DOCUMENT RESUME

ED 448 415 CS 014 184

AUTHOR Potter, Rosemary Lee
TITLE Technical Reading in the Middle School. Fastback 456.
INSTITUTION Phi Delta Kappa Educational Foundation, Bloomington, IN.
ISBN ISBN-0-87367-656-4
PUB DATE 1999-00-00
NOTE 60p.
AVAILABLE FROM Phi Delta Kappa International, 408 N. Union, P.O. Box 789, Bloomington, IN 47402-0789. Tel: 800-766-1156 (Toll Free); Web site: http://www.pdkintl.org.
PUB TYPE Guides - Classroom - Teacher (052) -- Opinion Papers (120)
EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Classroom Techniques; Futures (of Society); Middle Schools; *Reading Instruction; *Reading Skills; *Reading Strategies; Student Needs
IDENTIFIERS *Course Development

ABSTRACT

The world of the 21st century demands relevance in learning, consumer wisdom, technological skills, and, above all, the ability to read precisely and well. A new course of reading instruction--matched to the goals, needs, and interests of the middle school learner--is "technical reading." This fastback shares 3 years' experience of preparing for and teaching technical reading to seventh graders. It is divided into the following sections: Introduction; Technical Reading: What and Why (Reading in School and Workplace; Reading for Safety, Economic, and Career Information); Technical Reading: Course Designer Questions (Matching Existing Requirements; Considering Age-Level Interests, Needs, and Relevancy; Balancing Scope and Sequence); Class Components, Materials, and Activities (Choosing Matching Materials; Planning the Activities); Getting Started (Announcing the New Class; Working with Colleagues; Day-to-Day Operations; Evaluation and Grading); Special Features (Interdisciplinary Components; Projects; Gaming as Learning; Court Day; Rethinking "Extra" Credit); What We Learned (Student Class Evaluations; The Student-Parent Letter Connection); and Conclusion and Recommendations (Recommendations for Teaching Technical Reading). (Contains 17 resources arranged according to the units of the Tech Reading class.) (NKA)

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456 FASTBACK

Technical Reading in the Middle School

Rosemary Lee Potter

PHI DELTA KAPPA EDUCATIONAL FOUNDATION

Rosemary Lee Potter

Rosemary Lee Potter, a veteran of 37 years of classroom teaching, has spent the last 20 years integrating reading instruction with technology — television, computers, and telecommunications. She designed, implemented, and revised the technical reading program that is the subject of this fastback.

Potter also is a college recertification instructor, an education consultant, a newspaper columnist, and a freelance writer. She writes for professional journals, has authored two textbooks, and has co-authored numerous educational materials. This is her fourth fastback; her third was 355 *Using Telecommunications in Middle School Reading*.

Potter is a long-time member of the Clearwater-St. Petersburg Chapter of Phi Delta Kappa International and is a Phi Delta Kappa Educational Foundation Author Seminar-Lecturer.

Series Editor, Donovan R. Walling

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by
Rosemary Lee Potter

ISBN 0-87367-656-4

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Introduction

One September in the late 1990s new students sauntered into my reading classes to begin their mandated first semester, half-year course in seventh-grade reading. It was very apparent they were not looking forward to the task. There were the telling anticipatory murmurs of "borrring," some eye-rolling. The first students in the room clustered at the tables farthest from me. Chatting stretched to the very last echoes of the bell; and then ,very reluctantly, attention was turned my way.

In my school district, every seventh-grader takes reading. Therefore each of my classes was a very diverse group: some very able readers, some with reading disabilities, but most students likely to voice, "I can read already. Duh! So why am I in here?"

What would it take to get these students raring to attend class, perched on the edges of their seats, and challenging themselves to read better? Moreover, what would it take to prepare these young people for the practical reading that 21st century parents, school boards, communities, and employers expect?

There is a promising, beginning package of strategies with built-in dynamic motivation with which to address

societal needs. This bold new course of reading instruction — matched to the goals, needs, and interests of the middle school learner — is "technical reading."

Technical reading in middle school? Surely *that* kind of reading belongs in technical or vocational training and, at the very earliest, in high school. Middle school teachers might cry aghast, "What!? Shelve my dependable literary approach using beloved novels?"

But our mandate was clear: Explore different methods and materials; design, develop, and teach the first middle school technical reading course. Our reading supervisor and administrator encouraged us to just "Do it!"

This fastback shares our first three years' experience preparing for and teaching technical reading to seventh-graders. I hope that what my colleagues and I learned will provide some preliminary leads and cautions for educators who are seriously considering changing the nature of reading instruction in middle school.

Technical Reading: What and Why

We began with a working definition of technical reading as it might be applied to middle school:

> Technical reading is reading with understanding and efficiency the specific, practical information found in workplace manuals, consumer guides, safety instructions, assembly directions, and nonfiction materials. It includes the conscious application of appropriate reading comprehension and pace strategies to the solution of real problems. Such reading is rigorous, relevant, interdisciplinary, and inherently enjoyable.

Reading in School and Workplace

The joke goes that if you want your VCR timer set, ask a kid. But the directions are right there for the reading. So why are they not being read? Kids *can* set the VCR timer, but only because they may have more experience with electronics than some adults, not because they read the directions.

Often appliances, tools, electronic devices, and toys are torn from their boxes, plugged in, and expected to

perform instantly. And most of the time they do. People say, "I'll read the directions if I need them." In fact, this behavior is encouraged by manufacturers, who sometimes write directions in technical terms that most readers find obscure or confusing.

Here's the education paradox. Just when the idea of actually reading instructions has become humorous, devalued, seen as almost unnecessary, and so nearly abandoned in everyday life, the lack of this skill is turning up as a disability in the American marketplace. For example, employers report that data-entry personnel show lack of experience in reading precise directions or detailed information. At the same time, employees express impatience at, if not disdain for, this requirement.

Middle school students' need for future workplace reading skills is not the chief concern. Instead, the problem is that the students' current "workplace," the classroom, suffers from the larger societal avoidance of reading and failure to read precise information. All teachers see this when students turn in faulty work based on inaccurate reading of assignments, when students fail to follow written direction, or when they discount essential details when they read. Students often do not understand that strategic reading tools can save them time and help them learn.

Students need to learn when to apply such specific reading strategies as reading a chart to determine which consumer goods have the best rating, deciding logical key words to access an online index, adjusting pace and direction to locate information in an article, and accomplishing a sequence of tasks. Students often cannot ac-

quire such strategies without specific instruction; and failure to acquire these strategies can lead to distraction and lack of interest in reading, attitudes that become habitual if not corrected in school.

Reading for Safety, Economic, and Career Information

No less important than academic achievement are matters related to students' protection and preparation. These areas — understanding safety information, preparing to deal with money sensibly, and exploring career options — are entirely appropriate for middle school instruction. All three areas require precise reading, hold high academic possibilities for writing and discussion, and guarantee relevancy. Yet, while recreational safety, economic wisdom, and career awareness might be of high value to students, these areas currently are barely addressed in middle school.

Thus the rationale of the new seventh-grade technical reading course was that 1) technical reading skills are needed for both classroom and workplace achievement and 2) students at this instructional level need to know protective, preparatory information that often is provided in technical form. Our goal was to select relevant, high-interest components, information, and materials so that students would want to acquire the necessary strategic reading skills.

Technical Reading: Course Designer Questions

Only late spring and summer were available to get the new course planned and materials ordered. But this schedule is not unusual in school curriculum planning. Fortunately, there were plenty of suggestions and help. The language arts faculty, especially those teaching both reading and language arts as separate classes, hoped for a new, distinctly different sort of reading class. There had been some instructional overlap, particularly in the use of novels, though great care had been taken to avoid duplication of titles by teachers or across grades. However, book reports about novels and other literature assignments were included in both reading and language arts classes, and this repetition had been pointed out by parents and students alike.

We tried to define a distinctive body of information, materials, and assignments that would be unlike the language arts class that seventh-graders would be taking at the same time. The nature and emphasis of technical reading ensured that the selection of content,

materials, assignments, and activities differed from those in place in the other classes.

Matching Existing Requirements

Class requirements for reading already were in place at both district and state levels. Certain performance standards set expectations for every student. Therefore most of our planning involved Florida State's *Blueprint 2000* plan, specifically Goal 3 and Working Assumption 7: "Performance standards should be designed so that students may go beyond them by broadening the learning areas with which the standards are applied." While the nine standards we selected below are paraphrased, each standard was integral to the plan for the technical reading class. We chose not to focus on all of the standards.

- Standard 1: Access and use of information.
- Standard 2: Communication of information.
- Standard 3: Ideas for learning and solving problems.
- Standard 6: Allocation of time, money, and resources.
- Standard 7: Integration and use of technology in solving problems.
- Standards 8 and 9: Cooperative learning and peer negotiation.
- Standard 10: Multicultural diversity and understanding.
- Standard 11: Parents and community support for learning.

In addition to the *Blueprint 2000* standards, the *Sunshine State Standards for Reading* (1996), used in my district, provided a basis for student performance outcomes for the technical reading course. Again, not all of the printed standards were selected; and some were abbreviated and paraphrased.

Standard 1:

a. Uses background knowledge in prediction and organization,
b. Uses a variety of strategies to analyze words and text,
c. Effectively uses academic (subset technical) vocabularies, and
d. Uses strategies to clarify meaning, as in rereading, note-taking, writing a grade-level report.

Standard 2:

a. Determines main message, relevant details, facts and patterns in a text;
b. Identifies the author's purpose or point of view in a variety of texts and uses this information to construct meaning;
c. Recognizes logical, ethical, and emotional text appeals;
e. Locates, organizes, and interprets written information for a variety of purposes, including classroom research, collaborative decision making, and performing a school or real-world task;
f. Uses a variety of reference materials to gather information for research topics;
g. Synthesizes and separates collected information into useful components; and

h. Checks validity and accuracy of information obtained from research.

Considering Age-Level Interests, Needs, and Relevancy

No matter how distinctive the intent of the technical reading class, it would not engage students to improve their reading if it were not closely geared to their interests. Planners listened, observed, and interviewed students, parents, and teachers to discover these interests. Consideration was given to students' fast-paced, often glitzy, media experiences and the whirl of things they like to do in and out of school. We considered shopping, using the telephone, going to movies, watching and playing sports, and participating in social activities as possible leads for content, materials, and methods.

Which activities would offer the most worthwhile and logical opportunities for technical reading? Which extracurricular activities appealed to both boys and girls? Which involved the most students? Although golf and skateboarding both have avid student fans in Florida, many students are not participants. But biking and boating came up as high-interest and high-frequency activities.

One thought that occurred to us was to take advantage of students' enjoyment of make-believe monsters and the paranormal. However, school district constraints about such topics moved us to steer clear of science fiction and fantasy themes. However, students' interests in the unusual or mysterious could be tapped by incorporating

archaeology as a theme. Students would read about mummies and investigations into ancient cultures.

Socializing and shopping are high priorities for middle-schoolers. We reasoned that these young consumers and "socialites" would be interested in studies involving these activities. What if students used analytic reading to acquire consumer savvy prior to hitting the mall? What if these very social students could accomplish at least some of their schoolwork by studying with favorite partners and small groups of friends?

How about studies in career awareness? Would students want to study possible careers, and could they do so through rigorous reading?

What else would motivate students to participate, collaborate, and read for details? What is the use of reading precise instructions if one is not really building, assembling, rearranging, or designing something? We decided that we would have to include content-related projects that motivated students to read in order to make informed decisions to complete the tasks.

In addition to reading directions, students would need to develop other technical reading skills. For example, there would be online programs and CD-ROM programs that required careful, accurate reading.

All of these thoughts became part of the task of making the class fit the students.

Balancing Scope and Sequence

The rapid planning needed to launch this technical reading course for fall had a couple of other constraints.

First was scope: The components representing the relevant body of information had to be treated with a measure of depth appropriate to a one-semester (16-week) class. This constraint would limit the number and complexity of components.

The choice of components also would need to include several short-term units, such as a two-week career awareness unit, as well as longer-term, more developmental units, such as paced reading, which is learned initially and then practiced over time.

The technical reading class had to provide for the possibility that some less able students might be taking reading for the entire year. Thus we needed to avoid content duplication.

Second was sequence: What reading skills needed to be taught early so that they could be applied and practiced throughout the semester? Should units on safety be taught early so that students could adopt safer behaviors as soon as possible? For example, it seemed reasonable to emphasize the bicycle helmet law as soon as school opened in the fall. Boating safety regulations could be reasonably taken up in the spring, just before boating season commences.

Having considered all of these issues, we were ready to proceed to defining, developing, and adopting the units, materials, and activities of the new technical reading class.

Class Components, Materials, and Activities

At first we thought it would be difficult to select skills and a body of information that would be distinctive to the technical reading class. However, this task turned out to be easy. The many initial questions we posed for ourselves and the answers at which we arrived led to designating eight class components, or units:

- Safety (Biking or Boating)
- Consumerism
- Careers
- Following Directions
- Specific Reading Skills
- Technology
- Archaeology (Mayas and Mummies)
- Students and the Law

Choosing Matching Materials

After the content was selected and organized into components, we tackled the question of matching materials to that content. We decided that the class goals could best be reached by using nonfiction works; and it

was relatively easy to locate relevant materials, some packaged in distinctive forms. It would be possible to replace materials that students had seen or used in earlier reading instruction with reading matter they had never seen. At the same time, these materials were not obscure at all.

First, as the core text for the kick-off component on safety, we chose two lively safety-course manuals, one on bicycling, the other on boating. *The Best Bicyclist on Earth* and *How to Boat Smart* are cogent texts about real-life adventures, known dangers, and challenges. These inexpensive paperback manuals are colorful, consumable, and loaded with detailed illustrations and offer an appropriate reading level. Developed by the Florida State Department of Environmental Protection, the boating safety manual offers another benefit. Students who pass the boating course can receive a state certificate coordinated with a new teen boating education law.

Of course, students would neither bike nor boat in class. Instead, they would read about safe ways to enjoy these leisure activities. They would read for detail, learning the terms for bike and boat parts; they would read instructions about safe operation; and they would carefully read the "rules of the road" and the "rules of the sea." Several videos were chosen to accompany the printed materials. The videos would serve as our class "field trips."

Other materials that we selected also were new and challenging. During the planning for Tech Reading (the new name for the class) the district happened to adopt a new reading textbook, *Quest*, published by Houghton

Mifflin. It was designated for use in both sixth- and seventh-grade classes. The other seventh-grade reading teacher and I met with our sixth-grade colleagues and divided the new text into sixth- and seventh-grade content. The sixth-graders would take all of the fiction, while seventh-grade Tech Reading would tackle the nonfiction, which turned out to contain ample information for the archaeology component — a special bonus! There were new articles and modern photographs, including information about a recently discovered "Iceman" mummy.

To undergird reading about consumerism, two class subscriptions to the lively, middle school consumer magazine, *Zillions* (from Consumer Reports), were ordered. Reading studies about careers would be supported by a state publication, *Career Cruiser*, a consumable booklet with which each student could begin developing personal career awareness.

As tools for discussion, three highly regarded videos were selected: *Ten Ways to Lose Your Job* (about careers), *Tall Ships: High Sea Adventure* (about boating), and *The Mind's Treasure Chest* (to accompany the technology and reading skills lessons).

Planning the Activities

The following components are listed in the order in which they were introduced during the first two semesters of the course implementation.

Safety. Parents and the community have expressed high concern about students' safe participation in their frequent recreational and leisure pursuits. Accordingly, students in

the technical reading course will read and learn about biking (first semester) or boating safety (second semester).

Activities:

1. Reading and discussing the state safety manuals,
2. Viewing and discussing related videos, and
3. Demonstrating knowledge through projects and gaming.

Consumerism. Teenagers as a group are among the largest spenders. For this reason advertisers market many products to them in a highly compelling fashion. In addition to making students aware of persuasion techniques, it is important for them to test claims on goods and services they are considering purchasing. Accordingly, students in the technical reading course will read and learn about five persuasion techniques, the analysis of commercials, and consumer surveys and testing.

Activities:

1. Reading and discussing the student consumer reviews and testing in *Zillions* magazine,
2. Conducting and analyzing their own consumer tests and surveys, and
3. Demonstrating their findings in class, other classes, in the school newspaper, and at appropriate events such as the PTSA Open House (fall) and annual Curriculum Fair (spring).

Careers. Our school's parents and community employers have told us that students need experience in reading and understanding workplace documents and expectations. In addition, students express interest in

earning money. Accordingly, students in the technical reading course will read and learn about school and community career qualities, courtesy in the workplace, ways to get fired, and how to begin exploring their own career preferences.

Activities:

1. Designing a courtesy handbook for use in the school as a workplace,
2. Reading and completing an individual Career Cruiser,
3. Predicting ways people get fired, then viewing and discussing the video *Ten Easy Ways to Lose a Job*, and
4. Demonstrating their findings by holding a parent conference with the parent writing a letter to the teacher about the conference.

Following Directions. Teachers, parents, and community employers have indicated that students need more experience with reading directions and precise information both for success in their future work and achievement in their current classrooms. Accordingly, students in the technical reading course will read and learn about the nature of directions, the importance of precise instructions in order to accomplish a task, and ways to read and apply detailed, sequential, procedural information.

Activities:

1. Writing simple, but accurate instructions for someone to make a peanut butter sandwich and watching the success level of those instructions when someone else follows the steps literally,

2. Reading simple, but precise instructions to assemble tangram figures,
3. Following print instructions on constructing advanced paper airplanes and complex string figures or tying nautical knots, and
4. Demonstrating their findings by assembling wooden models and a bicycle in class.

Specific Reading Skills. Students show a lack of skill in many technical reading areas. For example, they are unlikely to develop specialized vocabulary or technical terminology needed in many of their regular activities. Also, they lack skill in locating and selecting information; studying new material; analyzing, synthesizing, and interpreting ideas; and adjusting their pace of reading to the material at hand. Accordingly, students in the technical reading course will read and learn about the development of appropriate technical vocabularies, the selection and use of standard reference and information sources, attacking new assigned material, applying critical thinking to their reading, and choosing appropriate reading speeds.

Activities:

1. Compiling vocabulary specific to the boat or bike safety materials, to generic instructions, and to technology, archaeology, and other course components;
2. Locating and selecting specific nonfiction books to research a topic, based on such book features as indices, glossaries, and tables;
3. Developing KWL, SQ3R, mapping, webbing, and metacognitive reading techniques;

4. Practicing skimming and scanning, as well as paced reading;
5. Constructing a nonfiction artifact story; and
6. Demonstrating their learning by using the skills during class work and through a report about a nonfiction book.

Technology. Students, like most citizens, already are involved in using technology now available in their everyday lives. These uses usually have a specific function, obtaining money from a machine or controlling a television, VCR, microwave, or screen game. While many use computers to play games and write reports, most still need to learn how to access information, whether from the school, local library, or the World Wide Web. Accessing information requires skilled technical reading in order to find needed data and make informed decisions. Even those students who are computer literate often have difficulty finding specific online information, the variety of details they are seeking, or appropriate information to use in time to meet an assignment due date. Accordingly, students in the technical reading course will read and learn about up-to-date computer terminology, how a computer works, how to access online reference tools, basic word-processing, and how to telecommunicate.

Activities:

1. Reading and locating online information for a nonfiction report about a career, using online encyclopedias, CD-ROMs, and laser discs;
2. Setting class standards for print or word-processed assignments;

3. Telecommunicating with homebound students during class; and
4. Demonstrating their learning through individual reports and class work.

Archaeology. Students display high interest in many somewhat bizarre topics, especially those involving supernatural phenomena. Since one planning decision for the technical reading course is that reading material be nonfiction, it obviates the inclusion of unscholarly content. However, students' love of the mysterious and fantastic can be used in a contemporary component on archaeology, including artifacts, mummies, and field discoveries amid the ruins of ancient cultures. This component is a natural tie-in to reading skills as applied in concurrent social studies and science courses. Accordingly, students in the technical reading course will read and learn about scientific methods and reading demands in the field of archaeology, the very detailed accounts of mummies and mummy-making, as well as investigations of historical ruins and artifacts discovered in Egypt, Europe, and Central America.

Activities:

1. Reading maps and scientific articles about mummies and the exploration of ancient ruins;
2. (First semester) Reading the "Treasures from the Past" and "Dig and Discover" sections of *Quest* text; (Second semester) Reading the Mayan sections of the *Star Walk* text;
3. Discussing and illustrating a class information board about the "Iceman" mummy; and

4. Demonstrating information in class by presenting reports as if they were reporting everyday life as that mummified person once saw it or archaeological work as the archaeologist experiences it.

Students and the Law. School resource officers, parents, and the community express concern that even students who basically exhibit law-abiding behavior, who practice their knowledge of right from wrong, express ignorance of the law as it pertains to them. They fail to see that, in most cases, the law derives from previous problems and is there to protect them. Thus some students scoff at laws they do know, deem them unfair, and find it funny to ignore their value, at least verbally. While they may not actually break the law, students may not respect it. They are amazed when they read the legal rules that directly apply to their decisions and behavior. Accordingly, students in the technical reading course will read and learn about special laws applying to minors, including laws concerning curfew, bike helmets, and boat operation, the reasons for such laws, and the specific consequences of breaking the law.

Activities:

1. Reading and discussing several laws, for example, a curfew law, the bike helmet law, identifying minors, and boat operation statutes;
2. Reading and analyzing selected newspaper articles about crimes and accidents involving teenagers and the laws being studied; and
3. Participating in a one-day mock court hearing for a fictitious person who has broken one or more of

the laws with dire results, playing roles and taking sides in order to air the views of both prosecution and defense.

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Getting Started

As soon as the content, components, and materials had been determined, we began ordering the materials that would be needed in the fall. In our case no "official" budget had been set. However, because the invitation to develop the technical reading course came from both the district supervisor and the school principal, I simply ordered the approved materials. Funds for them came from a variety of sources. For example, the state provided (free) the consumable, individual *Career Cruisers* and the first round of boating books and videos. The district picked up the cost of the paced reading materials. The school's budget was tapped for the adopted textbook, *Quest;* the biking texts; and test strategy booklets. The school's parent, teacher, and student association (PTSA) bought the first subscription to *Zillions* magazine. A small book-fair fund enabled the purchase of boating videos and individual model construction kits.

Materials for any new course, especially consumable materials, can present financial obstacles. However, it is probable that, as the value of school-based technical reading courses are recognized and more widely accepted, regular curricular monies will become available.

Students might be required to buy some or all of the consumables — especially the biking manuals and consumer publications, each under $2 per student — if such a requirement is permitted by the state or the school district.

Another avenue for acquiring material support is to request assistance from school-business partners and parents. Once we made these groups aware of the new class, they were generous with time, talents, and materials. Appropriate line, cleats, and boards were donated for students to use for nautical knot-tying. Safety equipment and Coast Guard-approved lifejackets were loaned to us, as were books on boating and bicycling. Several parents associated with law enforcement and with the Florida Marine Patrol came as guest speakers. The manager of a Wal-Mart near our school even loaned three new bicycles in cartons for students to assemble.

If funding the full technical reading class at first proves to be impossible, one way to begin is by integrating a single component into an existing class. Surrounding that unit with sufficient attention (publicity) can lead to support that later may enable the funding for an entire class. Good candidates for this approach are units on safety and careers. For example, we used the state's *Career Cruiser* in a short career unit in a literature-based class, keeping both school and district administrators well informed on student and parent reactions. The short unit generated enthusiastic parent and student attention. Undoubtedly it was the success of that unit that lead to the invitation to build an entire technical reading class.

Announcing the New Class

When research and development for the technical reading course began, so did publicity for it — not that students had to be convinced to sign up. Every seventh-grader, except those students taught reading in such exceptional classes as gifted or special needs, would take the course either first or second semester of the following year. Why spend time promoting the course?

First, we thought it was important that the faculty and staff be apprised. The language arts department and several colleagues would be asked for input on content and materials. The plant operator would need to be asked to supervise bike assembly. Given adequate time, the media specialist might be able to order additional materials to support access to career information. Though it was barely spring, school counselors needed to know the details in order to cope with scheduling. Everyone benefited from early information about the new class.

Another reason for early announcement was community involvement. Hundreds of volunteers annually provide thousands of hours of volunteer time in our school. Many corporations and local businesses contribute talent and services. A new class might attract busy volunteers who need time to schedule their visits. We also reasoned that hearing the news might prompt additional contributions of materials. In fact, three months of planning were required to arrange and manage the borrowing of the Wal-Mart bicycles. Time also was needed to acquire permission from the *St. Petersburg Times* to

copy a number of articles on archaeology, biking, boating, careers, and student law for use in the new class.

Finally, we announced the new class early to build enthusiasm. We wanted to get students excited about the interactive reading curriculum they would be undertaking. A short article about the class was published in a spring parent newsletter. I visited all of the sixth-grade reading classes and presented a lively talk that included a few enticing details about the biking, careers, and archaeology units. Afterwards, some students asked, "But where is the reading in all that?" Clearly they did not see reading as a path to exciting learning — yet.

Working with Colleagues

From the outset, we made sure that the technical reading class was seen as applied, interdisciplinary, and belonging to the whole school, not just to the language arts department or to the seventh grade. One's colleagues need to know what is going on, not merely to be informed but because they can assist with the effort to launch the new class. This assistance was vital to the development of the technical reading class.

For example, because they knew the goals and content of the reading class, the faculty of the Mathematics Department generously loaned us its tangram materials. The Language Arts and Science Departments helped us choose material for the archaeology component. Media specialists helped us locate videos and other media materials for the safety and archaeology sections. Counselors made suggestions about the career materi-

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als. A family and consumer science teacher sent over yarn and string for string figures.

Each semester I taught the course with one other teacher. From the beginning she participated in planning. Even though she would be teaching only one of the six sections each semester, she needed to know everything about the class. We planned to teach the class in the same way in order to enhance comparative observations and evaluation. We also reviewed the sample materials together and prepared joint lesson plans.

Even if I did not ask for specific help, having colleagues know what the seventh-grade technical reading students would study produced an informed and helpful group of fellow teachers. Later, when I needed to borrow something, ask for advice, or change a schedule, the basis for my requests was already established. I did not need to start by explaining the class each time.

Once the class had been finalized, I provided a concise overview to the entire faculty and staff. Teachers knew when the various units would be taught. The cafeteria manager knew when students were likely to visit the cafeteria as part of career exploration. The plant manager knew when security would be needed to ensure that the bikes borrowed from Wal-Mart did not disappear.

Day-to-Day Operations

The first technical reading class began. Students came into the classroom expecting something new, the result of the previous spring's build-up. The "look" of the classroom was not particularly distinctive, except for

tables set in groups instead of rows and the presence of a bicycle wheel and a glossy photograph of a mummy.

By the end of the first period the students knew that technical reading meant an emphasis on the practical. They would be concentrating on nonfiction, and there would be some new and interesting twists to instruction.

Within the next few days, we established routines. As students arrived, they picked up their folders from a shelf and sat at group tables with four or five classmates. The folders offered a simple, inexpensive way to keep track of assignments, check on progress, and hold many of the materials they would be using. Each folder remained in the classroom and also served as a mini-locker, holding fresh paper and pencils. Different folder colors were used by each class, and so it was easy for students to locate their materials. Some students initially complained about having to buy folders of a certain color and style, but those complaints were short-lived.

We introduced the bicycle-safety unit first. Two or three days each week for the first month of school were devoted to the unit. Activities alternated between individual silent reading in order to answer questions posed prior to reading and cooperative reading with brief oral reporting and discussion. Both activities always concluded with short written responses or reactions that were placed in the folder. Even if students did not get a chance to talk about their experiences, they still would be able to respond to each idea in writing. Soon many students were volunteering to share their responses to the day's reading or discussion.

One day a week, each of the five cooperative learning groups that made up the class used the period to re-

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view together and make up questions for quizzes, to plan and execute projects, and to work on gaming strategies related to the reading assignments. This mix of reading, writing, responding — all consistent with the applied nature of technical reading — was an effective organizing tool for seventh-graders. Once students experienced authentic time-saving and the pleasure of always having information, plans, and materials on hand, few folders ever left the room to be lost in disheveled backpacks or lockers. Those that did go home during projects or to show parents were carefully returned the following day for use in class.

As an integral aspect of the career unit, the folders were deemed analogous to business planners and portfolios. These folders were to remain unadorned — no writing, drawings, or stickers; just name and period number on the cover. Full credit would depend on these directions being followed. After years of seeing grubby folders covered with doodling, this career rationale reduced individual and classroom distractions. Respect for the appearance of folders and other student materials emerged with the habit. Many folders were exemplary — inside and out.

For the career unit, each student also was expected to display a two-sided name card daily and to keep it in the folder. The name card simulated the name tags, door signs, and desk plaques seen in the business world.

Behaviors the students adopted during the unit were in line with 10 "career qualities," which had been determined through a survey of local employers. The survey was conducted in 1997 by a committee at Safety

Harbor Middle School. The qualities include: punctuality, honesty, quality of work, professional training, communication, appearance, attitude, getting along with others, initiative, and reliability.

The other one or two days of the week were devoted to teaching specific skills, such as KWL or semantic mapping. Skills or reading procedures, such as paced reading, were taught using a high-interest context. KWL, for example, was first taught during the orientation to the bicycling manual using a newspaper clipping about a local bike accident. Paced reading began when students tackled a booklet with prepared, timed, nonfiction passages about a devastating hurricane.

The most important metacognitive aspect of each reading strategy was that, once introduced and practiced, the technique was applied for the rest of the semester in subsequent work, usually voluntarily. After one or two structured applications, for example, it was astounding to see students take out their folders and start right in with the KWL technique anytime we began some new assignment. Also heartening were students who reported using KWL in social studies and science classes — without being told to do so.

Evaluation and Grading

In terms of evaluation and grading, we made only a few modifications in the customary practices. For example, students helped set criteria, developed sound rubrics, and designed evaluation matrices for strategic use in evaluating and comparing projects and assign-

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ments. They wrote quiz questions to be used in interviews and games. They were willing to discuss how they were meeting standards at a surprisingly complex level, even steadfastly assigning lower scores to their own work if it did not meet the rubric test.

My colleague and I thought that this cooperation related both to their constant involvement and to the students' perception of themselves as doing well, which they were.

Another modification was that we assigned only 10 letter grades each semester. These grades were assigned to cumulative evaluations of several tasks or assignments. For example, one grade in the directions unit covered success in building a tangram figure, constructing a complex and fanciful balsa wood aircraft from a kit, and following specific directions in presenting a report on a nonfiction book.

The 10 grades included three grades for group projects (everyone in the group receiving the same grade); four individual grades on folders, reports, and special assignments; and three individual grades on traditional quizzes or tests. Extra credit, which I will discuss later, also played a role in learning and grading.

Special Features

From the start, Tech Reading incorporated, for want of a better term, some "special features" that made it distinctive from other classes. One was the use of cooperative learning groups, which quickly came to be called CLGs by the students.

Cooperative learning was a natural choice as part of the technical reading class. For starters, sitting down with friends while doing work that requires chatting is logical. Group involvement brought a variety of viewpoints to brainstorming sessions and a reasonableness to decision-making sessions. And weaker students were bolstered, not embarrassed.

Students tested their leadership skills as each group employed a materials manager, reader, recorder, and reporter. CLG members clarified ideas for each other, helped the group reach consensus, and kept the CLG on task. Because certain grades would depend on group productivity, the CLGs very soon determined the talents among their members and used them when divvying up tasks.

After four days sitting where they chose, the students were recorded on a seating chart by CLG with five or six CLGs to a class. After two weeks the groups were

invited to give themselves a name related to the technical reading components. Thus emerged such groups as the PFD Posse, Bikers Anonymous, Jumpin' Jetskiers, Mummifiers, and the CEOh-ohs.

The CLGs worked well. Only two or three each semester needed help on a continuing basis in learning to work together. Some reconfiguring of the groups took place as needed. My colleague and I functioned mainly as facilitators and supportive "visitors" for the CLGs.

Most CLGs enjoyed keeping themselves in order. At the close of every day of group work, a reporter from each group, cued by his or her peers, stood up and stated aloud that CLG's evaluation of the day's work, gave it a 1-10 rating, and suggested plans and improvement for the next group session. Sometimes there were written assessments: "Our CLG worked out extremely well. All the people had benevolent attitudes toward each other. There were hardly any disputes going on." And, "We all picked our jobs by seeing who was qualified and asking him if it was okay." Or, "Once we decided, we got right to work as a team."

Interdisciplinary Components

As we planned the class, it became evident that it would draw from diverse fields of study. Both planned and unplanned connections emerged. For example, students were computing distances and velocity in class, running consumer surveys and tallying them, discussing traffic patterns for bikes, and determining traffic patterns for boats. Students quickly realized they could use the same precise reading, writing, and computing

skills in many tasks. During a "Jeopardy"-style game designed for review, students used information they had gathered from four different units.

When students learned to access information using various forms of technology in the media center, they were able to locate data on their own in order to explore career preferences. After they viewed a video about the tall ship, the *Danmark*, a Danish marine training ship, their reactions made reference to nautical terminology, to the complexity of marine navigation, to the science of the sea and weather, and to the cultural differences between themselves and Danish teenagers.

Projects

CLG projects offered opportunities for self-assigned technical reading far beyond our lesson plans. Usually the groups had a choice of eight possible projects to accomplish within a two-week period. That schedule allowed any or all members of a CLG to pursue their work inside school and outside of school over a working weekend. Three full and two half periods also were provided in class to kick off, plan, and work on the projects.

The day before a project was due was always a CLG workday. Students usually used this day for compiling last-minute information, final proofreading, or making illustrations. All students completed two CLG projects each semester.

Following are eight project options, the last being an alternative at any time.

1. Shoot a video showing what you have learned about biking (or boating) safety. Remember to persuade, inform, and entertain us.
2. Prepare and present in class a TV commercial for a particular bike (or boat). Stress technical engineering features and safety aspects of the product.
3. Write and produce a skit about one or more careers which interest you. Hand in a copy of the actual script, your sources of information, and at least one interview with a person in the career or careers depicted.
4. Write and illustrate a book for young children on the subject of biking (or boating) safety. Read the book to at least two children and include a report of how the book was received by the listeners.
5. Design and be ready to lead the rest of the class in playing an attractive wall-game version of "Concentration," "Wheel of Fortune," or "Jeopardy." You can use any data read in this class as information and even combine data if in appropriate categories. The game must be lengthy enough for 10 minutes of sample play.
6. Make a survey of fellow students (N=50) regarding a type of food product, such as cereal or snacks. Create a survey sheet. Tally the findings. Report the findings on a large chart, overhead transparency, or computer printout (a copy for each student in class) and interpret the findings in a letter to *Zillions* magazine.
7. You have a chance to be the investigation team on an archaeological dig. Choose the country where

you will go, using actual archaeological information. Create a journal of your trip to share with us on your return. Be sure to note any dangerous encounters, strategic errors, or surprises and to describe any artifacts or human relics you discover.

8. Propose your own detailed project based on some part of the Tech Reading class. It must be just as challenging as any project listed above, and it will be due on the same date. Plan the details in writing on one page. Then meet with the teacher to obtain approval and suggestions.

Gaming as Learning

Gaming is useful because the students do not focus on learning to play; rather, they concentrate on playing to learn. Games offer an intriguing complexity of planning and reading. Games designed by students are particularly valuable. Ours became a contest of applied knowledge and provided a joyful way to review and extend learning.

All of the CLGs were assigned the task of designing a board game. Objective, directions, operation, cleverness of layout and pieces, inclusion of content, and ease of play were the design criteria. Students worked on the games in class for three days. The CLGs energetically manufactured and cleverly named their games. Once the games were made, they were played. At the sound of a small bell, the groups would rotate clockwise to the next table and play the game designed by that CLG for five minutes. Then they would rate the game. In the end,

all of the students had played all of the games. Students tallied their ratings and voted on each game.

Winners received special pencils donated by the PTSA, and the over-all winning CLG was featured on the school's TV news program. Those students also received movie passes purchased with book-fair earnings.

Other game-like activities also were included in the units, for example: constructing tangram pictures from specific directions, creating string figures with partners, sharing written instructions, and tying knots. The students also liked assembling the bicycles that were on loan from Wal-Mart, but that was not really a game. The bikes had to be returned to the store fully assembled for use as store demonstration models.

Court Day

When we designed the "Students and the Law" unit, we hoped that students would do more than simply read and analyze newspaper articles about crime or discuss statutes in legalese. A dramatic "hands-on" activity, in keeping with the idea of applying technical reading skills, was instituted. We called it "Court Day."

Students were asked to choose roles, ranging from bailiffs and attorneys to witnesses and court reporters. The court held civil hearings only, not trials. Thus we skirted the students' preoccupation with frivolous and faked TV versions of criminal court battles.

It took several class periods for students to prepare for these civil "hearings" on such questions as: "Was a speeding Waverunner operator responsible for both in-

jury and wake damage caused when operating his personal water craft?" "Did an employer wrongly fire an employee because of her gender, or was it because of her poor attendance record?" "Can parents be jailed because they allowed their child to ride a bike without the mandated bike helmet, thus endangering the child, the victim in a tragic auto accident?"

Court Day was a serious matter. I wore a black robe and wielded a gavel. Many students also dressed their part, some carrying briefcases. They rose and spoke with authority and confidence that I have seldom seen in the classroom. The hearing process proved frustrating to many of the students. Situations were not as neatly resolved as on many TV law programs. New questions arose when students reread material. Courtroom sessions therefore induced prodigious amounts of self-assigned reading and the clever creation of many elaborate documents in support of testimony.

Rethinking "Extra" Credit

Court Day and other activities motivated students to read "extra," self-assigned materials and to bring to class many content-related items. Students brought in lifejackets, bicycle tools, newspaper articles, and fiendishly complicated sets of directions for assembling things. I never knew what students would pull from their backpacks next. All of this added effort merited some form of extra credit.

The system we developed for awarding extra credit involved a number of conditions. First, extra-credit work

could not replace regular assignments nor bring up low or missing grades. Nor was it accepted during the last week of any marking period. Each instance of extra credit (with a limit of two per grading period) was worth only 0.1 point of credit. If a student happened to be on the "borderline" of a higher grade — for example, 3.4 — the extra 0.1 would raise the grade to 3.5, an A rather than a B.

Many students opted to do five or six extra-credit tasks, all self-assigned and preapproved experiences, even knowing they could obtain no more than 0.2 point of credit. In fact, many self-assignments became evident during the year. I had only to suggest the need for a list of books on careers or a sample of nonfiction books on a given subject, for example, and students would jump at the chance to do the work for "extra" credit.

What We Learned

After the first semester the incoming moans were gone. In fact, the hubbub as students first entered the room took on a decidedly different tone. "Are we really going to build bicycles?" "Is it true that we are going to have a court in here?" "Will there be another game contest?" "See? I already have my folder." (The covers already read "Tech Reading"). Clearly the first-semester students had been telling their friends good things about the class.

Student Class Evaluations

At the request of the district language arts supervisor, students evaluated the class at the end of each of the first three semesters. Students were asked to rate the class units using a scale from 5, "very valuable in my school and life," to 1, "holds little value to me in my life." Spaces were included so that the students could comment on the cooperative learning experience and make suggestions. Students were asked to sign the evaluations but were assured that the evaluations would not be graded. In fact, we sent the completed evaluations directly to the supervisor.

Following are the summary results from the 179 students (six classes) as of June 1997. The units are listed in order beginning with the one that students perceived as being the most valuable.

Careers	4.36
Technology	3.45
Consumerism	3.43
Following Directions	3.41
Specific Reading Skills	3.33
Students and the Law	3.32
Safety (Boating)	3.09
Archaeology (Mayas)	2.95

We were expecting to find that the career unit was highly valued. It was the first time ever that these middle school students were exploring their possible futures and confirmed the fascination that studying their own preferences seemed to inspire. Many students gave that unit a 5.

The technology unit also was highly rated. Students were enthralled by the use of the multimedia technology resources in the media center, not surprising since so many of them use computers.

As for consumerism, whenever *Zillions* magazine arrived, I could expect *total* silence as students eagerly read all of the details. They often asked to borrow *Zillions* or to write down information to share with their friends and parents.

We were disappointed that, even though Court Day was popular, the law unit was not as highly favored as some others. We also were surprised that the safety and

archaeology units were rated last. Both seemed sure-fire winners for high motivation, but perhaps they were too specialized or the concept load was too heavy for wide appeal. However, 40% of the students did pass the official boating safety test and sent off to Tallahassee for the Boatsmart card. Fifty of these students met the new Coast Guard rules for teen boat operation in Florida.

Many students took time to write comments, most of which expressed positive opinions regarding the class and the various units. Students particularly enjoyed the cooperative learning groups, and they wanted more projects.

A sampling of the comments about the units gives the flavor of their thoughts:

Careers

"It was a wonderful experience to me."

"This stuff was great!"

Specific Reading Skills

"Didn't like, but helped me."

"Paced reading was good for me."

Technology

"I just needed to know these things."

"Our library has a lot of stuff."

Safety (Boating)

"Valuable because we live in Florida."

"I don't like boats, really."

Consumerism

"Cool."

"I need to spend my money wisely."

Archaeology (Mayas)

"Interesting, but not necessary."

"Great stories."

The Student-Parent Letter Connection

Parents were pleased with the concept of the technical reading class from the start. In addition to early newsletter publicity, they had received a letter about the class on the first day their students attended it. They were told that it would be based on nonfiction materials and that there would be a central and detailed bicycling or boating safety unit. As the busy weeks passed, parents voiced their approval of the class whenever they chatted with me, one of my colleagues, or the principal.

The career unit required students to make an appointment with a parent to review *Career Cruiser*. The parent then was asked to provide a letter about the conference as part of the student's grade. Parents outdid themselves, providing lengthy and detailed praise for the school's efforts to help students read career information. Most of the parents' letters — some written in a foreign language — told how excited they were to hear about their children's interests in future careers.

Conclusion and Recommendations

Did students actually learn to read technical information better? Although we did not design this class to be an experimental study, we are experienced reading specialists who have seen years of student achievement, and we could derive a sense of whether the class succeeded. We were impressed with how well students performed when asked to read very detailed directions and reports. They were remarkably accurate and thoughtful in their responses.

Having practiced recognizing styles of questions, students reported that they were able to understand standardized reading test questions more easily. Although we do not yet have hard data to demonstrate that students score better on standardized tests, we conjecture that such data will emerge over time. Students perform well in class on tasks that require careful, accurate reading and reasoning. Moreover, students take on challenging reading independently.

Recommendations for Teaching Technical Reading

The strongest message of our experience is: "Do it!" Tech Reading succeeds in motivating students and building their reading skills. The choice of units is not sacrosanct; it should be based on the needs and interests of students where the class is to be instituted.

This account of our experiences can provide some shortcuts in procedures and planning. However, each school's experience will be different. At the same time, we can make some specific recommendations:

- Define technical reading. Adopt or adapt our definition, but be certain that students, parents, colleagues, and administrators understand what the class is about.
- Look for authenticity in tasks and projects. Use students' and parents' input — through discussion and surveys — to shape the units.
- Maintain flexibility. As interests change and as units are tried and evaluated, be prepared to make changes to fine-tune the class curriculum and to stay current.
- Include many hands-on and cooperative opportunities that demand and integrate reading and other activities.
- Establish measurable goals and evaluative criteria for the acquisition of specific applied reading skills.

Our three-year implementation of Tech Reading as a required class for all seventh-grade students demon-

strated that a middle school reading class could be motivating, innovative, and valuable. Tech Reading opened doors to new ways to learn and succeeded in making connections among various disciplines.

The world of the 21st century demands relevance in learning, consumer wisdom, technological skills, and, above all, the ability to read precisely and well. To be successful in school and beyond, students need to be prepared to meet these demands. Technical reading literacy is a millennial must.

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Resources

The resources in this section are arranged according to the units of the Tech Reading class.

Safety

The Best Bicyclist on Earth; The Bicyclist Guide. Seattle: Outdoor Empire. 1-800-645-5489.

Consumable workbook. Also available are snowmobile manuals, a sportfish identity guide, and several fishing activity books for younger students. The text of the first title is written at a slightly easier level and aimed at upper-intermediate students; the latter was developed more for the middle school market.

How to Boat Smart. Tallahassee: Florida State Department of Law Enforcement. 1-800-342-5367.

Consumable workbook free to Floridians. Educators from other states should contact their state's boating law administrator. Materials will be similar but will be based on that particular state's boating laws.

Tall Ship: High Sea Adventure, Videotape. Stamford, Conn.: Capital Cities/ABC.

This 50-minute video features the *Danmark,* a training ship for Danish teens. It incorporates nautical terms, a look

at nautical careers, weather and sea challenges, and cultural differences; and it is plotted to report teen life aboard and abroad. A great opportunity to use advance organizers or KWL.

Consumerism

Zillions Magazine. Vandalia, Ohio: Zillions Classroom Program. 1-800-235-2911.

This bi-monthly includes product ratings and consumer advice from *Consumer Reports* for young people, aged 8-14. No advertising. Attractive photographic and comic-style illustrations with input and writing from students. This magazine proved so worthwhile our school district added it to the supplementary reading materials lists.

Careers

Career Cruiser. Tallahassee: Florida State Department of Education Bureau of Career Development. 1-800-342-9271.

A consumable booklet (about 27 pages) for beginning exploration of career preferences, jargon, and options. It is frequently updated. It is based on information targeted to the state of Florida, but is a useful model.

Ten Easy Ways to Lose Your Job. Videotape. Pleasantville, N.Y.: Human Relations Media. 1-800-272-9747.

This 25-minute video is very realistic and often humorous, dealing with average young people who get fired for tardiness, undependability, dishonesty, discourtesy, and poor attitude. It briefly and discreetly addresses sexual harassment with gentle examples that are not depicted on screen. The realistic script provokes eye-opening discussion.

Young Entrepreneur. Chamblee, Ga.: KidsWay. 1-888-543-7929.

This is a bi-monthly, slick magazine about real young

people's entrepreneurial activities and finances. Other related activity kits and materials are offered.

Following Directions

"Build Your Own" model kits. Chesapeake, Va.: Dollar Tree Distributors. (757) 321-5000.

These motivating kits are made of light-weight wood, require no tools or glue, and can be colored with marking pens or paints. If the directions are followed carefully, these kits are relatively easy to assemble.

Specific Reading Skills

Fry, Edward B. *Reading Drills for Speed and Comprehension*. 3rd ed., Advanced Level. Providence, R.I.: Jamestown Publishers.

This is a well-known series designed to improve reading pace. Enough nonfiction passages are included that the work fits the technical reading course. Each student kept their own records, but the books were considered nonconsumable and purchased as class sets.

Test Ready Plus: Reading (A Quick-Study Program). North Billerica, Mass.: Curriculum Associates. 1-800-225-0248.

This material primarily included short nonfiction and was used for learning analysis and recognition of 13 specific questioning formats, as well as test-taking practice in reading comprehension.

Fisher, David, and Bragonier, Reginald, Jr. *What's What: A Visual Glossary of the Physical World*. Maplewood, N.J.: Hammond.

Even though this oversized text was older, students spent much time with it, as we studied precise terms for ideas and things. An updated version, including more

technology items, is available in the reference section of some public libraries.

Technology

Online Research Techniques. Videotape. Raleigh, N.C.: Rainbow Educational Media. 1-800-331-4047.

This 18-minute video depicts a middle-schooler in a home setting doing research for a report on the Civil War. Easy instructions on searching the Web are "walked-through," and cautions are offered about using time online efficiently.

Mysteries Revealed: Basic Research Skills. Videotape. Niles, Ill.: United Learning. 1-800-424-0362.

This 17-minute video has a diverse group of students seeking information about the unsolved mystery of the disappearance of the American Southwest Anasazi Indians. Using a large variety of library resources, students discern clues that may solve the mystery. At the beginning, a desert tribal scene is enacted, with similar clips included throughout. The data search includes online databases, the modern card catalog, and well-known print and microfiche references.

The Mind's Treasure Chest. Videotape. Chicago: Jellyvision. (312) 266-0606.

This clever, 92-minute video was a fine kick-off for the technology unit. It is a cleverly plotted story of a high school student who does a last-minute history report — using a phenomenal amount of library information resources, both print and electronic. It is a humorous, yet serious study in analysis and synthesis of data. It makes a strong point for critical reading and thinking, as well as the importance of having the modern skills to obtain information.

Archaeology

Cooper, J. David, and Pikulski, John J. *Quest*. Boston: Houghton Mifflin, 1996.

This is the most recent district/state-adopted, middle-school textbook in reading. The readings are primarily about Egyptian mummies and "The Iceman."

National Geographic. Washington, D.C.: National Geographic Society.

Students located and read many articles on underwater archaeology. Students were sent on a treasure hunt to locate the famous issue with the Robert Ballard article on his discovery of the *Titanic*.

Pearson, P. David; Johnson, Dale D.; Clymer, Theodore; et al. *Star Walk*. Needham, Mass.: Silver Burdett & Ginn.

This is the previous district/state-adopted textbook in reading. The readings are primarily about Pompeii, the Mayas, and Mexican antiquity.

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