MARTHA STONE WISKE
with KRISTI RENNEBOHM FRANZ *and* LISA BREIT

Teaching for Understanding with Technology

Contents

Part Two: The Elements of the Teaching for Understanding Framework

“At last, a book written with the practitioner in mind. *Teaching for Understanding with Technology* will serve as an invaluable guide for educators everywhere. The authors speak in real terms, through the eyes of real students and teachers. The vignettes show how technology can empower and motivate both student and teacher. As a principal and instructional manager, I see this book as a must-have blueprint for all educators. I intend to purchase a copy for every staff member in my building.”

Mary Skipper, headmaster, TechBoston Academy, Dorchester, Massachusetts

“If you have any doubts about the way in which technology can enrich the learning of all students, you are holding the book you need to read. Stone details the ways in which Kristi is reinventing learning in the age of technology and explains why this approach is so essential. What is remarkable is that when you treat first graders like graduate students they end up acting like them.”

Margaret Riel, senior researcher, Center for Technology in Learning SRI, and visiting professor, Pepperdine University

“This book is about translation and transformation, using the new technologies to improve teaching and learning. It demonstrates how these new technologies, essential ingredients in education in the twenty-first century, can support teachers as they refine their practice, and make learning a deeper and more lasting experience students learn to understand. The book makes an elegant case for the appropriate and informed use of technology in our schools.”

Isa Kaftal Zimmerman, director, Technology in Education Program, Lesley University

“This book is needed so that all educators will understand how to use the power of technology to propel teaching

and student learning. Teachers need to understand how to create classroom projects with technology that build on the students' interests and extend those interests by having students communicating and collaborating with peers around the globe. This book can help teachers break through the barriers of integrating technology into their curriculum. Classrooms can then become learning environments where students reach out to their world and find their place in it."

Katherine Law, Seattle public school teacher and lead educational technologist

Teaching for Understanding with Technology

Martha Stone Wiske
with Kristi Rennebohm Franz and Lisa Breit

JOSSEY-BASS
A Wiley Imprint
www.josseybass.com

Published by Jossey-Bass

A Wiley Imprint

989 Market Street, San Francisco, CA 94103-1741
www.josseybass.com

ISBN 0-7879-7230-4

Cataloging-in-Publication Data available upon request.

Preface

The need for good public education has never been greater than in today's complex, interdependent, and rapidly changing world. At the same time, pressures on schoolteachers and administrators have rarely been as intense. Educators need ways to specify clear goals and to coordinate their efforts coherently to help all students succeed. New information and communication technologies can be valuable resources in developing effective strategies for promoting ambitious learning in public education. This book presents a detailed language and a practical structure —the Teaching for Understanding framework—for guiding educators through the maelstrom of competing pressures toward effective teaching and learning with new technologies.

Background of the Problem

Policymakers and politicians, business leaders and parents, educational researchers and developers—all have their own particular and often competing expectations for educators and schools. They expect schools to

- Provide access to opportunity for *every* student to develop his or her full potential
- Differentiate instruction to meet all students' needs, with extra help for those who have fallen behind and special enrichment for students who are already advanced beyond their peers
- Transmit the legacies of multiple cultures

- Cover a required curriculum that encompasses vast amounts of information
- Prepare all students to pass standardized tests (whose items may not correlate with the endorsed curriculum standards)
- Develop students' ability to think critically, apply their knowledge in the world, and be continuing learners
- Enable students to succeed in the modern workplace[1]
- Produce citizens who will sustain local and global communities

All these stakeholders ply the schools with often incoherent and incompatible combinations of requirements, resources, constraints, and complaints.

Addressing these multiple agendas has always challenged and frustrated educators. During periods of rapid change, like the present, both the imperatives and the difficulties for providing excellent public education become even more intense. Astonishing technological developments during the past century have transformed the nature of knowledge and work, the speed of travel and communication, modes of warfare, and humanity's impact on the planet. All of these conditions make access to high-quality learning essential for all people. Economic development, international peace, democratic government, and preservation of the global environment all depend on universal education. Furthermore, traditional basic education in the three R's of reading, writing, and 'rithmetic is nowhere near adequate for modern conditions. Nor is traditional instruction, with teachers leading rows of students through standard curriculum materials, sufficient to prepare today's students to succeed as stewards of tomorrow's world. Teachers must be supported in their efforts to teach new curricula, using new methods and new technologies, to a newly diverse range of students.

In the face of competing agendas and mounting pressures, how can teachers make responsible choices as they design lessons and orchestrate learning with their students? How should school administrators establish priorities, design structures, and foster an organizational culture that galvanizes all members of a school community in a focused and sustained pursuit of coherent goals? How might policymakers, business leaders, and supporters of public education make contributions that truly help school people meet the challenges and serve the purposes of public education in these complex times? How can new technologies support these processes? Educators do not agree on the answers to these questions. They don’t even share a common language for articulating their own answers or forging them into a coherent plan.

What This Book Is About

This book outlines a coherent process to help educators address these questions. The Teaching for Understanding framework is distilled from years of analysis by researchers at the Harvard Graduate School of Education, in collaboration with reflective schoolteachers working in a range of subject matters and settings. The elements of the framework guide deliberate decisions about fundamental issues that all educators must resolve. These include framing curriculum topics, defining educational goals, designing learning activities, integrating coherent and effective assessments, developing supportive learning communities, and integrating new technologies to improve learning.

The framework does not supply particular answers, but it helps decision makers involved in all sorts of educational contexts develop effective strategies for their own particular circumstances; it is applicable for all subject matters, ages of learners, and types of settings. Classroom teachers, principals, curriculum planners, technology specialists, policymakers, teacher educators, university professors, corporate trainers, business leaders, researchers, parents, and philanthropists can apply it to their work. In so doing, they learn how to clarify, negotiate, and coordinate their efforts in ways that integrate new educational technologies to advance teaching and learning for understanding.

The book is organized to help a broad range of readers understand the underlying principles behind this model and learn to use it to help guide their work. Chapter One introduces the five elements of the Teaching for Understanding framework: (1) generative curriculum topics, (2) understanding goals, (3) performances of understanding, (4) ongoing assessment, and (5) collaborative, reflective

learning communities. It also describes how these elements fit together as a coherent guide for educators.

Chapter Two explains how this framework and new educational technologies can be effectively coordinated to improve student performance around key learning goals.

Each of the next five chapters concentrates on one element of the framework, elaborating on the key features of the element and illustrating how teachers can use it to guide their integration of new technologies and promote students' learning. The case studies are drawn from one author's extensive experience as a classroom teacher and from all the authors' consultation with a wide range of educators over many years. The examples reveal how teachers make choices as they plan curricula that integrate new technologies, assemble the materials and assistance they need, manage their classroom activities, and develop relationships with colleagues and collaborators within and beyond their school. Most of the examples deal with students in K–12 classrooms, but some vignettes illustrate how this approach works with other learners, including postsecondary students and teachers themselves. In all the examples, the central goal is to advance learners' understanding and their ability to apply knowledge in their lives.

Chapter Eight describes how educators learn to apply the framework to their own practice. It illustrates how the framework itself can be explicitly applied and modeled in designing professional development to support teaching for understanding with new technologies. The examples in this chapter are based on the authors' experience teaching graduate courses and leading professional development for educators, both in on-line courses and in on-site sessions.

The urgent rationale for taking action and some guidance for doing so are summarized in Chapter Nine. Thoughtfully integrating new technologies to help students develop

flexible and creative understanding is a complex process that requires sustained inquiry and collaboration among professional communities of educators and between schools and their surrounding communities. This ongoing process depends on coordinated support from policymakers, educational administrators, professional developers, and teacher educators.

Why This Book Is Needed Now

People in schools, as well as those who hope to support them, must respond to the urgent need for improved public education. All young people must now be educated in ways that enable them to be responsible citizens of the planet and of their local communities—a new kind of citizenship. The times generate crushing pressures on educators, with broad mandates to serve increasingly diverse student populations, narrowly focused accountability measures, and often chaotic administrative contexts in which contradictory policies generate competition for resources. Yet these times also provide new opportunities, including an emerging consensus about the nature of effective learning and increasing access to new technologies that support such learning. Teachers must be helped to perform in ways that go far beyond traditional conceptions of delivering instruction. Educational technologies can be used to promote the kinds of learning and teaching that today's world requires. These goals are challenging, but they must be accomplished.

The Authors' Ongoing Collaborative Inquiry

For the past two decades, the authors have worked to improve public education with new technologies in numerous ways—as researchers, professional developers, teacher educators, technology-integration specialists, and classroom teachers. Firsthand experience has revealed both

the challenges and the benefits of transforming educational practice from an emphasis on transmitting knowledge to constructing understanding, from isolation and competition to interaction and collaboration, and from trivial or distracting uses of technologies to applications that profoundly enrich and extend learning. Experience has also demonstrated the value of the Teaching for Understanding framework for guiding the thoughtful use of new technologies to support effective education.

The authors' understanding has evolved over decades of educational research, conducted both independently and during several periods of collaboration. Stone Wiske has worked for over twenty years at the Harvard Graduate School of Education. At Harvard's Educational Technology Center, she directed collaborative research about ways to use technologies to improve the teaching and learning of important topics—sometimes called targets of difficulty—in mathematics, computing, and science. She also worked with colleagues from Harvard's Project Zero for over ten years on a project that developed the Teaching for Understanding framework that forms much of the conceptual foundation underlying this book. Wiske conducts research and teaches graduate courses about educational design that integrates new technologies and focuses on teaching for understanding. Since the mid-1990s, she has developed and studied ways of using networked technologies to connect educational research with practice. This work includes a professional development program that uses the Internet to engage educators in interactive professional communities of inquiry aimed at improving public education.

Kristi Rennebohm Franz began teaching in 1989, with a commitment to creating classrooms in which even primary-grade school children would learn to become responsible and productive citizens by connecting their schoolwork to authentic problems in the local and global community. Her

goals have always encompassed not only ensuring that her students learn *what* they need to know but also *how* they develop enduring understanding that they can apply appropriately in the world and *why* this is important.

Beginning in the 1993–94 academic year, Franz started integrating new technologies into her classroom to promote more effective collaboration between her classroom and other teachers, students, and resources in the world. She was among the first elementary teachers to join a global education network called iEARN (the International Education and Resource Network), through which her classes participated in a number of collaborative projects, with remarkable social and civic results.

Franz was a visiting scholar at Harvard in 1997; her goal was to clarify and articulate how new technologies can provide profound educational leverage in her classroom. She knew that her young students were making academic progress and learning how to be responsible global citizens in ways that far surpassed most people's expectations for K–2 students. She believed that new technologies were partly responsible, but she lacked a framework and a group of colleagues to help formulate and test her hypotheses. Wiske and Rennebohm Franz found that the Teaching for Understanding framework provided a set of concepts and a common language for mapping connections among their goals, practices, and insights.

Lisa Breit directed a multiyear program to integrate educational technologies into teachers' practice in the Watertown, Massachusetts, schools. Beginning in 2002, her doctoral work at the Harvard Graduate School of Education focused on teachers as instructional leaders, with an emphasis on the use of new technologies to support both teachers' learning and their work with students.

Through many conversations and much collaborative teaching, the three authors refined their conception of the

Teaching for Understanding framework, designed and described classroom practices that specifically highlight elements of the framework, and synthesized recommendations for putting these approaches into practice. They have applied these ideas with a wide range of learners, including school children in all grades, graduate students, beginning and veteran teachers, teacher educators, and educational leaders and policymakers. These experiences demonstrate that collaboration and conversation structured by a shared language based on an explicit educational model help educators design and refine ways of using new technologies to improve teaching for understanding. Changing teaching practice is a gradual process that must be supported through cycles of trying an innovative approach, analyzing how and why it worked, devising refinements, and working through the cycle again. All of this is difficult to accomplish alone. It benefits from just the sort of reflective, collaborative dialogue with like-minded colleagues that has generated this book.

This book can help educators promote cycles of innovation, dialogue, and inquiry toward teaching for understanding. Such inquiry is endangered by the current context of competing political priorities and intense pressures to hold teachers and students accountable using overly narrow measures of student performance. Professional inquiry is threatened by a welter of incoherent mandates and by autocratic insistence on standardized procedures for achieving limited objectives. We hope to support professional collaboration that is coherent, that generates clear evidence of improvement in teaching practice and student performance, and that engages teachers and other educators in nourishing and fruitful inquiry.

How to Use This Book

Instead of prescribing specific answers to key questions about education, the framework presented here provides a clear, cogent, and practical structure to help educators make their own decisions. The framework helps educators address mandated curriculum and assessment priorities while honoring their own expertise. The tone and form of the book reflect the authors' dual commitment to research-based principles and time-tested practices. The combination of clear criteria and vivid cases can help educators see how to apply this framework in their own situations, taking into account their particular preferences, priorities, learners, and circumstances. Although most of the examples are drawn from schools, this approach is applicable in all kinds of educational settings, both formal and informal, with any subject matter and for all kinds of learners.

The goal of this book is not simply to present a set of useful concepts but to stimulate educators to apply these ideas in ways that improve teaching and learning, thus generating both success and satisfaction for teachers and their students. Effective designs for learning do not result from replicating "best practices" or dutifully following a recipe. They always require a degree of invention, interpretation, and adaptation by thoughtful teachers attuned to the particular demands and opportunities of their own situation.

So why offer people a book, knowing that reading about ideas is not sufficient to enable educators to accomplish ongoing inquiry and significant change in daily practice? The hope is that readers will use the book while participating in a community of other people who are interested in collaborating with them to think and work with these ideas. Such groups might be formed within schools or professional associations, at universities, or through collaborations

across organizations. The book may provide useful guidance for teacher study groups,[2] leaders of staff development and curriculum design, coordinators of educational technology, teacher educators, and others engaged in systematic school improvement.

Ideally, as readers work through this book, they will take time to try out new strategies, such as drafting policies, revising curriculum, designing lesson plans, or applying new pedagogical strategies. Under such circumstances, the book can become a working guide by which to structure ongoing collegial reflection and dialogue on questions about teaching: How might I apply this idea in my situation? What did you try? How did it go? What might we do next? In light of this experience, now what do you think about this framework?

Additional resources and structures are available to help educators apply the approach outlined in this book. The case studies and vignettes throughout the book refer to a range of print materials and Web sites that teachers may find helpful. Chapter Eight includes extensive descriptions of interactive on-line resources and professional development activities designed specifically to support teaching for understanding with new technologies. Readers who might want to use these resources to design curriculum or take on-line courses about these ideas may want to read Chapter Eight first.

• • •

In all these endeavors, a continual process of considering new educational ideas and principles, translating them into terms that make sense in one’s own circumstances, developing a plan based on this thinking, trying out the new approach, and reflecting on the results is essential. Each of these steps benefits from collaboration and dialogue with colleagues who share common goals and a common

language for discussing teaching practice. We hope this book stimulates and supports collaborative, reflective communities of educators committed to ongoing inquiry and invention.

Cambridge, Massachusetts *Stone Wiske*
May 2004

NOTES

1. For a recent summary of what business leaders, policymakers, and educators think students need to know to succeed, see *Learning for the 21st Century,* published in 2003 by the Partnership for 21st Century Skills, downloaded from http://www.21stcenturyskills.org/downloads/P21_Report.pdf on April 26, 2004.

2. The process of lesson study, as carried out by teachers in Japanese schools, would be an excellent structure for making sense of this book. For a description of this process, see *The Teaching Gap: Best Ideas from the World's Teachers for Improving Education in the Classroom* (Stigler, J. W., and Hiebert, J. New York: Free Press, 1999).

Acknowledgments

This book synthesizes more than twenty years of learning that was spurred on by too many colleagues to thank individually. So I will mention only those whose ideas were especially influential in shaping my understanding.

At the Educational Technology Center at the Harvard Graduate School of Education, Judah Schwartz, Greg Jackson, and Charles Thompson first introduced me to ways of thinking about the potential of new technologies to improve teaching and learning of important "targets of difficulty." David Perkins also shaped my thinking in those days and taught by example how to develop ideas in groups. He, along with Howard Gardner and Vito Perrone, were the guiding minds behind the Teaching for Understanding project. They and other colleagues, especially Lois Hetland and Joan Sobel, were especially important in stimulating my understanding of the framework developed by the Teaching for Understanding project through years of collaboration among teachers and researchers.

Connecting the ideas developed at the Educational Technology Center with those formulated through the Teaching for Understanding project is an ongoing endeavor, which I have pursued for the past decade. During that time, Jim Moore, Donily Corr, Susan Wirsig, Mindy Sick Munger, Shannon Martin Croft, Cheryl Campbell, and Heidi Soule have been especially thoughtful and generous in helping me see how to make sense of these ideas and to apply them effectively in teaching. Using on-line technologies to support this work has been my focus during the past five years at the WIDE World (Wide-scale Interactive Development for Educators) project with David Perkins and Nathan Finch,

among many other remarkably creative and dedicated colleagues.

Integrating these strands of work into a clear, vivid, and useful form is the goal of this book. Kristi Rennebohm Franz has been a powerhouse of inspiration, support, and encouragement for this process. Her brilliance as a teacher is captivating, her determination to analyze good teaching is incessant, and her generosity as a collaborator is unbounded. We have discussed all the ideas in this book; many of them originated with her, and she has read every page through several drafts. Through all this dialogue, Kristi's good spirit, excellent mind, and deep devotion to humanity supplied both momentum and meticulous care. Kristi provided all the material for the case studies of her practice in Pullman, Washington. Lisa Breit, another bountifully thoughtful educator, joined our conversation during the past two years and has added sparkle, breadth of experience, and her own special enthusiasm to the endeavor. Lisa wrote the vignettes that portray teaching for understanding with new technologies.

Many other creative teachers have shared their ideas and experiences with practical examples that illustrate the themes of this book. They include Marta Liebedinsky, Cesar Nunes, Mary Teixiera, Lisa Martinez, Scott Weatherford, Audrey Ting, Miranda Whitmore, Janet Jehle, Patricia Norris, Amy Fritz, Kate Paterson, Beth-Ann Keane, Linnie Regan, Monica Hiller, Lisa McDonagh, Ellen Fitanidies, Katie Beller, Allison Levit, Linda Picceri, Wendy Hankins, and Bernie Dodge.

Several especially generous colleagues read an early draft of this book and offered astute advice about how to improve it: Robert Reich, Milton Chen, Margaret Riel, Les Foltos, Adriana Villela, Ed Gragert, Mary Skipper, and Kathy Klock. Lesley Iura, my editor at Jossey-Bass, has been a steady source of good suggestions and encouragement about this

work. Linda Chisom has provided administrative support with unfailing good cheer and sound judgment. I have tried to heed the excellent recommendations of these wise readers, but any remaining mistakes or flaws are my responsibility. To all of these teachers and collaborators, I extend my deep appreciation and my hope that you will find your own good work carried along through these pages.

The Authors

Martha Stone Wiske is a lecturer at the Harvard Graduate School of Education where she codirected the Educational Technology Center from 1997–2003. She teaches, conducts collaborative research, and consults with educators both nationally and internationally, with a focus on the integration of new technology to enhance teaching and learning. Her projects include the Education with New Technologies Web site at http://learnweb.harvard.edu/ent and an on-line professional development program called WIDE World (Wide-scale Interactive Development for Educators at http://wideworld.pz.harvard.edu). WIDE World applies educational research to improve teaching practice through a range of on-line programs and on-site professional development activities for educators.

Wiske edited *Teaching for Understanding: Linking Research with Practice* (Jossey-Bass, 1998). She is cofounder of ECi (Education, Communication, and Information at http://www.open.ac.uk/eci), a journal for international dialogue about new developments in educational theory, practice, and technology.

Kristi Rennebohm Franz, a Washington State teacher, has designed and implemented curricula with new technologies that connect school communities worldwide. Her classroom teaching and contributions to education have been recognized with the Peace Corps's Paul D. Coverdell World Wise Schools Excellence in Education Award, the Presidential Award for Excellence in Teaching Science, the Milken Educator Award, and the Washington State University Dr. Martin Luther King Jr. "Keeping the Dream Alive" Award, a Scholastic Blue Ribbon Website Award, and by the International Reading Association. Her classroom teaching