1

Introduction

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.

The evidence that was gathered during the lab drives the entire conversation, and some students hold on to their beliefs, while other students change theirs. Sometimes, students discuss the idea that the data might be flawed because of too many variables. For example, during one discussion, two students debated the idea that the tests performed on various gasses produced minimal results because the method that some groups used to gather the gas was crude. The conversation went on for over 30 minutes, until the class came to the conclusion that as long as they noted whether the gas burned or not it was fine because no exact numbers were being applied to the final conclusion.

A homework assignment completes the processing. Using their notebooks, students write conclusions or summaries, create graphs, or complete other similar assignments designed to push their thinking to the next level.

On subsequent days, students complete additional investigations, using their notebooks and following this same process. Students become accustomed to and comfortable with a process that starts with a question, introduces ideas through lab or other inquiry experience, includes hypothesizing, collection of data, presentation of evidence, and summarization. Keeping this lesson framework constant, with variation in the learning experiences to keep interest high, this scientific method for investigation becomes the continuing mode through which to explore any new ideas in class. The process, patterns, and expectations remain the same. By following an established protocol that stays constant, the student has the teacher's format to rely on every day and every lesson.

WHAT ARE THE BENEFITS OF USING INTERACTIVE NOTEBOOKS?

The benefits of using interactive notebooks can be considered from three vantage points: developing students' thinking in ways that prepare them to be part of the 21st-century workforce, increasing communication between stakeholders, and differentiating instruction.

Preparing Students to Compete Globally

On the Third International Mathematics and Science Study, U.S. students performed poorly compared to their counterparts in other countries. These results have fueled an increased sense of urgency in regard to improving science instruction in U.S. schools. According to Wallis (2006), schools can better prepare students for the future by

- Starting earlier in the student's developmental stage;
- Monitoring the gap between minority and majority social classes;
- Providing opportunity to challenge students, to push them further;
- Using computers to support instructional goals rather than just to be using them;
- Providing inquiry lessons that bridge relevant content; and
- Involving the community.

Using interactive notebooks in the classroom targets all of the aforementioned needs and helps develop the globally competitive student. Notebooks address these needs by

- Connecting students' thinking and experiences with science concepts;
- Engaging students in collaborative inquiry as a way of learning science content;

- Providing opportunities for all students;
- Creating a concrete record of reflection, assessment, and connections that can be viewed and discussed;
- Developing academic language; and
- Providing students with an opportunity to think critically and make informed decisions.

The interactive notebook becomes real evidence of student learning and thinking, a shaping tool for future productive citizens in the science world.

Increasing Communication Between Stakeholders

Notebooking promotes communication between the stakeholders—students, teachers, and parents. A science classroom exposes students to shared experiences of observable marvels or happenings. The interactive notebook is a way of capturing these common experiences on paper, in a place where it won't get lost, so that students can refer back to the common experiences whenever they need them as a way of driving discourse. This provides students with an opportunity to come to consensus and build on the knowledge that was collaboratively gained.

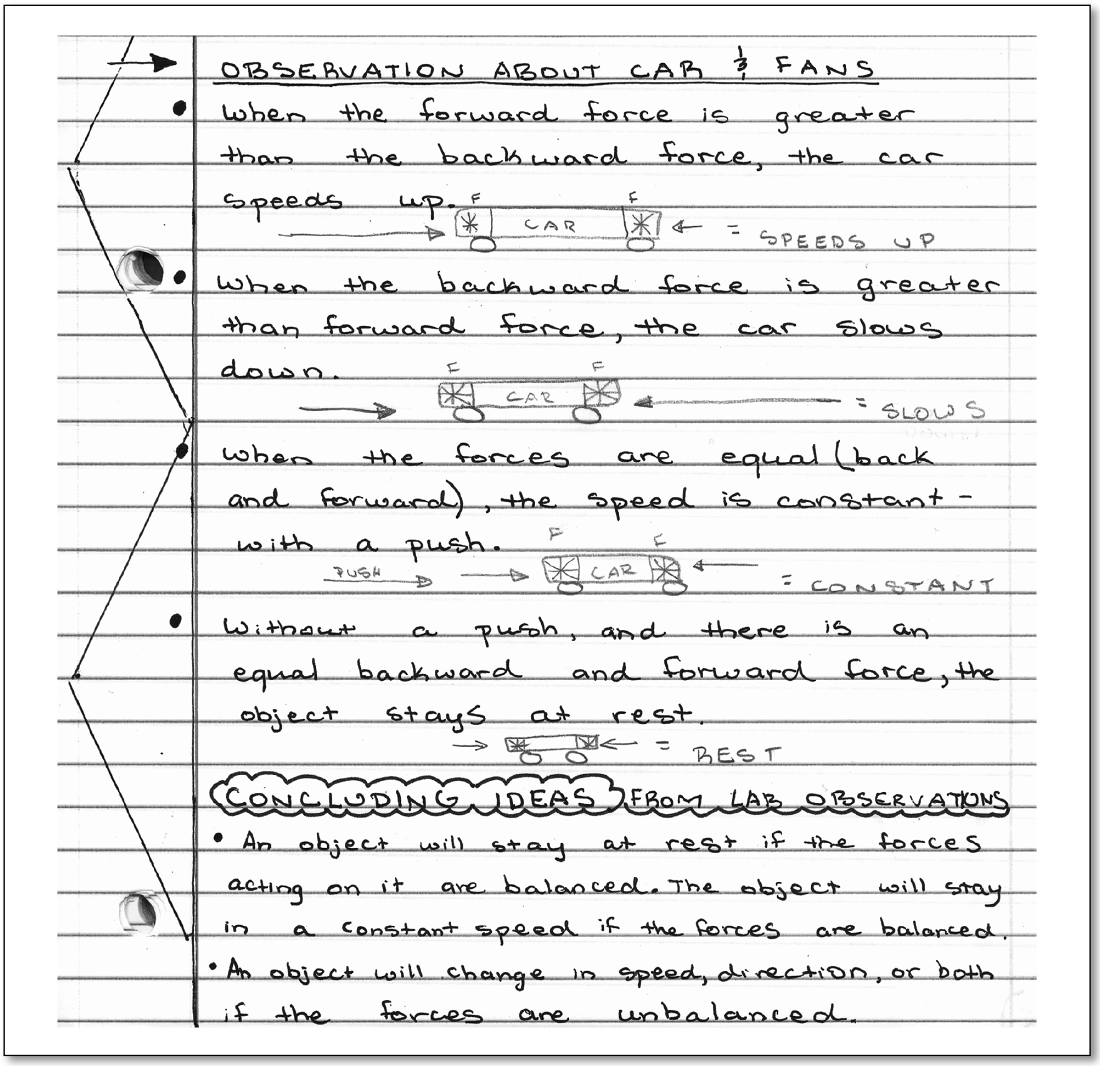
Consider an example based on Newton's first law of motion. As part of their inquiry, students observed low-friction cars at rest and at a constant speed moving in the same direction. They observed the interactions and collected data (input). Figure 1.1 shows an example of student observations. Students used their findings as evidence to support their ideas about the phenomena (output). The interactive notebooks provided a means of communicating with the teacher. The teacher read the students' work and gained an understanding of their thinking processes. Student entries become evidence not only of what they know but also of how they know it. Entries also indicated what students don't know.

The interactive notebook also enhances communication between the student and the parent or the teacher and the parent. Parents can simply pick up the interactive notebook and start asking questions about the student's entries. The interactive notebook provides parents with evidence of a student's conceptual understanding and personal reflections. A notebook rubric, which is permanently affixed in the front of the notebook, can be used by parents, teachers, and students to discuss expectations and the extent to which the student is meeting them.

Differentiating Instruction to Meet the Needs of All Students

When working with English language learners or students with special needs, the interactive notebook is an effective tool for the development and reinforcement of scientific or academic language. The notebook provides a safe place to practice writing and express prior knowledge and newly acquired knowledge. The interactive notebooks can be reviewed at meetings with intervention teachers and language specialists to provide evidence about how students are developing in your science class. It can help facilitate the development of intervention strategies for students with special needs.

Figure 1.1 By looking at this sample of a student's observations, one can see that the lab experiment helped guide the student to his final concluding ideas. His use of diagrams is helpful to the teacher because they show what he observed, and they make it easy to follow his thinking process. The diagrams become evidence for his final ideas. In those concluding ideas, he sums up Newton's first law.



OBSERVATION ABOUT CAR & FANS

- When the forward force is greater than the backward force, the car speeds up.
  F CAR F = SPEEDS UP
- When the backward force is greater than forward force, the car slows down.
  F CAR F = SLOWS
- When the forces are equal (back and forward), the speed is constant - with a push.
  PUSH F CAR F = CONSTANT
- Without a push, and there is an equal backward and forward force, the object stays at rest.
  = REST

CONCLUDING IDEAS FROM LAB OBSERVATIONS

- An object will stay at rest if the forces acting on it are balanced. The object will stay in a constant speed if the forces are balanced.
- An object will change in speed, direction, or both if the forces are unbalanced.

WHAT RESEARCH SUPPORTS USING INTERACTIVE NOTEBOOKS?

Notebooks support effective science instruction in a multitude of ways. According to *How Students Learn: Science in the Classroom* (Donovan & Bransford, 2005) science instruction should

- Elicit and address students' prior conceptions of scientific phenomena;
- Help students build deep understandings of science subject matter and of scientific inquiry (i.e., what it means to "do science"); and
- Help students monitor and take control of their own learning (metacognition).

Thoughtful use of interactive science notebooks can help meet all three of these recommendations. The interactive science notebook allows students the opportunity to identify their preexisting ideas, deepen and refine their scientific ideas throughout the learning activities, and reflect on their learning.

Beyond the connection to the general findings of Donovan and Bransford (2005) about effective science instruction, researchers have found specific evidence of how interactive notebooks promote student learning and increase achievement.

- Science notebooks expose students' thinking, providing important insights about student understandings and serving as formative assessment tools (Hargrove & Nesbit, 2003; Gilbert & Kotelman, 2005).
- Notebooks encourage active learning and provide opportunities for students to pursue their own interests and tackle authentic problems (Hargrove & Nesbit, 2003; Gilbert & Kotelman, 2005).
- Notebooks offer numerous opportunities to develop and enhance students' writing skills (Gilbert & Kotelman, 2005; Young, 2003).
- Notebooks provide a structure and support for differentiated learning, helping all students to achieve (Amaral, Garrison, & Klentschy, 2002; Gilbert & Kotelman, 2005).
- Interactive notebooks help improve students' organizational skills (Madden, 2001).
- Notebooks facilitate communication with parents and can be used to provide them with evidence of student growth (Hargrove & Nesbit, 2003; Young, 2003).

Some of the research on the use of notebooks focused directly on students' understanding of "doing science" and the nature of science and found that

- Thoughtfully implemented science notebooks use reflective writing and include a think-aloud feature that is common to the notebooks of actual scientists as they explore the world in a first hand manner (Magnusson & Palincsar, 2003);
- Science notebooks engage students in authentic science processes, such as recording information and data and engaging in research, collaboration, and analysis (Hargrove & Nesbit, 2003; Young, 2003); and
- Using an interactive notebook allows a student to think, record data and observations, and reflect just as professional scientists do (Young, 2003).

A CLOSER LOOK AT HOW NOTEBOOKS SUPPORT EFFECTIVE INSTRUCTION

We can consider notebooking from another vantage point—by examining how the processes of notebooking correlate with the nine effective strategies identified by Marzano, Pickering, and Pollock (2001) in *Classroom Instruction That Works.* Figure 1.2 shows how these strategies are integral to interactive-notebooking processes.

Figure 1.2 Interactive Notebooks and Effective Instructional Strategies

Strategies Described in *Classroom Instruction That Works*	**Interactive Science Notebooks**
Identifying similarities and differences	Notebooks are used by students to record their observations and make connections between concepts.
Summarizing and note taking	Students take notes as they complete science investigations and write summaries during each unit.
Reinforcing effort and providing recognition	Notebooks provide an ongoing record of student work and growth, leading to recognition from their peers, teachers, and parents.
Homework and practice	Homework assignments and practice are built into the use of interactive notebooks, providing valuable processing opportunities.
Nonlinguistic representations	Students illustrate their observations during each inquiry-based lab activity and create different kinds of graphs to represent their data.
Cooperative learning	Students work with partners and in teams to complete investigations and engage in classroom discourse.
Setting objectives and providing feedback	Students help identify key questions to explore during each unit. Notebooks allow the teacher to provide continual, specific feedback.
Generating and testing hypotheses	Students build the habit of generating hypotheses before beginning their explorations.
Questions, cues, and advance organizers	Questions are present throughout students' interactive notebooks, and the notebooks are richly littered with graphic organizers.

The following examples of student work show how interactive science notebooks incorporate many effective instructional strategies.

Identifying Similarities and Differences

Figure 1.3 This is an excellent example of the differences between a series and parallel circuit. As an educator, it is clear to me that the student understands the concept of how each works. Again, look at the use of arrows which provide information about her understanding not only of how each circuit works, but also how the energy flows and in which direction.

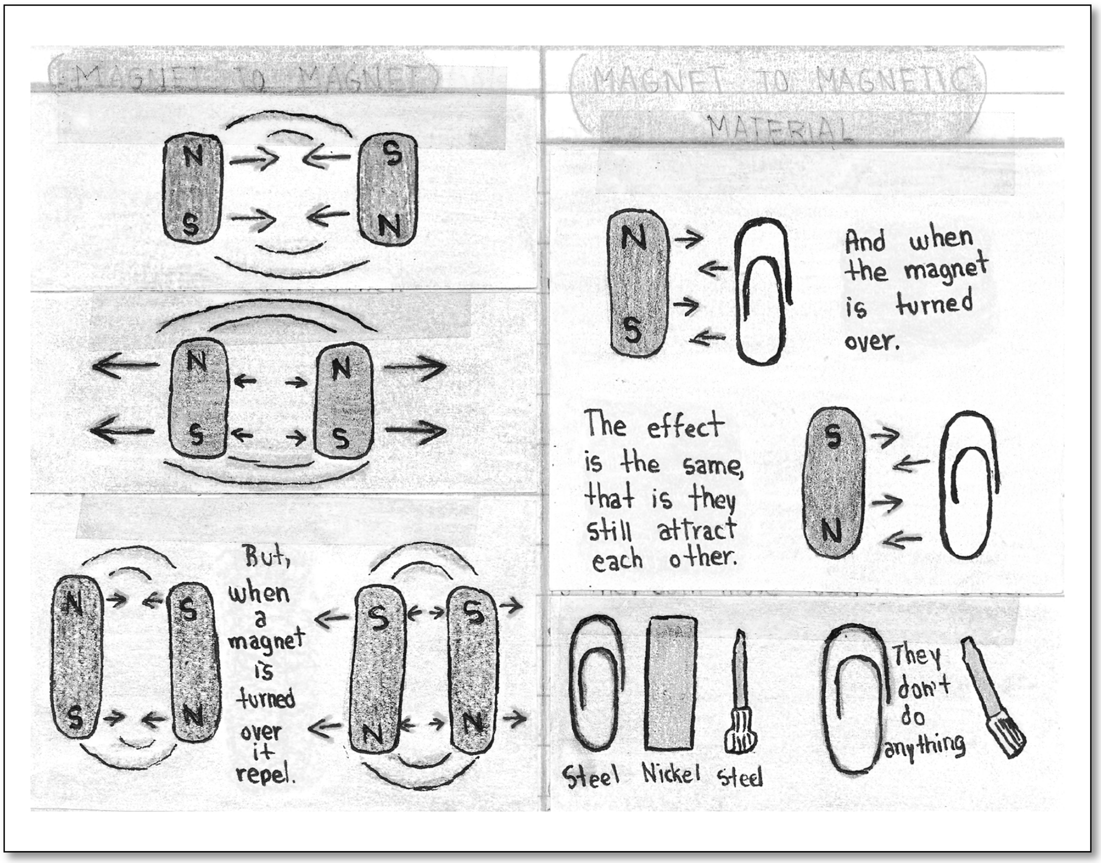
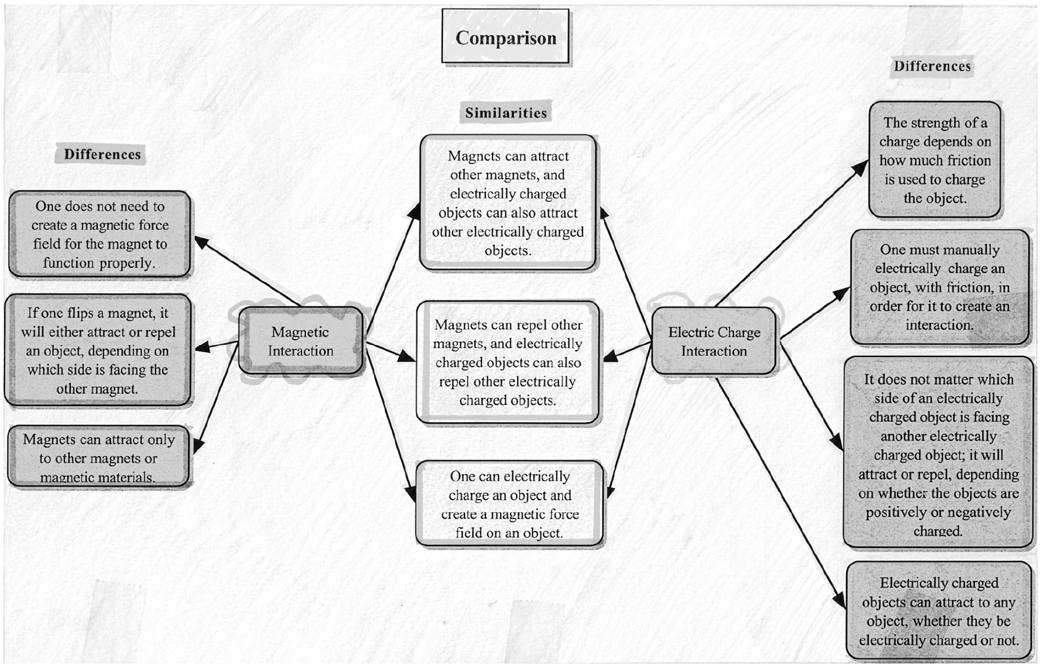


Figure 1.4 This is a graphic that a student created to show her understanding of the similarities and differences between magnetic interactions and electric charge interactions.



Summarizing and Note Taking

Figure 1.5 Under "Observations," the student recorded pieces of information that she can use later to formulate or back up claims. She was experimenting with a wooden puck connected to a balloon to see how forces affect motion. Her comments that "The balloon slowly got smaller decreasing in speed while gliding on a cushion of air" and "The puck slowed down because it sometimes just floated in place unless you pushed it" can be used later as evidence to prove that forces affect motion.

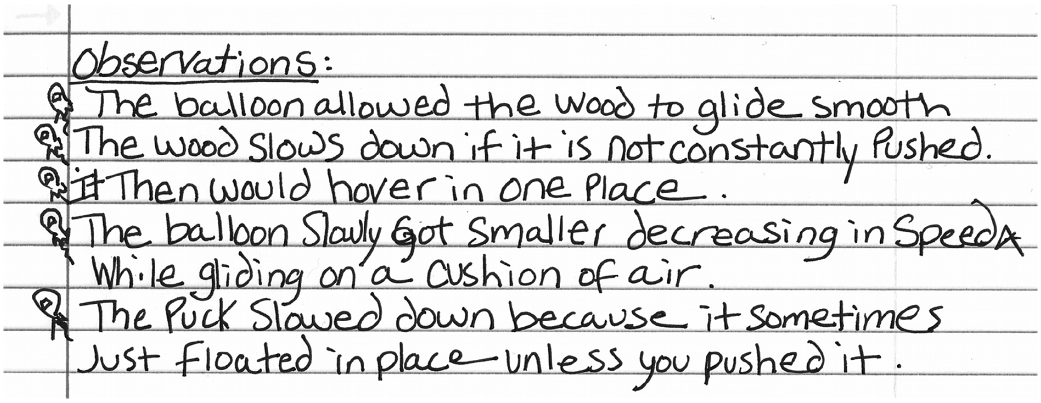
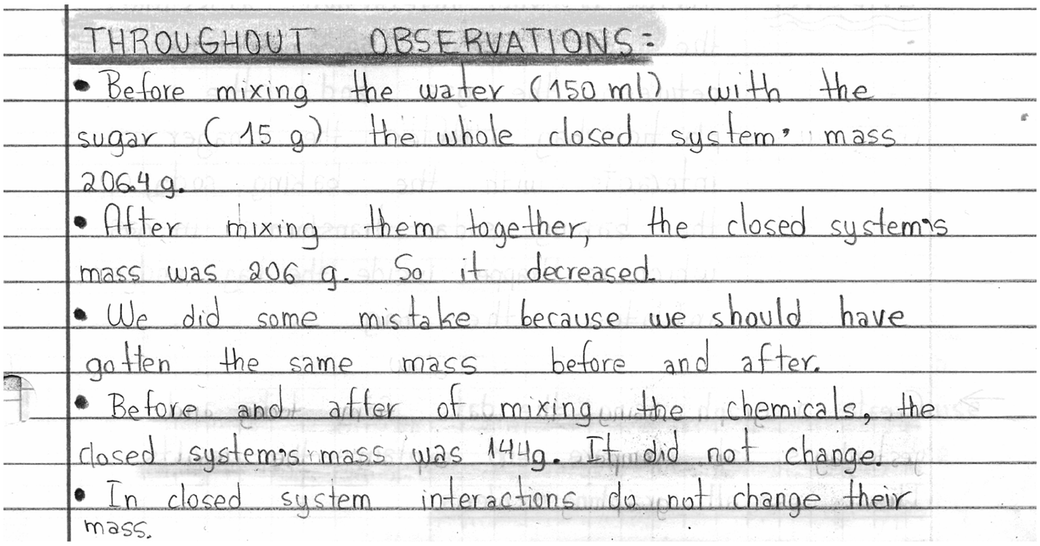
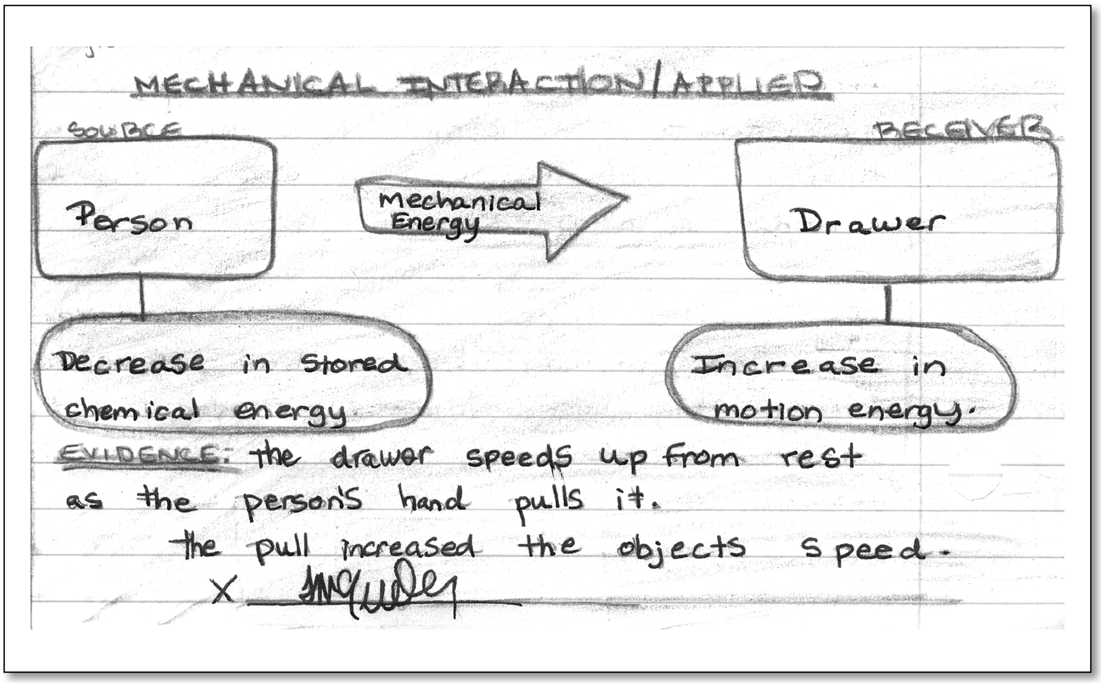

Observations:
The balloon allowed the wood to glide smooth
The wood slows down if it is not constantly pushed.
It Then would hover in one place.
The balloon slowly got smaller decreasing in speed
While gliding on a cushion of air.
The puck slowed down because it sometimes
Just floated in place unless you pushed it.

Figure 1.6 Under "Throughout Observations," the student wrote specifics about mass and how it decreased, then she self-corrected by writing that the mass should have remained the same both before and after. The final bullet is a starting point for her claim, "In a closed system interactions do not change their mass," which answers the question, "In a closed system, does the mass increase, decrease, or stay the same?"


THROUGHOUT OBSERVATIONS:
- Before mixing the water (150 ml) with the sugar (15 g) the whole closed system's mass 206.4 g.
- After mixing them together, the closed system's mass was 206 g. So it decreased.
- We did some mistake because we should have gotten the same mass before and after.
- Before and after of mixing the chemicals, the closed system's mass was 144g. It did not change.
- In closed system interactions do not change their mass.

Homework and Practice

Figure 1.7 For this homework assignment, I asked students to observe an interaction at home and create an energy diagram. At the bottom of the page, I asked for a parent signature, which serves two purposes: one, to make the parent check the homework; and two, to force a conversation between the parent and student. This gave the student an opportunity to reinforce what he learned in class by having to explain and teach the idea to his parent.



Nonlinguistic Representations

Figure 1.8 This student shows her understanding of an interaction by drawing butter in a pan before and after it melts. The arrows point to the object that changes state, and the drawing shows the butter changing shape.

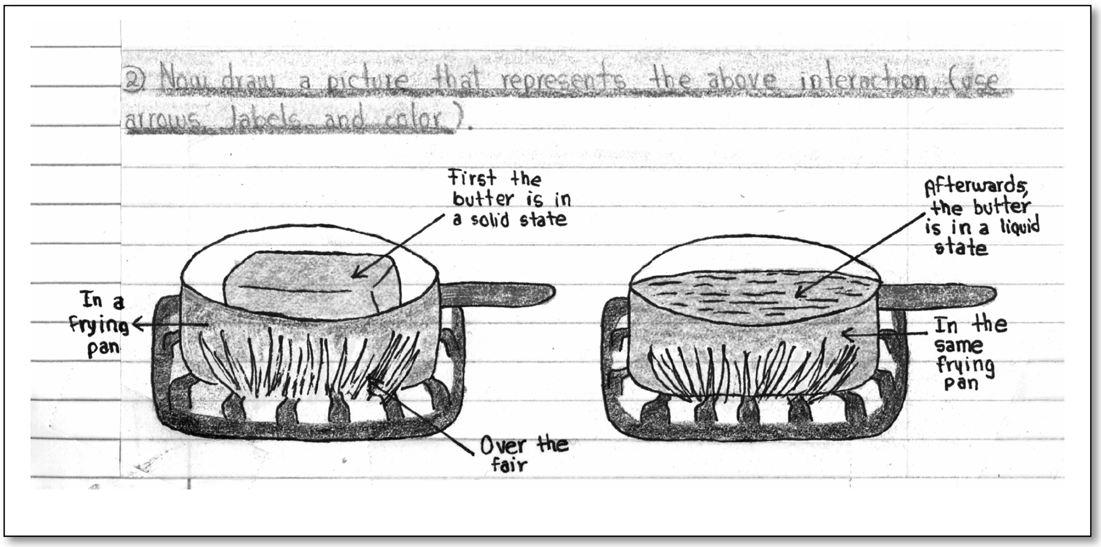
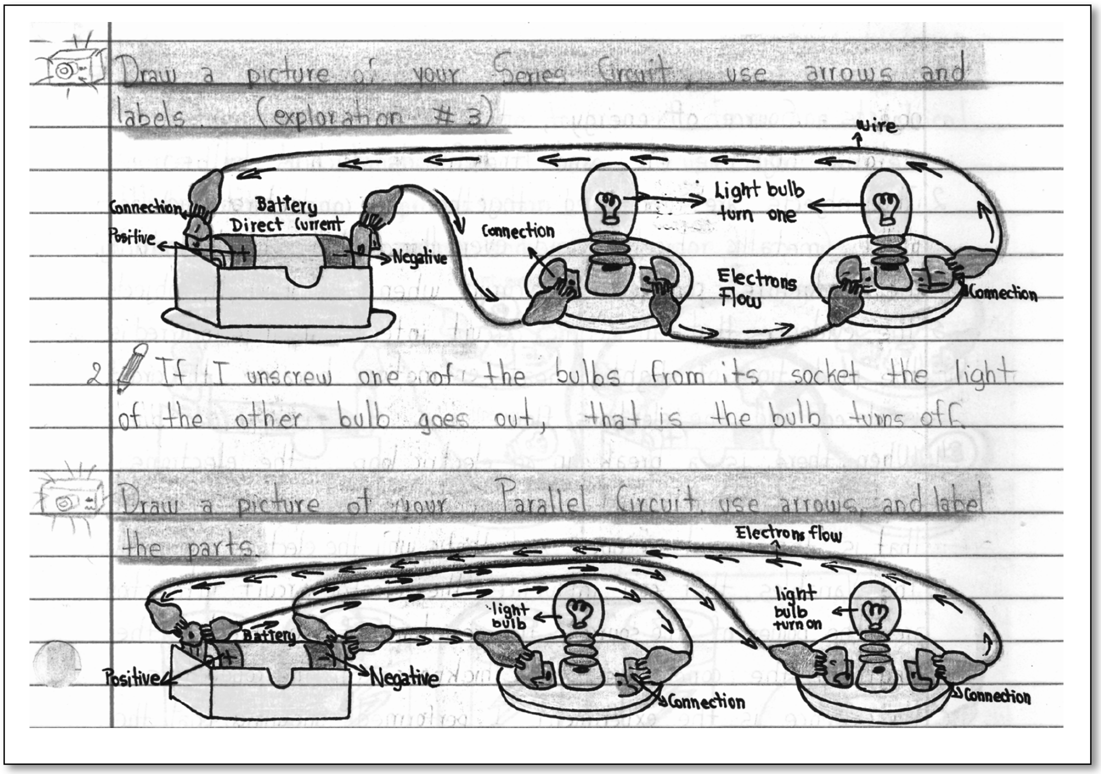


Figure 1.9 The student shows her understanding of how magnets interact, and you can clearly see from the use of arrows that she understands how magnets interact on both the north and south poles. The student even draws the force field that shows the relationship to energy, revealing a deeper understanding of the interaction between the two. This is the work of a student for whom English is a second language, so the nonlinguistic representations are keys to understanding her thinking processes.



Generating and Testing Hypotheses

Figure 1.10 This is an example of a hypothesis.

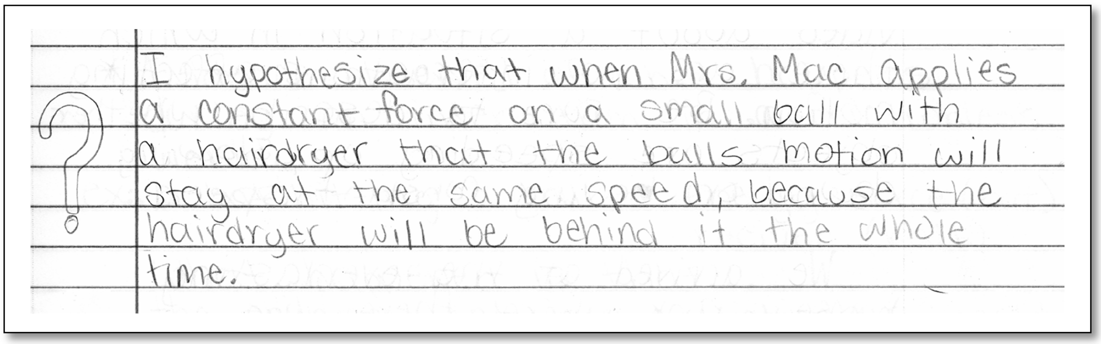
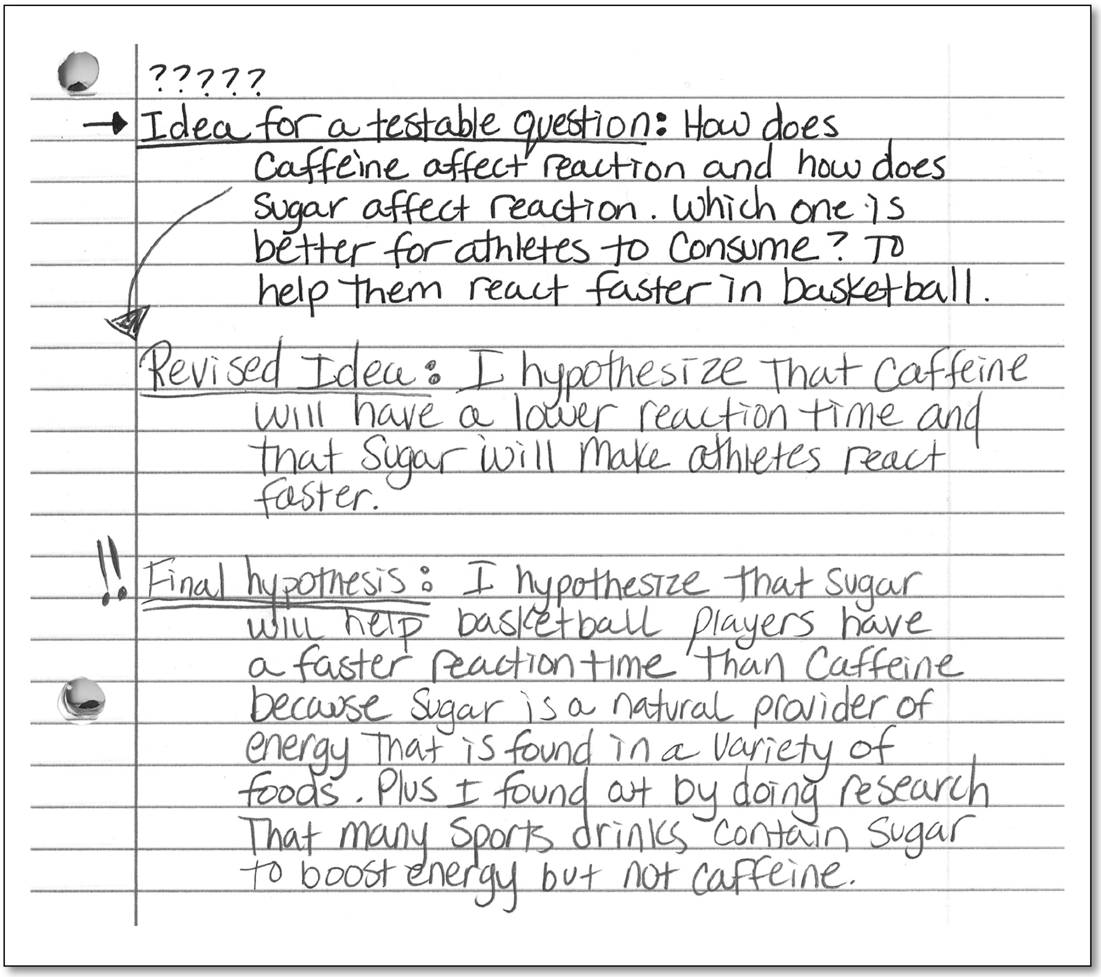


Figure 1.11 This notebook sample shows a student's thinking from beginning to end in the development of a science-fair project that spans six months. She came up with a testable question and through research developed a final hypothesis. You can see the development clearly as you read through to her final hypothesis.



?????

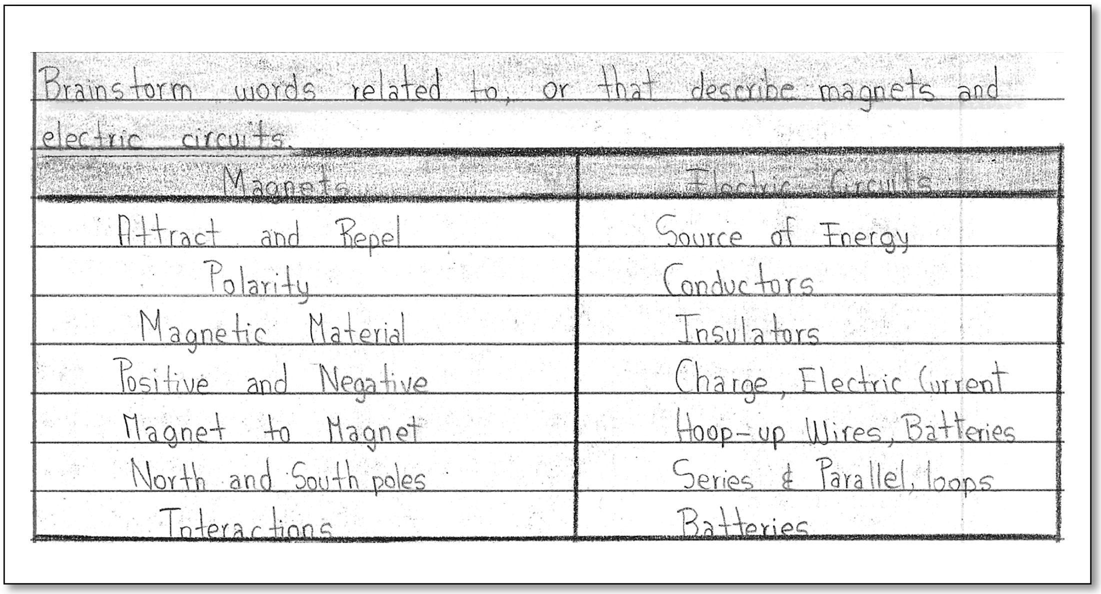
Idea for a testable question: How does Caffeine affect reaction and how does Sugar affect reaction. Which one is better for athletes to Consume? To help them react faster in basketball.

Revised Idea: I hypothesize that caffeine will have a lower reaction time and that Sugar will make athletes react faster.

!! Final hypothesis: I hypothesize that Sugar will help basketball players have a faster reaction time than Caffeine because Sugar is a natural provider of energy that is found in a variety of foods. Plus I found out by doing research that many Sports drinks contain Sugar to boost energy but not caffeine.

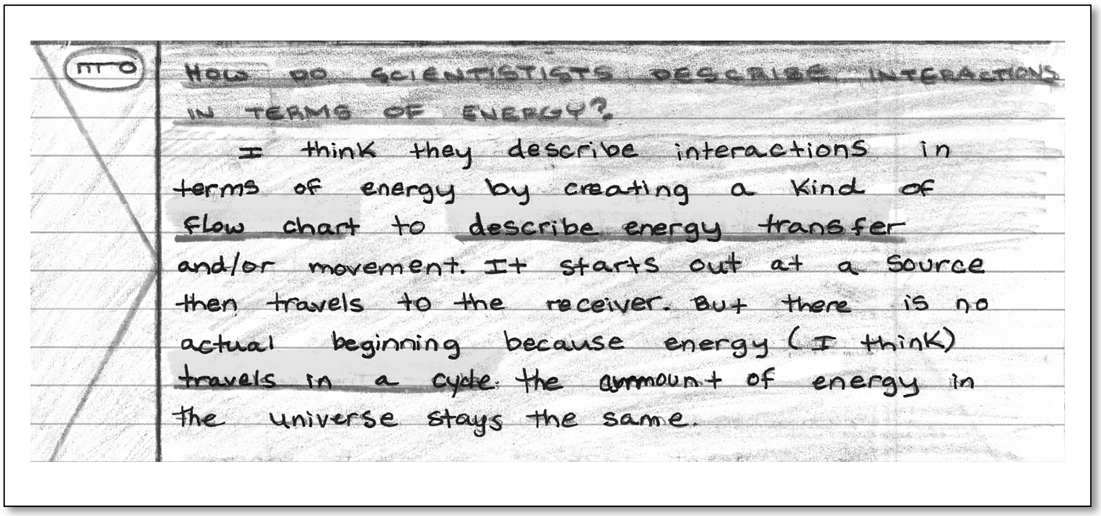
Questions, Cues, and Advance Organizers

Figure 1.12 This student uses a T-chart as a way of sorting and organizing her thoughts.


Brainstorm words related to, or that describe magnets and electric circuits.

Magnets	Electric Circuits
Attract and Repel	Source of Energy
Polarity	Conductors
Magnetic Material	Insulators
Positive and Negative	Charge, Electric Current
Magnet to Magnet	Hoop-up Wires, Batteries
North and South poles	Series & Parallel, loops
Interactions	Batteries

Figure 1.13 This is an example of a student response to a key question. A key question is a way of tapping into a students' prior knowledge and giving the student a focus point for the day's work. The student knows that there is a source and a receiver, but he is still searching for the "how" part of the concept. Every second page in the interactive notebook begins with a key question, providing plenty of opportunity for students to experience this way of thinking.


HOW DO SCIENTISTISTS DESCRIBE INTERACTIONS IN TERMS OF ENERGY?

I think they describe interactions in terms of energy by creating a kind of flow chart to describe energy transfer and/or movement. It starts out at a source then travels to the receiver. But there is no actual beginning because energy (I think) travels in a cyde. the amount of energy in the universe stays the same.

MAKING CONNECTIONS

At the beginning of the year, a class was studying basic electricity concepts. Students investigated the properties of interactions in an open and closed circuit. In their notebooks, they drew, labeled, and explained how these circuits work. They engaged in a series of explorations in which they were trying to make a light turn on, a buzzer sound, and a fan blow air all at the same time. They explored ways to make this happen by using both open and closed circuits. Students inquired, "Why does this one work? Why would it be better to use that one?" These were excellent questions at the time of the lab. But, the real payoff for using notebooks came in March, when students were trying to make meaning of chemistry ideas, and the concept of open and closed systems came up. Because the students had learned to rely on their notebooks to generate conversation, they were able to go back and reference their lab work earlier in the year to inform their conversations.

During an accountable-talk session, one of my students, Jason, said,

> An open and closed system is very similar to open and closed circuits because in a closed circuit the energy keeps flowing around and around, keeping the energy in that cycle. In a closed system, nothing can come in or out, it can only move within the system. In an open circuit, the energy can be cut off by a switch that can open and close, allowing energy to flow in or out, making the bulb turn on or shut off. Kind of like an open system that allows mass and volume to increase or decrease because matter can travel in or out of that system.

The conversation continued, and when another student asked for evidence, Jason referenced the data from the lab five months earlier to back up his point. Although Jason was not completely accurate, he was able to use the notebook to identify similarities between the two lab explorations.

From there, the students and I built on Jason's comparison to generate comments about contrast as well as similarity. Other students found differences that also led to a rich discussion. Though the two lab explorations were 5 months apart, the students were able to refer to their earlier learning to construct new understanding. If these students had been completing assignments the traditional way—using loose-leaf paper, or even science materials in packets—the earlier data would have been unavailable, having been discarded and recycled long ago. Because the notebook was maintained all year, Jason had it in front of him, and he used it, which made him feel smart, and helped him draw conclusions around another concept.

Using notebooks helps students come to see learning as integrated. Students rely on the data and become accustomed to asking one another for evidence to back up their thinking. This example also illustrates how interactive notebooks or journals reinforce student effort and provide a way to recognize student work. Jason feels well armed with data and confident enough to speak out to the class with his findings and ideas. His hard work and efforts pay off, and he feels recognized for those efforts, recognized by his teacher and, more important, by his peers.

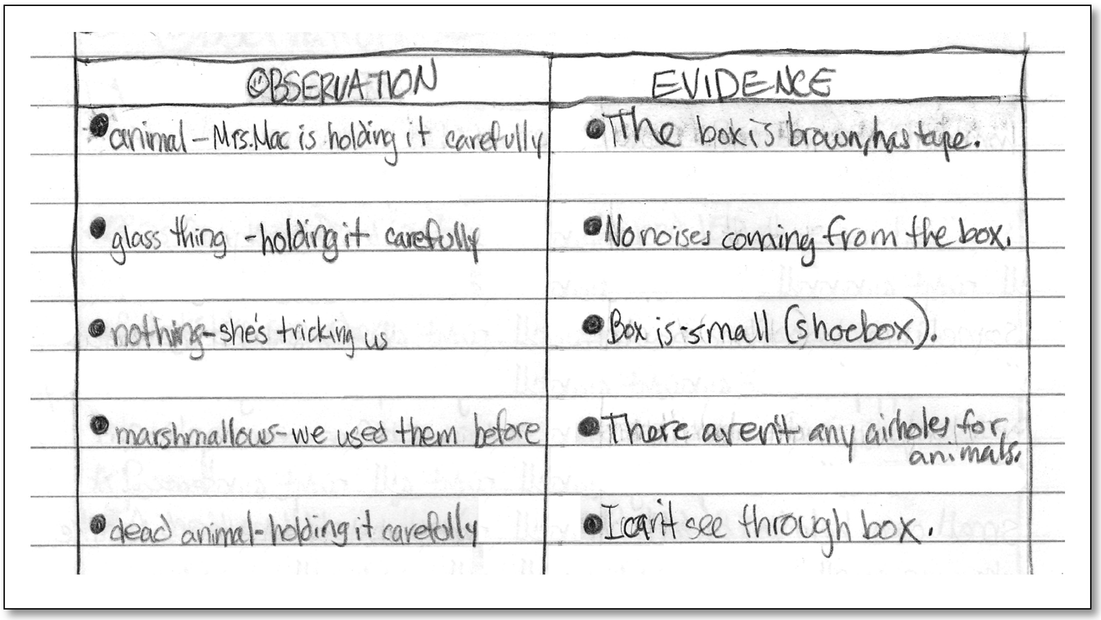
WHAT YOU NEED TO KNOW TO BEGIN

Like most effective educational practices, incorporating interactive science notebooks into the classroom is a learning process for the teacher. Becoming skilled in their use will not happen overnight for you or your students. The implementation of notebooks takes time in the beginning of the year to set up. You will need to set the parameters and make the expectations very clear for your students from the beginning. Chapters 5 and 6 will go into detail about the first days of school and how to set the stage for notebooking all year.

When thinking about your expectations for interactive notebooks, try to set clear goals that you can sustain all year long. These should be goals you care about and believe are important to overall student learning. For example, if you want students to write in complete sentences, you need to begin holding them accountable for this in September, and continue with the same expectation through the school year to May.

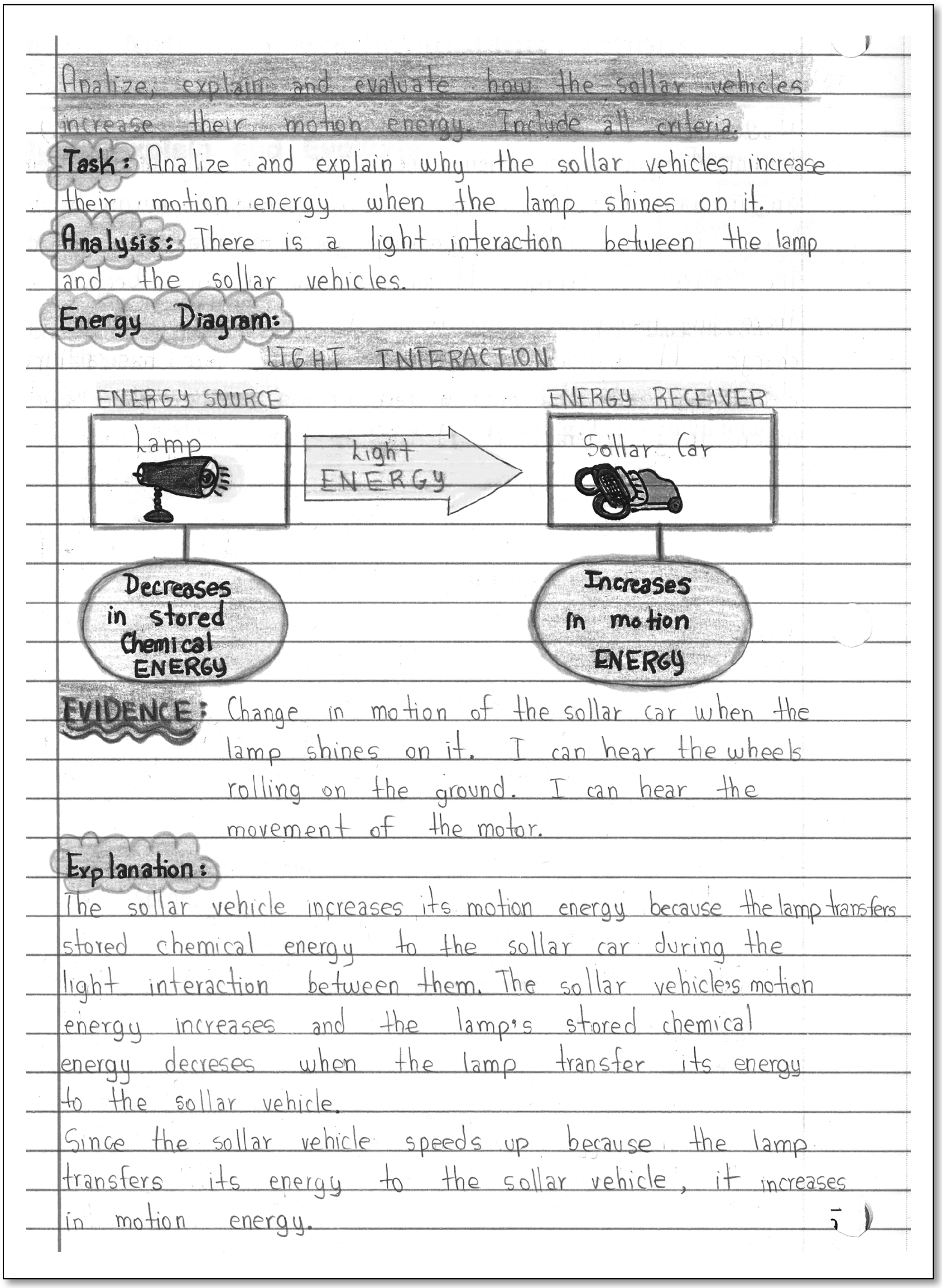
Maintaining successful notebooking throughout the year will take time and effort. It takes patience to work through initial problems. It will be easy to say, “It’s not working, so forget it!” I encourage you to start the process, maintain it to the best of your ability, make changes and adjustments where needed, and know that you will do better next year. If you have been using interactive notebooks for a while, challenge yourself to add something new, or focus on a weakness with the goal of increasing student achievement.

Figure 1.14 In my first year using interactive notebooks, I just wanted a place for students to record their work. I wasn’t thinking much beyond that. The notebooks that year had little metacognition and were more teacher guided. In the sample below, there is no use of color, the student writes in incomplete sentences, and her work itself doesn’t tell me much about what she knows.



OBSERVATION	EVIDENCE
• animal – Mrs. Mac is holding it carefully	• The box is brown, has tape.
• glass thing – holding it carefully	• No noises coming from the box.
• nothing – she's tricking us	• Box is small (shoebox).
• marshmallows – we used them before	• There aren't any airholes for animals.
• dead animal – holding it carefully	• I can't see through box.

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.



Analize, explain and evaluate how the sollar vehicles increase their motion energy. Include all criteria.

Task: Analize and explain why the sollar vehicles increase their motion energy when the lamp shines on it.

Analysis: There is a light interaction between the lamp and the sollar vehicles.

Energy Diagram:

EVIDENCE: Change in motion of the sollar car when the lamp shines on it. I can hear the wheels rolling on the ground. I can hear the movement of the motor.

Explanation:
The sollar vehicle increases its motion energy because the lamp transfers stored chemical energy to the sollar car during the light interaction between them. The sollar vehicle's motion energy increases and the lamp's stored chemical energy decreses when the lamp transfer its energy to the sollar vehicle.
Since the sollar vehicle speeds up because the lamp transfers its energy to the sollar vehicle, it increases in motion energy.

CLASSROOM SNAPSHOT

What should you see when students use interactive notebooks in your classroom? You should see students constantly using their interactive notebooks! The interactive notebook should be open at all times—during a lab, while using the textbook, and during student discourse.

You should see students writing. The entire interactive notebook is filled with writing from the beginning to the end. Students get the chance to practice writing, revise their writing, complete formal writing, do summary writing, and write conclusions both after labs and for graphs. Writing helps to synthesize student thinking and is used as a way for students to communicate to teachers what they know.

When you open up a notebook, you should see work on every page. You should see the use of text features such as highlighting, color, graphics, headings, and writing. Different parts of each page should jump out at you.

You should see the student work getting progressively better through the notebook pages. You should be able to see the thought process of the students. You should see thoughtful responses with self-reflection embedded in the work; you should see revisions and students adding to previous ideas that were already recorded in their notebook.

The classroom as a whole should be more student driven, with less and less teacher-guided moments as the year advances. Your classroom might be noisy due to the inquiry-type of activities the students are participating in. You might see students talking while using their interactive notebooks as a way of driving discussion. You may hear students using data to back up their claims and making connections to various labs.

You will see students experiencing a high degree of ownership—for their learning and their work. This ownership can provide the teacher opportunities to ask for more out of students, and because they are passionate about their notebooks, students will go the extra mile, which leads to student growth.

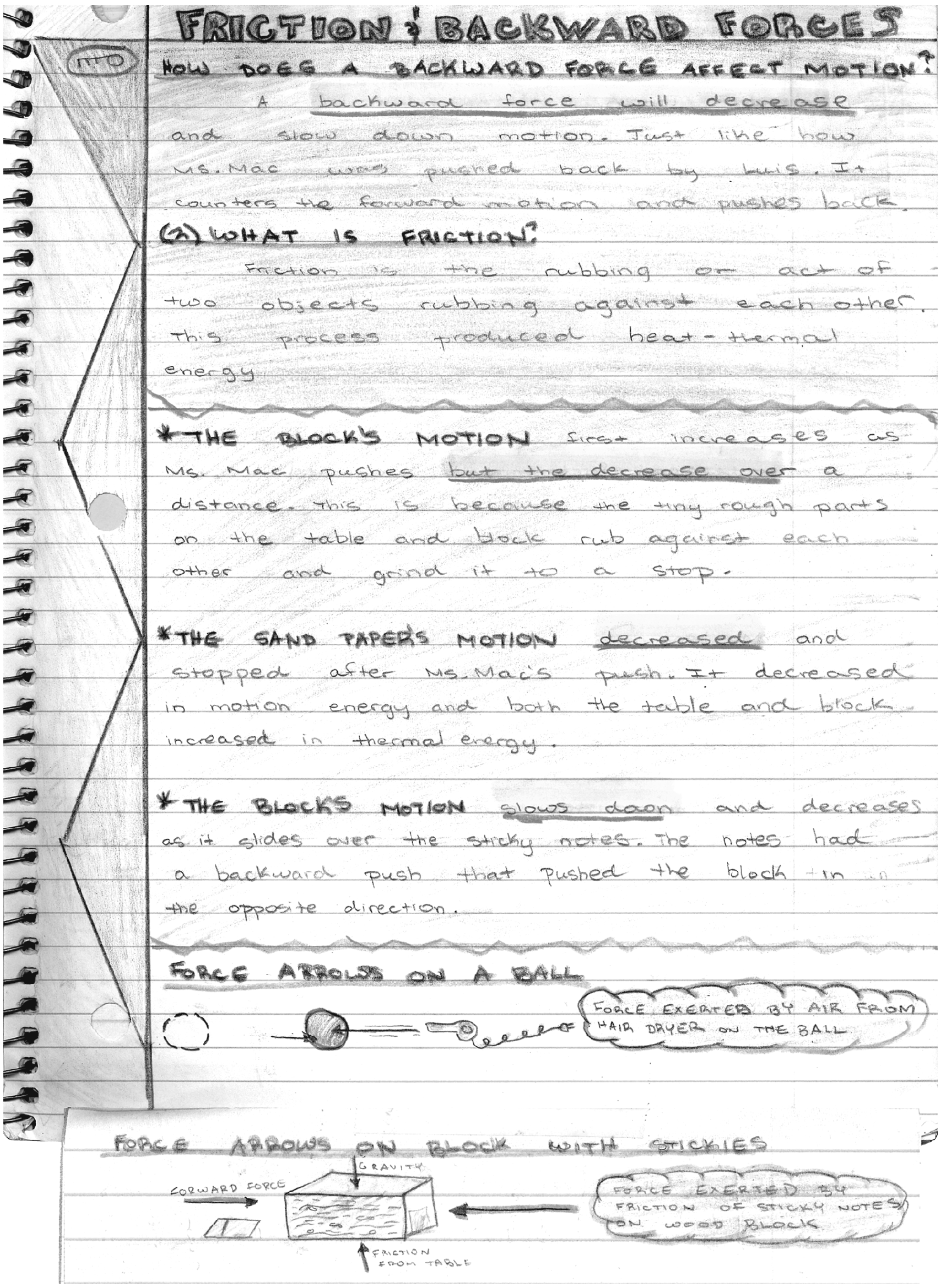
You will also see an increase in student discourse. Students will talk in order to clarify ideas, hear new ideas, build on existing ideas, and come to a group consensus about concepts that are introduced in class. Students will use the evidence in their notebooks to back up their statements.

SUMMARY

An interactive notebook is a tool used by teachers to increase student thinking and achievement. Interactive notebooks can be used to track, reflect, communicate, and assess the work students do. They are a record of the work done by students throughout the year. The interactive notebook is a tool of opportunity to help bridge the learning gap. When thinking about implementing the interactive notebook in your classroom, it is helpful to remember to

- Choose a time to begin using interactive notebooks, and just do it!
- Focus on goals and components that are important to you, and stick with them;
- Use interactive notebooks to help students to become better thinkers; and
- Take advantage of their power as tools for interactivity between stakeholders.

Figure 1.16 This is a fabulous example of a *typical* student's notebook page. The focus is on metacognition and explaining through writing what she learned. This example shows the student questioning, self-correcting, diagramming, processing, and understanding friction through pictures and written examples. Notebooking enhanced her individual creative process. Some notebooks become a source of personal pride as "works of art."



FRICTION & BACKWARD FORCES

HOW DOES A BACKWARD FORCE AFFECT MOTION?

A backward force will decrease and slow down motion. Just like how Ms. Mac was pushed back by Luis. It counters the forward motion and pushes back.

(2) WHAT IS FRICTION?

Friction is the rubbing or act of two objects rubbing against each other. This process produced heat - thermal energy

*THE BLOCK'S MOTION first increases as Ms. Mac pushes but the decrease over a distance. This is because the tiny rough parts on the table and block rub against each other and grind it to a stop.

*THE SAND PAPERS MOTION decreased and stopped after Ms. Mac's push. It decreased in motion energy and both the table and block increased in thermal energy.

*THE BLOCKS MOTION slows doon and decreases as it slides over the sticky notes. The notes had a backward push that pushed the block in the opposite direction.

FORCE ARROWS ON A BALL

FORCE EXERTED BY AIR FROM HAIR DRYER ON THE BALL

FORCE ARROWS ON BLOCK WITH STICKIES

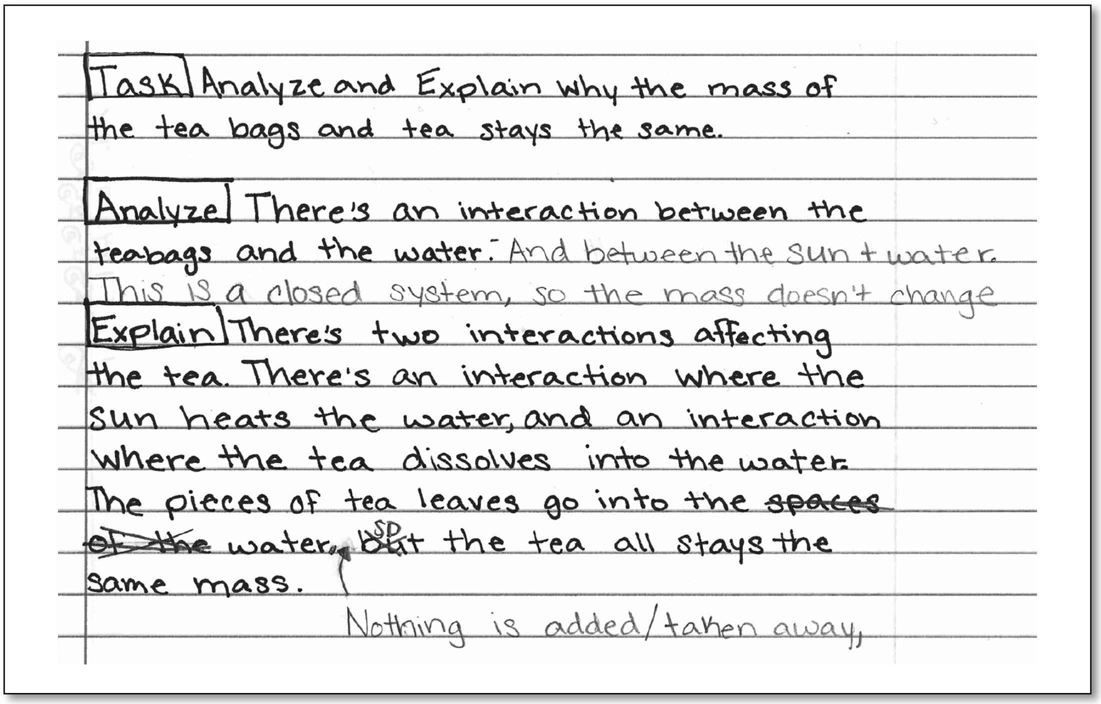
GRAVITY

FORWARD FORCE

FORCE EXERTED BY FRICTION OF STICKY NOTES ON WOOD BLOCK

FRICTION FROM TABLE

Figure 1.17 This sample shows how students use the notebooks as a way of self-correcting the work they do. This student added to his work after participating in a group discussion about the various types of interactions.



Task Analyze and Explain why the mass of the tea bags and tea stays the same.

Analyze There's an interaction between the teabags and the water. And between the sun + water. This is a closed system, so the mass doesn't change

Explain There's two interactions affecting the tea. There's an interaction where the sun heats the water, and an interaction where the tea dissolves into the water. The pieces of tea leaves go into the ~~spaces of the~~ water. ~~But~~ SO the tea all stays the same mass.

Nothing is added/taken away,