isn't just about what *learners* will ultimately achieve—it's also about you, the educators they'll long remember. Together, let's make classrooms the launchpads for the bold and the curious, ourselves included.

Let's Innov8!

BLUEPRINTS AND BEGINNINGS

CHAPTER 1

The challenges we all face now and in the future demand a different approach to education, an approach that equips K–8 learners with the skills to adapt, collaborate, and create. As we rethink what schools and classrooms can be, existing innovation ecosystem structures and the folx acting within them offer powerful models to guide us.

Understanding Innovation Ecosystems

Innovation ecosystems represent an evolution in how we think about driving forward-thinking resilient growth in our communities. Dynamic physical hubs and districts, often located in city centers, blend the strengths of anchor institutions like universities and hospitals with the entrepreneurial drive of businesses, startups, and community organizations.

Although there are always examples of cross-disciplinary collaboration, historically, innovation has happened in isolated silos, with ideation, research, and production happening in classrooms, labs, and industries operating independently and usually in competition. Innovation ecosystems break down these historical barriers through intentionally designing and programming spaces where ideas flow freely; the idea, along with talent, is nurtured from seed to sprout to blossoming, and cutting-edge research quickly translates into real-world solutions (and ultimately impact).

As a starting example, let's head to Winston-Salem, North Carolina, and visit Innovation Quarter (IQ), as our first innovation district case study. IQ is a tale of transformation and growth that's representative of other innovation ecosystems around the world. It began in the early 1990s as an intentional community-driven effort to repurpose old manufacturing buildings after the closure of R.J. Reynolds Tobacco Company's facilities. Over the years, this intentional reimagining evolved into a more organically connected idea and research park where, among other movements, departments from various academic institutions now collaborate with industry and community partners on projects that range from regenerative

medicine to space science. This district, like so many others, stands as a symbol of physical and infrastructure revitalization as well as mindset shifts in the region, showcasing how intentional efforts around innovation can and necessarily will breathe new life into old structures and old ideas.

IQ isn't alone. It's joined by South Lake Union in Seattle, Washington . . . Science Center in Philadelphia . . . Oxford Road Corridor in Manchester, United Kingdom . . . The Pearl in Charlotte, North Carolina . . . St. Louis, Providence, Detroit, Raleigh-Durham, Glasgow. . . . What makes these "districts" different from other general real estate developments that pop up in a lot of cities or communities? What makes each of them special within this innovation district world? What makes them "good" real-world examples of innovative thinking?

They are truly ecosystems. Like ecosystems in the wild, these innovation districts thrive on interdependence, diversity, and resilience. What sets these ecosystems apart is not simply advanced technology or abundant resources, but intentional structures strategically placed that support creativity and adaptability. Just as a natural ecosystem requires balance and collaboration among its flora and fauna to flourish, these districts rely on the collaboration of folx, organizations, and ideas to fuel innovation. Schools can learn a great deal from these spaces: how to create dynamic environments that function in ways everyone feels empowered to contribute.

As we move forward, consider how the innovation district characteristics that follow might look in your unique educational context. For instance, what does *collaboration* mean in your classroom? How might you encourage creativity and experimentation in your classroom, even with limited resources? By understanding the building blocks of innovation ecosystems and how they might connect to your educational context, we can start to lay the foundation for transforming education at the macro and micro levels.

It's worth noting now and throughout that bringing the characteristics of innovation ecosystems into K–8 classrooms offers exciting possibilities, but not without challenges. Individuals and systemic and systematic pressures can all create barriers to building truly innovative learning environments. However, by understanding challenges and working collaboratively to address them, we can create schools that lean into creativity, collaboration, and adaptability. We hope that throughout you'll find tips that help you navigate some of the challenges ahead; however, when we are ready to sustain our innovative work in Chapter 10, we'll add some more tips about navigating barriers.

So, here's an ongoing task as you read: Pay close attention to how each of the following characteristics of innovation districts shape the actions, decisions, and successes of our featured educators and learners that we'll share as "People in Practice" in each chapter. Then, consider how you might apply these insights in your own work.

1. Collaborative Spaces

Innovation districts are built around collaborative spaces (physical and virtual hubs) where individuals and teams come together to solve problems, share ideas, and cocreate.

- **Quick Connect to Your Context:** K–8 classrooms can emulate collaborative spaces by adopting flexible layouts, shared workstations, and breakout areas that encourage teamwork and cross-disciplinary exploration.
- **Example:** Learners in a middle school science class redesign their lab space to include group workstations and digital collaboration tools, encouraging joint experiments and brainstorming.
- **Look For It:** How do collaborative spaces transform the experiences of learners and teachers in the featured profiles?

2. Diversity of Expertise

In innovation ecosystems, professionals from various fields (science, art, business, technology) bring unique perspectives to intentional efforts that fuel creativity.

- **Quick Connect to Your Context:** Schools can cultivate diversity of expertise by integrating cross-curricular projects and inviting industry professionals and experts to mentor learners.
- **Example:** A fourth-grade team leans into "STEAM Week" where learners collaborate on a project that involves interacting with teachers from art, engineering, and technology disciplines, blending expert skills to mentor learners as they create a functional prototype.
- **Look for It:** Notice how diverse expertise sparks new ways of thinking and problem solving in the profiles shared.

3. Incubator and Accelerator Models

Innovation districts intentionally support startups through incubators and accelerators, providing resources, mentorship, and space to develop and scale ideas.

- **Quick Connect to Your Context:** Schools can adopt this model by creating "idea labs" where learners can develop projects, receive feedback, and iterate on their work.
- **Example:** A middle school sets up a project incubator where learners pitch ideas for community improvement, get mentorship from local leaders, and develop real-world solutions.
- **Look for It:** How do educators serve as incubators for their learners' ideas in the profiles?

4. Community Engagement

Community is at the heart of innovation ecosystems. Partnerships with local organizations, businesses, and residents ensure relevance and real-world impact.

- **Quick Connect to Your Context:** Schools can become community hubs by partnering with local organizations to create experiential learning opportunities.
- **Example:** A middle school partners with a local hospital to create a health sciences pathway alongside a high school, allowing learners to learn from medical professionals.
- **Look for It:** Notice the impact of community engagement on learners and their work.

5. Technology and Infrastructure

Cutting-edge technology and infrastructure are the backbone of innovation districts, enabling seamless collaboration and creativity.

- **Quick Connect to Your Context:** Schools can integrate technology not as an add-on but as a core tool for learning, connecting learners to global resources and networks.

- **Example:** A second-grade classroom leverages augmented reality/virtual reality (AR/VR) to explore historical landmarks virtually, breaking down geographical barriers and enriching the curriculum.
- **Look for It:** How is technology used to expand possibilities and connections in the profiles?

6. Sustainability and Inclusivity

Innovation ecosystems prioritize sustainability (meeting the needs of the present without compromising the ability of future learners to meet their own needs) and inclusivity to ensure long-term impact and equitable access.

- **Quick Connect to Your Context:** Schools can embed long-term vision into their culture and operations while carefully and thoughtfully designing programs that are accessible to all learners.
- **Example:** A middle school revamps their afterschool programming and implements a long-term vision to offer an after-school coding club specifically designed to seek out young women interested in computer science.
- **Look for It:** Observe how inclusive practices and sustainability are woven into educational approaches.

7. Continuous Learning and Adaptation

Innovation districts thrive on a mindset of continuous improvement, driven by a loop of feedback, data, and fueled by a willingness to pivot.

- **Quick Connect to Your Context:** Schools can create a culture of learning by encouraging teachers and learners to view feedback as an essential part of growth.
- **Example:** Teachers codesign lessons with learners, identify success criteria alongside learners, and iterate based on feedback and outcomes to improve engagement and understanding.
- **Look for It:** How do continuous learning and adaptation shape the growth of educators and learners in the profile examples?

8. Networking and Mentorship

Innovation ecosystems flourish through intentional networking and mentorship programs that connect emerging talent with seasoned professionals.

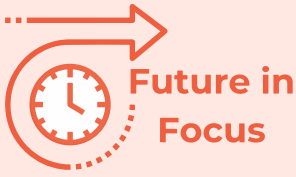
- **Quick Connect to Your Context:** Schools can create mentorship opportunities for learners by connecting them with industry professionals, school alumni, and community leaders.
- **Example:** A seventh-grade teacher pairs learners with local entrepreneurs for monthly mentorship meetings, inspiring career exploration and personal growth.
- **Look for It:** Where do mentorship and networking drive transformative outcomes in the stories shared?

Ignite!

One little spark of inspiration can change a lot. Invite your learners to look for sparks around them. Encourage them to take a walk through your school or neighborhood and view the spaces through a new lens: innovation. What do they notice? Maybe it's the library, a place where learners gather to learn. Maybe it's the playground, a place full of laughter and creativity, or the school garden, a place quietly transforming sunlight into food. Ask them to consider the technology they use every day; those who inspire them at home, in the community, or school; or the ideas that spark their curiosity.

Challenge your learners to see their everyday spaces and tools they use through a fresh lens. Could their cafeteria become a place for designing solutions to reduce waste? Might the school parking lot transform into a solar-powered charging station? Could the library evolve into the hub of a new community makerspace?

Have your learners document their observations: what spaces *already* connect folx, support solving problems, or improve lives? Then, guide learners to think about what's missing. What could make these places more vibrant, inclusive, or innovative? By the end of this simple exploration, your learners will begin to see all the possibilities, recognizing that innovation doesn't always mean creating something new; it often starts by uncovering the untapped potential in what's already there.



Welcome to 2035!

A spark can create a bonfire. Picture this: Just ten years ago in 2025, these fifth-grade learners might have been learning from textbooks and working on static projects. Now, their classroom is a living, breathing hub of innovation, connected to the pulse of their community and the world beyond. In just ten years, neighborhoods around this school have transformed into special "innovation districts," their school blends with greenspace, coworking hubs dot the landscape and most folx are within walking distance to one another and all they need in a community that deeply reflects the needs and strengths of the folx who live here. All around is creativity and energy.

In class today, these fifth graders collaborate across continents, designing solutions to a global challenge in real time. A virtual exchange with a class in Brazil reveals how their rainforest restoration project has inspired similar initiatives around the world. AI tools help learners refine their ideas, the AI coach providing real-world data. In fourth grade, these same learners designed a vertical garden that was installed downtown and now provides fresh produce to hundreds of families.

In a decade, education has evolved to meet the future head on. Problems that once seemed insurmountable in 2025—climate change, food insecurity, and access to clean water—are now fully integrated into the curriculum as challenges for K–8 learners to solve. The content reveals itself through doing. Learners are no longer passive recipients of knowledge; they are changemakers. Learners dream big, knowing their ideas will be shared with city planners who've learned to value the bold creativity of young minds, just like the vertical garden and now the rainforest project. Just a decade ago, these might have been dismissed as only "school projects." Now, this work is simply a part of how communities grow, one idea at a time, led by young adults. This is the promise of a decade and a single spark: when innovation is nurtured with intentionality and passion, connections deepen, ideas flourish, and tomorrow becomes brighter than we ever imagined. ●

Looking Back

As you reflect on the start of our journey, consider the following questions:

1. How has your understanding of innovation ecosystems evolved after reading this chapter?

(Continued)

(Continued)

2. What connections can you draw between the characteristics of innovation ecosystems and your current classroom practices?
3. Which characteristics of innovation ecosystems (e.g., collaborative spaces, inclusivity, continuous learning) resonate most with your current teaching philosophy, and why?
4. What is one tangible change you can make to create an environment in your classroom that mirrors an innovation ecosystem?
5. How do you envision integrating broader frameworks like the SDGs and ISPs into your daily teaching to inspire learners and encourage purpose-driven innovation?

By answering these questions, you can gain valuable insights into your progress and identify areas for further exploration. Remember, the journey to innovation is ongoing. There is always more to learn, more to explore, and more to create!

Before we look ahead, let's anchor our thinking in a final reflection for this chapter. Use the tool template in Table 1.1 as a guide. For each topic we covered in this chapter, think about your thinking—what did you think before? What do you think now?

Table 1.1

Reflection Tool

	I used to think . . .	Now I think . . .
Innovation Ecosystems		
Collaborative Spaces		
Diversity of Expertise		
Incubator & Accelerator Models		
Community Engagement		

	I used to think . . .	Now I think . . .
Technology & Infrastructure		
Sustainability & Inclusivity		
Continuous Learning & Adaptation		
Networking & Mentorship		

online resources You can access digital copies of the reflection tool through the online companion, available for printing or digital reflection at **https://companion.corwin.com/courses/SparkingInnovationThroughSTEM**

Looking Ahead

Innovation districts teach us that transformation starts with the decision to be intentional. These districts remind us that thriving systems of change don't happen by chance; they are built on a foundation of collaboration, adaptability, and continuous growth. The same can be true for our schools and classrooms. But knowing the "why" of innovation isn't enough; we also need a "how." How do we bring these principles to life in the education space more fully? How do we transform our classrooms into ecosystems of creativity and impact?

Tomorrow is closer than we think, and there's no time to waste—let's get started!