Contents

Foreword **vii**
Rodger W. Bybee

Preface **ix**
How This Book Is Arranged x
Special Features xi
Who This Book Is For xi
Next Steps xi

Acknowledgments **xiii**

About the Author **xv**

1. Introduction **1**
What Is an Interactive Notebook? 2
How Are Interactive Notebooks Used? 2
What Are the Benefits of Using Interactive Notebooks? 3
What Research Supports Using Interactive Notebooks? 5
A Closer Look at How Notebooks Support Effective Instruction 7
What You Need to Know to Begin 17
Classroom Snapshot 19
Summary 19

2. Organizing Notebooks for Learning **23**
The Components of the Science Unit 24
Notebooks and the Learning Cycle 24
Making Connections for Deeper Understanding 26
The Genesis of the "Aha" Experience 26
The Aha Connections 27
The Steps From the Aha Connections to the Aha Thesis 29
The Trigger Assignment 31
Using the Teacher Notebook to Plan 35
Summary 39

3. Gaining Student Buy In and Ownership **41**
Personalizing the Interactive Notebook Visual Page 42
Personalizing Unit Cover Pages 42
Valuing Ideas and Promoting Community 45
Choice, Connections, and Creativity 47

The Need for Flexibility 49
A By-Product of Ownership 49
Summary 51

4. Using Notebooks During Investigations 53
A Classroom Investigation 54
Developing Student Thinking 57
Engage and Explore: A Closer Look at the Input Page 59
The Role of Questions 61
Elaborate and Extend: A Closer Look at the Output Page 62
Metacognitive Thinking 63
Promoting the Use of Scientific Language 66
A Continuum of Teacher-Student Interactivity 69
Summary 71

5. Getting Started: The First Three Days 73
Choosing the Notebooks 74
Day One 75
Day Two 79
Day Three 81
Summary 94

6. Using the Notebooks: Days Four to Seven 95
Day Four 96
Day Five 97
Day Six 103
Day Seven and Following 107
Day-By-Day Review 108
Summary 109

7. Learning Through Writing 111
Challenges in Implementing Writing 112
Crosscurricular Connections 112
Forms of Writing in the Interactive Notebook 113
Modeling Writing 113
Procedure Writing 114
Summary and Conclusion Writing 114
Writing a Self-Reflection 119
Writing a Thesis Paper 119
Assessment 127
Summary 130

8. Learning Through Discussion 133
Features of Accountable Talk 134
Introducing Accountable Talk 135
Strategies for Accountable Talk 136
Talking Tasks 138
Whole-Class Discussions 140
Effective Questions and Discussion 141
The "Accountable Talk" Classroom 142
Summary 143

9. Conclusion **145**
Student Benefits 146
Teacher Benefits 151

Resource A: Reproducibles **153**
1. Interactive Notebook Rubric 154
2. Aha Connections Visual Outline 155
3. Words of Wisdom About the Aha Connections Visual Outline 156
4. Why We Keep Interactive Notebooks in Science 157
5. Interactive Notebook Thinking Processes 158
6. Constructing the Aha Connections Pages 159
7. How to Write an Aha Connections Thesis 160
8. How to Write a Self-Reflection 161
9. Table of Contents for Your Interactive Notebook 162

Resource B: Crosscurricular Connections **163**

References and Further Reading **169**

Index **171**

WHAT IS AN INTERACTIVE NOTEBOOK?

An interactive notebook is a tool students use to make connections prior to new learning, to revise their thinking, and to deepen their understandings of the world around them. It is the culmination of a student's work throughout the year that shows both the content learned (input) and the reflective knowledge (output) gained. Put another way, an interactive notebook provides a space where students may take what is inside their brains, lay it out, make meaning, apply it, and share it with their peers, parents, and teachers. I use the term *interactive* to describe how these notebooks can be used. That is to say, the notebooks support interactivity and an exchange of ideas from teacher to student, student to student, student to parent, and parent to teacher.

Here's what one student wrote about her interactive notebook:

> It's like my own piece of property that I have to take responsibility for. It shows my personal thinking and creativity. My notebook shows that I can think for myself and figure out where I went wrong for myself instead of someone telling me. I like my interactive notebook because I feel like it's my own little book where I can write my own questions and answer them. However, I think it represents me. Like if I were to look through a stranger's interactive notebook, I would get a sense of their personality, too—cool.

Teachers use interactive notebooks to increase student thinking and achievement. They provide a means of communicating, tracking, assessing, and reflecting the work students do. Interactive notebooks provide a window into the minds of students to reveal their true understanding and their misconceptions, and they provide an opportunity for teachers to open up new horizons for their students to explore.

HOW ARE INTERACTIVE NOTEBOOKS USED?

Below is a brief overview of the process of using notebooks as part of the science curriculum. In the chapters that follow, we will examine the steps of using interactive notebooks in much greater detail.

At the beginning of each science unit, the teacher works with the class to develop an overarching question or problem that will be researched during the unit. All learning during the unit will be linked back to this question.

The unit continues with several lab investigations. The teacher starts each one with a key question, giving students time to write what they think in their notebooks and then discuss it in groups. The teacher and students explore the ideas in class, and students individually form their hypotheses. This allows students to start thinking about the topic and prepares students for the next step.

Students then participate in an inquiry-based investigation—gathering data, observing, forming questions, making sketches, and beginning to formulate ideas about the topic being studied. Student interaction and probing questions by the teacher and peers are essential parts of the process. Students record the processes and data in their notebooks.

After the investigation is over, the students and teacher come together as a class for a discussion (I call this "an accountable talk" session), where the collected data is used to make meaning of student's initial ideas and questions. This is the exciting part of the process. Discussions may become heated as students' ideas are challenged.

Figure 1.15 Here is an example of a more recent notebook page. The student uses color, text features, diagrams, and pictures to document what she is learning. An opportunity has been provided to make meaning of the concept; the work is more student-generated, and it shows in-depth understanding of these new ideas.

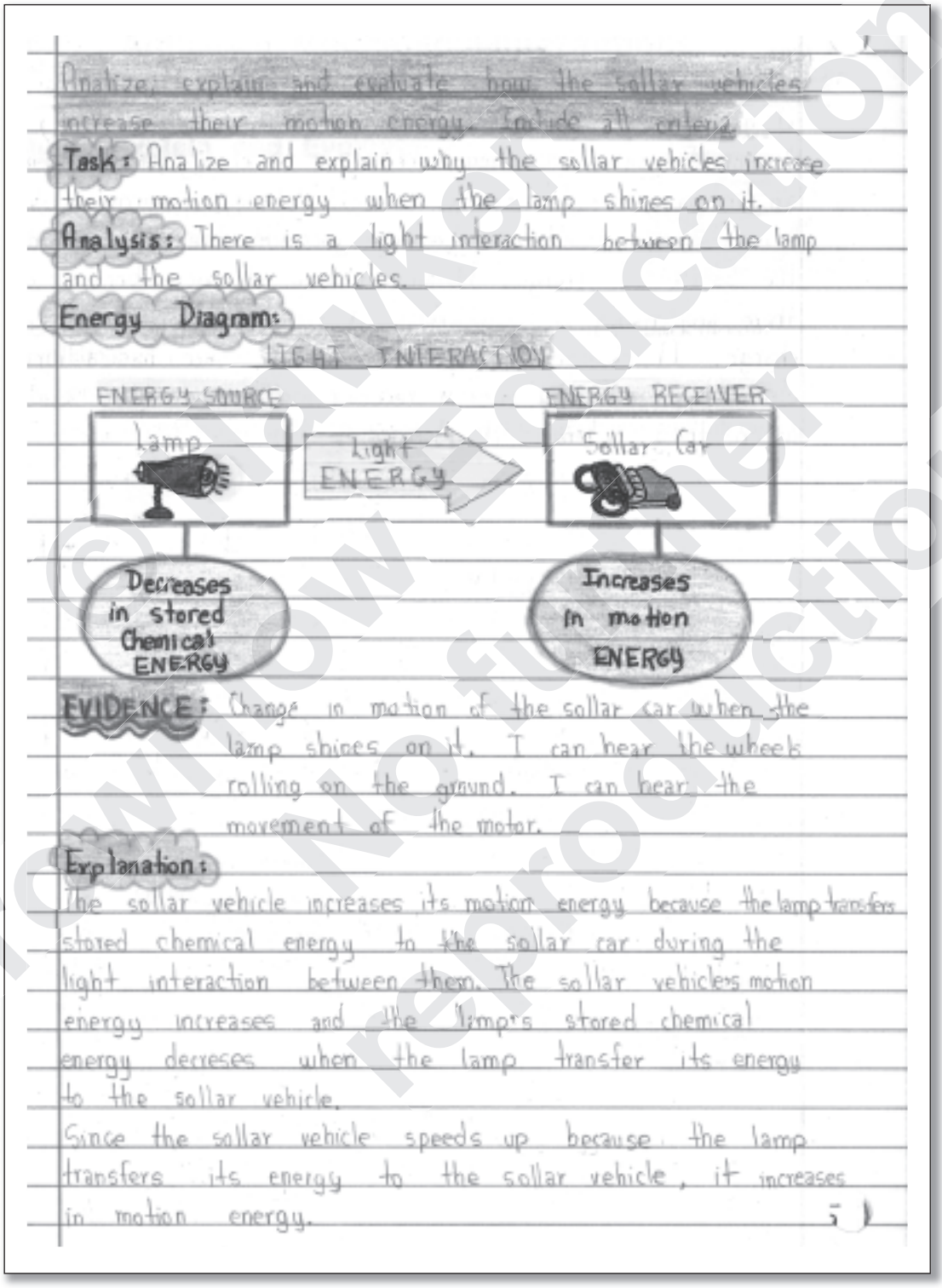

Figure 2.8 Backward Design Using the 5E Learning Cycle

Lesson Concept or Focus Question	
Teacher Does	**Student Does**
(6) Engage: Develop questions or activities for kids that will produce a student goal for what you want them to do in the Engage step.	(2) Engage: How do you engage prior knowledge? What will the students do to connect to a prior lesson?
(7) Explore: Consider possible activities or prompts. How does this activity help students meet the goal?	(3) Explore: What are the students going to be doing? What do the kids need to explore? How will you take the students from where they are to where you want them to go?
(8) Explain: What are you going to ask or collect? What will let you know that the students understand?	(1) Explain: What will the students say, write, draw, do, . . . ?
(9) Elaborate/Extend: What could you do and/or have students do to show an understanding of a new situation?	(4) Elaborate/Extend: Apply the knowledge learned to a new situation.

Question: Does Step 6 get you to Step 3? What kinds of work are you generating?

(5) Decision-Point Assessment (DPA): If the students don't give you what you want to hear, what are you going to do?

Start your planning by asking, "What do I want the students to say about what they learned as they leave the room? What do I want them to know? What will this sound like in student language? What key scientific language will I want to hear?" The answers to these questions become the lesson concept.

Next, think about what the students will say, draw, and write at the end of the lesson. This becomes the Explain for what the student does in the backwards-design lesson planning, or Step 1. Whatever work the students are generating, these are the things you would like to hear them saying at the end of the day.

After identifying these ideas, move to the Engage portion of the lesson, keeping in mind what you want from the students. (Do not think about what *you* will do yet; think about what the *student does.*) For Step 2, ask yourself, "What will the students do to connect to a prior lesson?" This phase of the lesson usually begins with a key question.

In Step 3, move to the Explore phase where you ask yourself, "What are the students going to be doing that will take them from where they are to where I want them to go?" This student work will be reflected on the input page of the notebook. Think about what it will look like, and sketch a template in your teacher notebook. (Use pencil). As you teach the lesson, you can make changes to the page format. You can add to or change specific aspects of the page to better fit what the students need in that particular lesson.