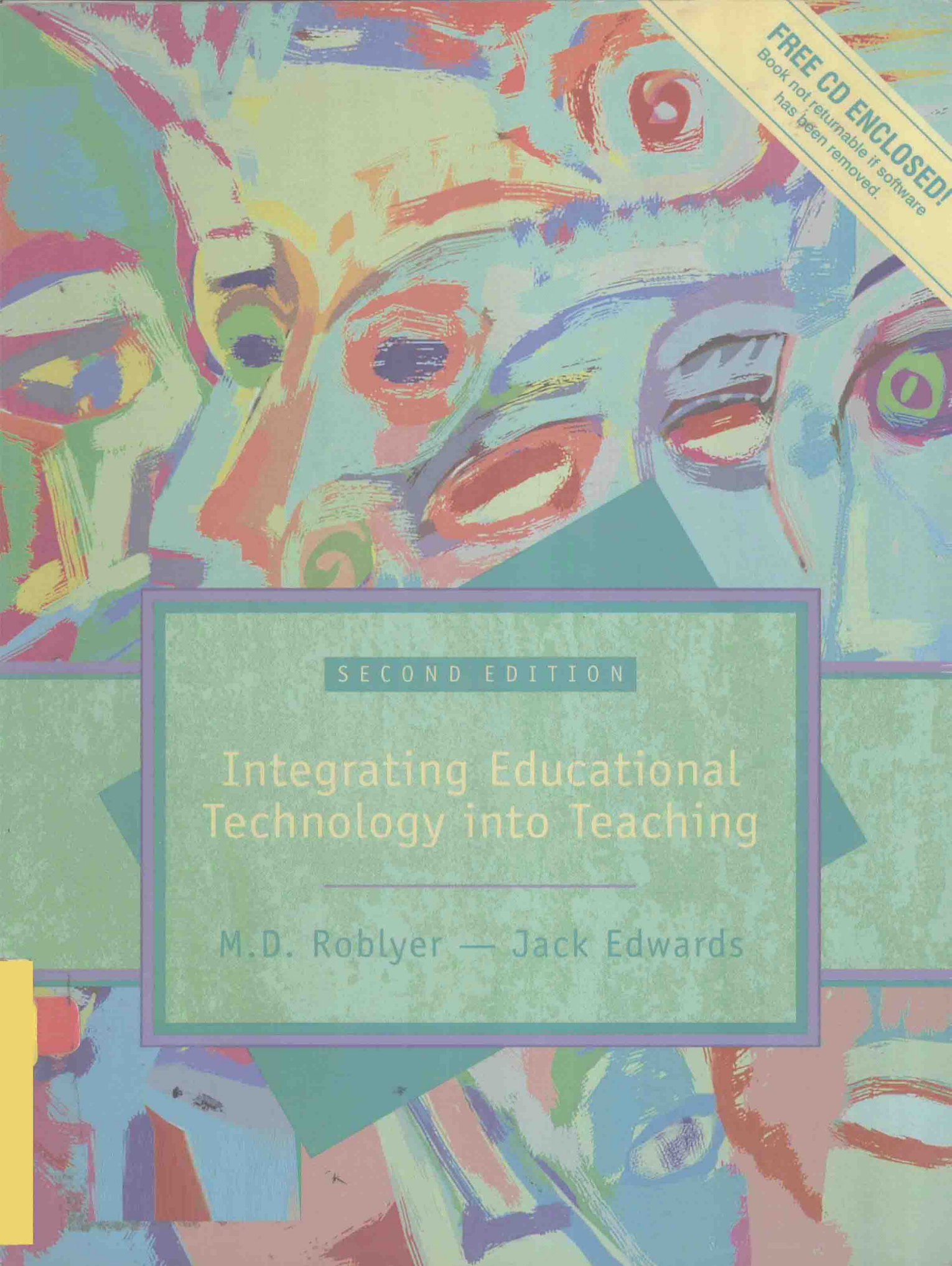
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SECOND EDITION
Integrating Educational Technology into Teaching
M.D. Roblyer — Jack Edwards

Integrating Educational Technology into Teaching

Second Edition

M. D. Roblyer
The State University of West Georgia

Jack Edwards
The Webster School

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To Bill and Paige Wiencke,
two of my best and most patient teachers

–M.D.R.

To Robert W. Edwards, in memory of Mary E. Edwards,
and to Jordan M. Burke

–J.E.

Preface

"Come to the edge," he said.
They said, "We are afraid."
"Come to the edge," he said.
They came.
He pushed them.

And they flew.

Apollinaire, as quoted by Elliot W. Eisner in *Educational Researcher* (August–September, 1997)

As we stand at the edge of this new millennium, gazing out into its uncharted expanse, some of us feel as if we are stepping out onto a launching pad; others feel at the brink of an abyss. Some see the challenges and the marvels to come and are exhilarated; some see only the certainty of change and its uncertain outcomes and are apprehensive. How amazing it is that the influence of technology is a primary force shaping both perspectives. All of us recognize the vital role computers and other electronic tools have played in bringing us to the place where we stand now. But our views on what technology means to us as a society and what our responses to it should be differ primarily because of the way we define technology, our views on who controls how technology is used in education, and our knowledge about teaching.

- **The way we define technology.** Rather than seeing technology as some foreign invader that has come to confuse and complicate the simple life of the past, educators must recognize that our technology is very much *our own response* to overcoming obstacles that stand in the way of a better, more productive way of life. As Walt Kelly's "profound 'possum" Pogo said, "We has met the enemy, and he is us." *Technology is us*—our tools, our methods, and our own creative attempts to solve problems in our environment. We are the culprit responsible for the turmoil we experience as we go through periods of transition, adapting to the new environment we ourselves have created.
- **Our views on who controls how technology is used in education.** As a follow-up to our recognition that "technology is us," we must recognize the truth of Peter Drucker's statement: "The best way to predict the future is to create it." Both individual teachers and teaching organizations must see themselves as shapers of our future. Each teacher must take a position on what the future of education should look like; each should acquire skills to help work toward realizing that vision.
- **Our knowledge about teaching.** No matter how much we know about how to use technology tools, educational practice never will improve unless we have clear goals for what teaching and learning should accomplish and we see the path we want to take to achieve them. Technology-using teachers never can be a force for improved education unless they are first and foremost informed, knowledgeable shapers of their craft. Before integrating technology into their teaching, educators must know a great deal, for example, about why there are different views on appropriate teaching strategies, how societal factors and learning theories have shaped these views, and how each strategy can address differing needs.

The purpose of this book is to show that whether we fall or fly into the future of educational technology rests to a great degree on us: how we view technology, how we respond to the challenge it presents, and how we see it helping us accomplish our own informed

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vision of what teaching and learning should be. Our approach to accomplishing this purpose rests on the following three premises.

- **Integration methods should be based both in learning theory and teaching practice.** There is no shortage of innovative ideas in the field of instructional technology—new and interesting methods come forward about as often as new and improved gadgets. Those who would build on the knowledge of the past should know why they do what they do as well as how to do it. Thus, we have linked various technology-based integration strategies to well-researched theories of learning, and we have illustrated them with examples of successful practices based on these theories.
- **Integration should match specific teaching and learning needs.** Technology has the power to improve teaching and learning, but it can also make a teacher's life more complicated. Therefore, each resource should be examined for its unique qualities and its potential benefits for teachers and students. Teachers should not use a tool simply because it is new and available—each integration strategy should be matched to a recognized need. We do not oppose experimentation, but we do advocate informed use.
- **Old integration strategies are not necessarily bad; new strategies are not necessarily good.** As technology products change and evolve at lightning speed, there is a decided tendency toward throwing out older teaching methods with the older machines. Sometimes this is a good idea; sometimes it would be a shame. Each of the integration strategies recommended in this book is based on methods with proven usefulness to teachers and students. Some of the strategies are based on directed methods that have been used for some time; other strategies are based on the newer, constructivist learning models. Each is recommended on the basis of its usefulness rather than its age.

This edition differs in some structural ways from the first, but its goal remains the same: *to help teachers see their role in shaping the future of technology in education.* This book can help them perceive that stepping out from the edge where we stand requires some faith in ourselves, a belief that we can fly with wings of our own making.

Who Will Find This Book Helpful

This book is designed to help teach both theoretical and practical characteristics of technology integration strategies. It should be useful in several different types of education settings:

- **As primary instructional material.** It should benefit instructional technology courses for preservice teachers and workshops and graduate courses for inservice teachers.
- **As supplemental instructional material.** It should support research and content-area methods courses.
- **As a reference.** It should provide topical information in K–12 school libraries/media centers and university college of education libraries and media centers.

New to This Edition

This edition has added new information and reorganized some information from the first edition to help make sense of both new and emerging concepts. Readers will note the following changes and improvements:

- **More emphasis on integration rationales and strategies.** Chapter 2 has more detailed information on integration steps, and Chapter 3 has additional discussion on learning theory (e.g., Howard Gardner's Theory of Multiple Intelligences) and integration procedures based on them. Much of the background information on computers and technical information on microcomputers

has been de-emphasized to better focus on integration. For example, sections on hardware and software were moved to the Appendix.

- **Better, more in-depth treatment of emerging technologies.** This edition has expanded coverage of new and emerging technologies and how they will help shape the future of education.
- **Expanded coverage of distance learning.** In light of the growing importance of distance learning in education and training, this edition has two chapters in this area: one on distance learning options and the other focusing on the Internet.
- **Addition of integration strategies for health and physical education.** In response to many reviewers' requests, a new Chapter 14 addresses integration strategies for these important content areas.
- **Links to integration lesson plans on a CD-ROM database.** This textbook is packaged with a CD-ROM containing 250 example technology integration lesson plans. Spanning a variety of content areas and grade levels, these teacher-tested lessons are keyed to national standards. Users can modify existing lesson plans or add new ones. Look for the CD-ROM icon throughout the text. A User's Guide to the CD-ROM starts on page 347.
- **Companion Web site.** A Web site with additional support materials for students and instructors is available at http://www.prenhall.com/roblyer. The Web site includes chapter objectives, online quizzes with immediate feedback, links to related Web sites, a message board, an online syllabus manager, and other exciting tools. Look for the companion Web site icon at the end of each chapter.

Organization of the Text

This text is organized into four sections—one of background and three of resources and applications.

Part I: Introduction and Background on Integrating Technology in Education. Einstein is said to have observed that "Everything should be made as simple as possible, but not more so." Using technology as a force for change becomes simpler when one understands the foundations upon which integration strategies are based—but that is no small task in itself. This section provides a "big picture" background on technology's role in education, reviews a variety of planning issues to be addressed prior to and during integration, and describes learning theories and teaching/learning models related to technology integration.

Part II: Using Software and Media Tutors and Tools: Principles and Strategies. To paraphrase a popular jingle, "Software—it ain't just CAI anymore." This section describes more than 40 types of instructional software products ranging from drill and practice to integrated learning systems, from word processing to groupware. Multimedia and hypermedia are now in this section, since they fit so well under the rubric of tools. Each software and media product description covers unique qualities, potential benefits, and sample integration strategies.

Part III: Linking to Learn—Principles and Strategies. This section represents the most significant revision from the first edition. In light of the growing importance of connecting people and resources for a technology-permeated future, two chapters are devoted to the types and uses of distance technologies. As with Part II, example lesson plans or activities are given for each recommended integration strategy. Chapter 9 provides a "link to the future," courtesy of William R. Wiencke, in describing technologies that are changing the way members of our society live, work, and communicate.

Part IV: Integrating Technology into the Curriculum. These six chapters describe and give examples of technology resources and integration strategies for several different content areas. In addition to a new chapter on health and physical education, content areas covered in the first edition have been updated: language arts and foreign languages, math and science, social sciences, the arts, and special education. Although these chapters separate the areas into topics, the chapters themselves recognize and incorporate the current trends toward thematic, interdisciplinary instruction. Many of the examples cross discipline boundaries and serve to illustrate how the concepts of several content areas can be merged into a single lesson or learning activity—and how technology can support the process.

Special Features

Each chapter has the following features to help both the instructor and the student.

- **A list of descriptive topics and objectives.** This list appears at the beginning of each chapter.
- **Illustrative screens.** Figures show screen displays from software, media, and networks whenever possible.
- **Summary tables of important information.** These aid recall and analysis.
- **Sample, teacher-designed lesson plans.** All from published sources, these materials match integration strategies. Links also are given to information on a companion Web site and on the lesson plan CD-ROM, *Integrating Technology Across the Curriculum.*
- **Exercises.** Improved end-of-chapter questions, many of them linked to the companion Web site and CD-ROM, call for students to analyze and apply what they have read to problems in education and in applying technology.
- **A list of sample resources.** References for further reading end each chapter.

Instructors also have access to two additional resources:

- **A comprehensive Instructor's Manual.** The manual contains content overviews, teaching strategies and activities, and additional resources (including a list of Web sites).
- **A computerized Test Bank.** Available for either Windows or Macintosh, the Test Bank includes a variety of question formats, such as true-false, multiple choice, short answer, and essay.

Acknowledgments

The first thing we would like to acknowledge is that this second edition was not—as we had been promised—easier to write than the first. If anything, it was more difficult! Educational technology not only is changing rapidly, it's expanding quickly. It is an even more challenging task to capture and communicate its scope and essence than it was in 1996. However, several people helped us meet this challenge.

The following reviewers provided insightful and practical critiques and advice, all of which helped us clarify our prose and sharpen our focus: Diane F. Cauble, Catawba College; Michelle Churma, Ashland University; Farah Fisher, California State University, Dominguez Hills; Sarah Huyvaert, Eastern Michigan University; Kathleen P. King, Widener University/Pennsylvania Institute of Technology; and Decker Walker, Stanford University.

Colleagues like Anita Best of ISTE; Donna Baumbach and Mary Bird at the University of Central Florida; Richard A. Smith of the Houston Independent School District; Melinda Crowley of the Florida Department of Education; and Ronnie Akers, Diane Boothe, Judy Butler, Letty Ekhaml, Elizabeth Kirby, Karen Lee, Angela Lumpkin, Lisa Marcotte, Barbara McKenzie, Mary Ann Myers, Elaine Roberts, and Joanne Schick from the State University of West Georgia responded graciously and quickly to our requests for articles, sources, and advice. Thanks also to Nicole Stewart, Meg Cooper, Tiffani Hines, Richard Logan, and Lisa Marcotte for their last-minute help with our photo shoots. As before, we must acknowledge the wisdom of a saying in special education that "people don't care how much you know until they know how much you care." The field of educational technology—indeed, education itself—is fortunate to have such knowledgeable and caring professionals.

We would like to acknowledge the assistance of many people whom we have never met but who took time from busy schedules to send a photo or give permission to use a diagram. Among them are Sandra Powell of Texas Instruments, Yvonne Ruwe of the American Education Company, and Dawn Torre of Vernier Software.

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As before, we would like to thank our families for taking second place for so many weekends and holidays while we dedicated the time and work required to accomplish this "little revision." M. D. Roblyer would like to recognize the enduring love and patience of her family, Bill and Paige Wiencke and Tom and Becky Kelley; the tenacious loyalty of old friends like Barbara Hansen and Sherry Alter; and the support offered by new friends and colleagues like Cher Chester, Elizabeth Kirby, Letty Ekhaml, Barbara McKenzie, Mary Ann Myers, Priscilla Bennett, and Laurie Tennant at the State University of West Georgia. Jack Edwards would like to recognize the special support given by colleagues Mary Lou Beverly and Scarlet Harriss; his father, Robert W. Edwards; and his son, Jordan M. Burke. Also, we would like to continue to remember and acknowledge the enduring contributions of those who are with us now only in memory: S. L. Roblyer, Raymond and Marjorie Wiencke, and Mary E. Edwards.

And, as always, we must recognize the contributions of all the educators who have worked so long and so hard to make it possible for us to wing our way into the next century with a renewed sense of purpose, direction, and courage.

M. D. Roblyer
Carrollton, Georgia

Jack Edwards
St. Augustine, Florida

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- **Web Destinations**—links to www sites that relate to chapter content

To take advantage of these and other resources, please visit the *Integrating Educational Technology into Teaching* Companion Web Site at http://www.prenhall.com/roblyer.

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About the Authors

M. D. Roblyer has been a technology-using teacher and a contributor to the field of educational technology for over 25 years. She began her exploration of technology's benefits for teaching in 1971 as a graduate student at one of the country's first successful instructional computer training sites, Pennsylvania State University, where she helped author tutorial literacy lessons in Coursewriter II on an IBM 1500 dedicated instructional mainframe. While obtaining a Ph.D. in Instructional Systems at Florida State University, she worked on several major courseware development and training projects with Control Data Corporation's PLATO system. After working as Instructional Technology Coordinator for the Florida Educational Computing Project (the predecessor of what is now the state's Bureau of Educational Technology), she became a private consultant, working for companies such as Random House and the Apple Computer Company. In 1981–82, she designed one of the early microcomputer software series, *Grammar Problems for Practice,* in conjunction with the Milliken Publishing Company.

She has written extensively and served as contributing editor for educational technology publications such *Educational Technology* and *Learning and Leading with Technology.* Her book with Castine and King, *Assessing the Impact of Computer-based Instruction: A Review of Research* (Haworth, 1988), is widely considered the most comprehensive review and meta-analysis ever written on the effects of computer technology on learning.

Currently, she is Professor of Educational Technology at the University of West Georgia's College of Education in Carrollton, Georgia, where she teaches graduate courses in technology, instructional design, and diffusion of innovation. She is married to William R. Wiencke and is the mother of a daughter, Paige.

Jack Edwards has been using instructional technology in his classroom since 1988 when he was hired to teach gifted students at the Webster School in St. Augustine, Florida. In that same year, the Webster School was selected to be one of the Florida Department of Education's five Model Technology Schools. In 1990, he was one of 28 teachers from Florida selected to spend the summer at the Florida Institute of Technology participating in the Florida Science Videodisc Project.

Edwards has trained thousands of Florida teachers over the past 10 years. His training experience includes spending three years as a teacher-on-special-assignment with the University of Central Florida's Instructional Technology Resource Center. During that time he traveled throughout Florida consulting with school districts and teachers on strategies for technology integration.

Edwards also served as the lead faculty member for instructional technology with the University of North Florida's First Coast Urban Academy from 1993 to 1995. This academy served as a catalyst for initiating systemic change in seven inner-city schools. He is former president of the Florida Association for Computers in Education (FACE), a state affiliate of the International Society for Technology in Education (ISTE).

In addition to teaching fifth grade gifted students, Edwards is also an instructor at St. Johns River Community College in St. Augustine. He resides in St. Augustine with his son, Jordan, and his boxer, Kozmo.

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