



EMERALD POINTS

MAKER PEDAGOGY

A Paradigm for Teaching,
Learning, and Leading in the
Modern School

BRIDGET LOONEY



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MAKER PEDAGOGY: A PARADIGM FOR TEACHING, LEARNING, AND LEADING IN THE MODERN SCHOOL

BY

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INVESTOR IN PEOPLE

*For Mom and Dad
and all of my cats*

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INTRODUCTION

This book proposes maker pedagogy as a mainstream paradigm for teaching, learning, and school leadership, taking schools beyond the traditional transmission model of education to a more dynamic, student-centered approach that aligns with the evolving needs of learners in the 21st century.

In today's rapidly changing global society, education faces numerous challenges, including the digital divide, equity concerns, and the increasing influence of artificial intelligence. The current educational landscape, particularly in countries like the U.S. with its emphasis on standardized testing and knowledge transmission, often fails to adequately prepare students for the complexities of modern life. Maker pedagogy offers a solution by fostering knowledge transfer, creativity, problem-solving skills, and self-directed learning, which are crucial for success in an increasingly automated and technologically advanced world.

This book distinguishes itself from previous works on makerspaces and maker education by presenting maker pedagogy as a holistic framework for learning across the entire K-12 curriculum, rather than as an add-on or specialized program. It draws on empirical research to demonstrate how teachers have successfully implemented maker pedagogy in practice, providing concrete examples of both achievements and challenges.

Central to maker pedagogy is the recognition of students' innate curiosity and capacity for learning. By emphasizing hands-on experiences, creative problem-solving, and interdisciplinary connections, this approach aligns more closely with how children naturally interact with and make sense of the world. It promotes the development of multiple literacies – including STEM skills – as everyday, practical, contextually relevant tools, helping to broaden participation and reduce barriers to engagement with these domains. By supporting students in applying background knowledge in context-rich design tasks, maker pedagogy strengthens the conceptual foundations that support reading comprehension and disciplinary literacy.

Moreover, maker pedagogy addresses the growing disconnect between traditional schooling and the realities of learning in the digital age. As children

and adults increasingly turn to online resources and social media for self-directed learning, schools must adapt to foster independence, adaptability, and critical thinking skills. This approach not only prepares students for a future where continuous learning and innovation are essential but also recognizes and builds upon the entrepreneurial capabilities that many young people are already demonstrating outside of formal educational settings.

By reimagining the roles of teachers, students, and school leaders, maker pedagogy promotes a more democratic and equitable educational environment. It challenges the existing social hierarchies built on traditional notions of knowledge as wealth, instead valuing creative and investigative capital. This shift is particularly relevant in light of recent societal changes, including the rise of AI and evolving perspectives on equity in education.

Maker Pedagogy: A Paradigm for Teaching, Learning, and Leading in the Modern School offers a timely and necessary exploration of how education can evolve to meet the needs of today's learners. By presenting a research-based, comprehensive approach to integrating maker principles across the curriculum, this book provides educators, policymakers, and researchers with valuable insights into creating more engaging, relevant, and effective learning environments for all students.

STRUCTURE OF THE BOOK

Part I of this book builds a foundation for understanding maker pedagogy as a new paradigm for teaching and learning that better serves students in today's world. This section serves as a prelude to teacher case studies and practical applications of maker pedagogy discussed later. By analyzing the foundational concepts of maker pedagogy, the aim is to contextualize how these ideas manifest in classrooms and relate to broader educational and societal trends.

Chapter 1 introduces the makerspace as a participatory environment where hands-on exploration, collaborative learning, and community engagement come together. It examines the materials and tools makers use and how they invite iterative problem-solving and embodied engagement with ideas. This chapter will emphasize the social and material dimensions of making, highlighting how these aspects foster a sense of belonging and community among learners.

Chapter 2 contextualizes maker pedagogy within the framework of rapid technological and societal changes that necessitate a shift to more adaptive, student-directed approaches. To articulate how maker pedagogy represents a timely paradigm for teaching and learning, this chapter will provide examples

of how maker pedagogy invites learners to engage with ideas and materials in open-ended ways that support critical thinking, creative sense-making, and embodied inquiry.

The chapter also addresses the historical origins of the Maker Movement, illustrating how its evolution and promotion have inspired contemporary teaching practices. By grounding the discussion in theoretical and practical frameworks, it sets the stage for case studies of teachers who have embraced maker pedagogy, as explored in Parts II and III.

Ultimately, Part I invites teachers, school leaders, policymakers, and scholars to reconsider teaching and learning possibilities in the 21st century. By understanding the foundational principles of maker pedagogy, stakeholders can appreciate its potential to engage students in meaningful, hands-on learning experiences that empower them as active participants in their educational journeys.

Building on the rationale for implementing maker pedagogy in schools that is explored in Part I, Part II focuses on the experiences of teachers in suburban New Jersey schools who practice maker pedagogy in their classrooms. Integrating maker pedagogy into a structured K-12 environment presents unique challenges, requiring teachers to balance their teaching philosophies with the demands of their teaching contexts. This section, which includes Chapters 3–5, draws from ethnographic research on teachers implementing maker pedagogy in elementary and middle school classrooms. It features case studies of three teachers – Mary, Sandra, and Eli – each working in a different type of school. These cases highlight how each teacher adapted maker pedagogy to their discipline, grade-level range, and school environment. Mary and Sandra, public school teachers, also factored state educational policy into their approach. The cases explore what motivated these teachers to adopt maker pedagogy, the values shaping their approaches, and contextual factors influencing their decisions.

Each case study begins with a snapshot of the teacher interacting with students. Background information about the school context, the teacher's position, and professional journey offers insight into how their identity and experiences inform practices. Each case concludes with key findings, elucidating how teacher identity, values, and resilience influence their persistence with maker pedagogy.

Part II examines the constraints of working within formal school environments, where routines, structures, policies, and power dynamics can limit flexibility typically associated with makerspaces. It investigates how these constraints create tensions for teachers and students, shaping teaching and learning, while also exploring how students and teachers adaptively navigate materials, tools, and classroom dynamics.

These case studies are illustrative examples of how teachers creatively adapted maker pedagogy to their different school and classroom contexts. By showcasing the ingenuity and perseverance of these teachers as they navigated systemic constraints, this section foregrounds the concept of *contact zones* within schools – spaces of negotiation between collaborative learning and institutional norms. Each teacher’s story reveals the importance of responsiveness, sustained effort, and improvisational engagement in shaping learning experiences for students.

The case studies were designed using Yin’s (2017) case study model. Data analysis was informed by a sociocultural framework including Discourse theory (Gee, 2014), self-authoring theory (Bakhtin & Holquist, 1981), history-in-person theory (Holland & Lave, 2001), and grammar of schooling theory (Tyack & Tobin, 1994).

James Gee’s (2017) Discourse theory explains how communities of practice form. Gee posited that a Discourse exerts a normative influence supporting essential socio-linguistic and sociological functions, such as the socially-networked ‘storage’ of collective knowledge and induction of new members. This framework was applied to examine how teachers conceptualized maker pedagogy in relation to traditional K-12 teaching methods. Bakhtin (Bakhtin & Holquist, 1981) focused on the individual’s relationship to Discourses. Using “authority” instead of “Discourse,” Bakhtin acknowledged the conforming aims and purposes of authorities while emphasizing the natural human compulsion to respond to an authority – and any other messages from the social world – with a point of view. Bakhtin contended that by interacting with the social world, one authors it and oneself; within the dialogical relationship between individual and authority, both evolve (Holquist, 1983). Bakhtin’s self-authoring, developed into a theory in Holland et al. (1998), illuminated how teachers’ identities as makers influenced decision-making in the classroom and within school and state policy contexts.

History-in-Person theory (Holland & Lave, 2001) emphasizes the relationship between broader historical and cultural formations that live on within a person, engaging in contentious social practices, and identity development. Contentious, or socially-contested, practices lack legitimacy and pose a threat to the reputations of individuals and organizations (Gonsalves, 2020). Holland and Lave (2001) described how taking part in contentious local practices can reshape one’s participation and identity through evolving, embodied engagement with one’s sociocultural environment. History-in-person theory provided a framework to understand how teachers responded to the nested pressures of their school context, K-12 education, and the Maker Movement, potentially acting as agents of change. Tyack and Tobin’s (1994)

grammar of schooling theory helped make sense of similarities in teaching practices across schools by suggesting that there are institutionalized structures and practices that cut across all K-12 schools. It posits that society associates “school” with characteristics of the early educational institutions established over a century ago, including the physical attributes and activities occurring within a school. These theoretical frameworks shed light on how teachers used their developing identities as makers to navigate constraints imposed on maker pedagogy by the conforming nature of teaching, the school context, and the state educational policy environment. While this book draws primarily on a sociocultural analysis, it also gestures toward an enactivist perspective – particularly in how it reconsiders agency, identity, and creativity not as fixed attributes but as emergent through participation, interaction, and embodied engagement. This shift reflects an evolving understanding to be explored more fully in future research.

In Part III of this examination of maker pedagogy, the focus shifts from teachers’ individual experiences to broader challenges and opportunities related to spread and scale of maker pedagogy in a school. Building upon findings from the lived experiences of Mary, Sandra, and Eli in Part II, this last section of the book analyzes how organizational factors influence spread and sustainability of maker pedagogy.

Coburn’s multidimensional framework for scaling educational innovations provides a lens for analyzing key factors such as depth, sustainability, spread, and shifts in ownership. Through this framework, common patterns across the experiences of the three teachers are identified, highlighting conditions that support or hinder the growth of maker pedagogy.

Coburn’s framework also enables examination of tensions between maker pedagogy and traditional school practices. Mary, Sandra, and Eli’s stories highlight the need for supportive leadership, communities of practice, and flexible school structures that can accommodate the dynamic nature of making.

Part III calls on school leaders and policymakers to view maker pedagogy as a paradigm shift that is capable of reshaping school culture, routines, and leadership practices.

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PART I

UNDERSTANDING MAKER PEDAGOGY: FOUNDATIONS AND CONTEXT