



A Teacher's Guide to  
**multisensory**  
**LEARNING**

Improving **Literacy** by Engaging the Senses

Lawrence Baines

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PAPERBACK ISBN: 978-1-4166-0713-7 • ASCD product #108009 • n10/08  
 Also available as an e-book through ebrary, netLibrary, and many online booksellers (see Books in Print for the ISBNs).

Quantity discounts for the paperback edition only: 10–49 copies, 10%; 50+ copies, 15%; for 1,000 or more copies, call 800-933-2723, ext. 5634, or 703-575-5634. For desk copies: [member@ascd.org](mailto:member@ascd.org).

**Library of Congress Cataloging-in-Publication Data**

Baines, Lawrence.  
 A teacher's guide to multisensory learning : improving literacy by engaging the senses / Lawrence Baines.  
 p. cm.  
 Includes bibliographical references and index.  
 ISBN 978-1-4166-0713-7 (pbk. : alk. paper) 1. Language arts. 2. Perceptual learning.  
 3. Teaching—Aids and devices. I. Title.

LB1576.B245 2008  
 371.3—dc22 2008021542

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**Improving Literacy by Engaging the Senses**



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To Judith Daso Herb,  
a woman of vision and compassion

## Acknowledgments ■ ■ ■

I extend my thanks to the many people whose contributions enriched this book: For their work in Chapter 3, David James Poissant of Tucson, Arizona; Mike Angelotti of Norman, Oklahoma; and Debra Winston of Carbondale, Colorado. For their work in Chapter 4, Chris Goering of the University of Arkansas; and Mark Rabbit and Rob Deckard of Toledo, Ohio. For their work in Chapter 6, Lesley Kahle of Tampa, Florida; Robert Masters III of Temperance, Michigan; and Matt Copeland of Topeka, Kansas. For their work in Chapter 7, Pamela Sissi Carroll of Tallahassee, Florida; and Michael W. Kibby, William J. Rapaport, Karen M. Wieland, and Debra A. Dechert of Buffalo, New York. I'm grateful to Berenice Felix-Diaz of Irving, Texas, for sharing a beautiful quotation from one of her young students.

Special thanks to David Pyles and Lori Keleman, who over a period of three-and-a-half years helped me gather enough books and articles to fill 16 filing cabinets; 34 cardboard boxes; all the drawers of my massive, clunky desk; and half the floor of my office. Thanks to Mom, Dad, and my wife Coleen for help with editing and for dispensing much-needed warm fuzzies.





## Introduction ■ ■ ■

*Yo puedo oler el perfume de las flores que planta cada año mi Tía Maria. Leyendo bajo los árboles un libro perfecto a mi primita, me siento mágica. Jugando y disfrutando con mi prima junto al aire fresco de otoño, yo pienso, “Que rico el aire que salpica en mi cara.” Después de que me canso de jugar siento al misma vez paz y sueño.*

*I can smell the perfume of the flowers planted each year by Aunt Maria. Reading a perfect book to my little cousin under the arbor, I feel the magic. Playing together with my cousin in the outdoors, I think, “The rich air sprinkles in my face.” In time, I tire of playing, but I feel the peace nevertheless.*

—3rd grade student of Berenice Felix-Diaz, Irving, Texas

Two of the greatest challenges for teachers in the years ahead will be student engagement and achievement. Multisensory learning techniques provide an effective, highly adaptable method for addressing both. The premise of multisensory learning is simple. When students invoke more than one sense, simultaneously or over a period of time, they tend to interact with the material more intensely and thereby retain what they have learned for longer periods of time. In multisensory learning, a teacher engages students through hands-on, visual, auditory, and olfactory stimuli, then links the activity to relevant academic objectives. It is through the reciprocal relationship between sensory input and thinking that multisensory techniques gain their power.

Sensory input without thought yields only transitory sensations. If you notice a funny smell in the classroom one day but are too tired to bother identifying it, then a natural gas leak might go undetected for weeks. Without a reason to remember sensory input, the information communicated via the senses disappears. How many windows do you have in your classroom? How many floor tiles? Although you teach in your classroom every day, unless you have a reason to keep such information in your head, the sensory input is lost.

On the other hand, thought without sensory input is difficult to retain. Anyone who has tried to study for a mathematics exam by memorizing formulas or slogged through pages of abstruse musings in philosophy journals knows the difficulties of trying to learn through abstraction without the benefit of real, sensory experience.

For purposes of illustration, assume that an academic objective is for students to learn the definition of the word *mephitic* (which means offensive smelling or noxious). A traditional approach for teaching new vocabulary has been for students to copy a word three times, write its definition, then use it in a sentence. “It was mephitic” is the kind of sentence that students in my classes used to write when I made such a request.

Teaching the meaning of *mephitic* through multisensory stimuli would constitute a dramatic departure for both teacher and learner. Instead of having students flip through the pages of a dictionary to find and record a formalized definition they might not comprehend, a teacher would ask students to picture in their minds a foul-smelling odor. After students discussed the images in their minds that related to a foul-smelling odor, the teacher would show a photo of a chicken farm, an outhouse, and a smokestack emitting black puffs of industrial waste—all visual representations of *mephitic*. At the appearance of each image, the teacher would point to the word *mephitic*, perhaps written on the board in a large font, and

pronounce it. Students would repeat “Mephitic!” after hearing the pronunciation by the teacher. Finally, the teacher would walk students outside to a safe area on the school grounds—perhaps a grassy patch of land or a piece of empty asphalt. After students gathered around, the teacher would spray a fetid scent into the air. As students pinched their noses and complained about the smell, the teacher would say, “Mephitic.”

Learning the meaning and pronunciation of *mephitic* through such a process would take approximately the same amount of time as using the “write three times/define/use in a sentence” approach. Yet, students who participated in the multisensory experience of *mephitic* would likely retain the word’s meaning for the next 60 years, whereas students participating in the quiet seatwork lesson likely would not retain the meaning until the end of the class period.

The tenets of multisensory learning are already familiar to the handful of specialized doctors, psychiatrists, and educators who routinely work with individuals with severely impaired mental capacities. The research base that affirms the power of using multisensory approaches with learning-disabled children and adults is vast and growing—I cite only a fraction of the available studies in this book.

In reading descriptions of the quantum leaps in motivation and achievement experienced by participants in multisensory studies, I have marveled that the techniques were not co-opted by teachers years ago. Because multisensory approaches have been used effectively with populations of profoundly disabled students, it seems logical that similar techniques would work in classrooms of the nondisabled. Yet multisensory techniques remain relatively obscure in nontherapeutic settings such as classrooms.

Instead of focusing on making learning more engaging, relevant, and enduring, the emphasis in some schools seems to be on assigning and assessing. Often, the specter of the state standardized exam is the rationale used to justify a seemingly intractable assign-and-assess approach to learning. However, assign and assess has proven time and again that it can deliver, at best, mediocre academic results of limited duration, even when the sole unit of measurement is the test score. Indeed, how unsatisfying it must be to teach expressly to a narrow, predetermined curriculum for the purpose of documenting tiny, ephemeral increments in test scores.

When a student is asked to read a story silently from a textbook and answer the questions at the end of the story in complete sentences, what is being learned? Basically, such an exercise evaluates a student’s ability to perform two tasks:

1. To independently extract meaning from dark squiggles on a page (words).
2. To communicate a précis of the meaning of the squiggles to an audience of one—the teacher.

In this scenario, the teacher is not doing anything to influence the understanding of words or the formulation of a written response. The teacher has merely assigned a task, then assessed the extent to which students can independently perform the task. There has been no discovery, no interaction, no risk, no negotiation, no learning. Of course, silent reading is an essential practice, but the point is that an assign-and-assess approach teaches little. Assigning and assessing do not alter the behaviors in which students already engage; this approach merely involves recording them.

On the other hand, multisensory techniques have the power to be transformative—to change student behavior. In contrast to the somber routine of assign and assess, multisensory techniques can make learning enjoyable.

In this book, I offer an argument for the use of multisensory techniques as a foundational strategy for teaching. Chapter 1 describes the dramatic changes in the use of leisure time and the decline in reading among children and young adults in the recent past. Students who inhabit schools today truly possess different talents, skills, and weaknesses than students who preceded them. Chapter 1 explains how and why students are different and emphasizes the urgency of developing a more engaging and authentic approach to instruction, especially in light of the centrality of literacy to 21st century skills, as noted by a plethora of special commission reports and recommendations.

Chapter 2 offers a brief overview of the history, milestones, and seminal studies in fields related to multisensory learning. One major point of the chapter is that teaching through abstract representation is one of the least effective methods for cultivating learning. Unfortunately, because it is easy to implement, teaching through abstract representation continues to be among the most popular instructional methods in schools today.

Chapters 3 to 6 describe specific research relating to each sense—sight, sound, smell and taste, movement and touch—with commentary on a few studies that seem especially pertinent to teachers. Chapters 3 to 6 also feature proven multisensory lessons straight from the classroom, many replete with samples of student work.

Chapter 7 asserts the importance of making learning fun. Through ingenious simulations, these final activities demonstrate the effectiveness of learning through a sense of play.

To close the loop, samples of student work and grading criteria are included with most activities. To provide consistency, I adapted the 6-point scale commonly used by the National Assessment of Educational Progress (NAEP) to assess competence in writing. This 6-point scale is also widely used in various state assessments across the country. In the NAEP system, the basic evaluation system is as follows:

0 No response	1 Unsatisfactory	2 Insufficient	3 Uneven	4 Sufficient	5 Skillful	6 Excellent
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Sometimes, when perusing the assessment criteria of state or other national tests, teachers can get confused over what would appear to be different evaluation instruments. For example, in some reports, a 5-point scale is used. In most cases, this 5-point scale is the same as the 6-point scale except that the categories of 0 (no response) and 1 (unsatisfactory response) are combined.

0 No response or unsatisfactory response	1 Insufficient	2 Uneven	3 Sufficient	4 Skillful	5 Excellent
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Sometimes, even a 4-point scale is used. For example, in some reports, the NAEP will use the terms *advanced*, *proficient*, *basic*, and *below basic* as classifications to characterize student competence. Again, this is a 6-point scale in disguise, with 6 associated with advanced (or excellent), 5 with proficient (or skillful), 4 with basic (or sufficient), and all scores below 4 as below basic (uneven, insufficient, unsatisfactory, and no response).

0 No response	1 Unsatisfactory	2 Insufficient	3 Uneven	4 Sufficient	5 Skillful	6 Excellent
<b>Below basic</b>	<b>Below basic</b>	<b>Below basic</b>	<b>Below basic</b>	<b>Basic</b>	<b>Proficient</b>	<b>Advanced</b>

The general guidelines for placing student work in the 4-point scale categories are listed in Figure 1.

**Figure 1 General Guidelines for Categories in 4-Point Scale**

Grade 4	
<b>Basic/ Below Basic</b>	<ul style="list-style-type: none"> <li>• Is somewhat organized</li> <li>• Includes some supporting details</li> <li>• Has some mistakes in grammar, spelling, and capitalization that get in the way of meaning</li> </ul>
<b>Proficient</b>	<ul style="list-style-type: none"> <li>• Is organized</li> <li>• Includes supporting details</li> <li>• Demonstrates audience awareness through form, content, and language</li> <li>• Has some mistakes in grammar, spelling, and capitalization, but they do not interfere with meaning</li> </ul>
<b>Advanced</b>	<ul style="list-style-type: none"> <li>• Is clearly organized</li> <li>• Has a consistent topic or theme</li> <li>• Has a logical sequence</li> <li>• Includes details</li> <li>• Has a clearly marked beginning and ending</li> <li>• Shows evidence of precise and varied language</li> <li>• May show signs of analytical, evaluative, or creative thinking</li> <li>• Has grammar, spelling, and capitalization errors that are so few and so minor that a reader can easily skim over them</li> </ul>
Grade 8	
<b>Basic/ Below Basic</b>	<ul style="list-style-type: none"> <li>• Demonstrates a general understanding of the task</li> <li>• Shows awareness of the audience</li> <li>• Provides some supporting details</li> <li>• Has some mistakes in grammar, spelling, and capitalization that get in the way of meaning</li> </ul>
<b>Proficient</b>	<ul style="list-style-type: none"> <li>• Is organized</li> <li>• Includes supporting details</li> <li>• Uses precise language</li> <li>• Uses varied sentence structure</li> <li>• Demonstrates audience awareness through form, content, and language</li> <li>• Shows analytical, evaluative, or creative thinking</li> <li>• Has some mistakes in grammar, spelling, and capitalization, but they do not interfere with meaning</li> </ul>
<b>Advanced</b>	<ul style="list-style-type: none"> <li>• Is clearly and consistently organized</li> <li>• Is logically sequenced</li> <li>• Is fully developed</li> <li>• Includes details and elaboration</li> <li>• Uses strategies such as analogies, illustrations, examples, anecdotes, or figurative language to clarify a point</li> <li>• Shows some analytical, evaluative, or creative thinking</li> <li>• Uses precise word choice</li> <li>• Uses varied sentence structure</li> <li>• May show signs of analytical, evaluative, or creative thinking</li> <li>• Has few errors in grammar, spelling, punctuation, capitalization, and sentence structure; demonstrates good control of these elements and may use them for stylistic effect</li> </ul>

**Figure 1 (continued)****Grade 12**

<b>Basic/ Below Basic</b>	<ul style="list-style-type: none"> <li>• Demonstrates understanding of task and audience</li> <li>• Shows some analytical, evaluative, or creative thinking</li> <li>• Includes details that support and develop the central idea</li> <li>• Is clearly organized, making use of techniques such as a consistency in topic or theme, sequencing, and a clear introduction and conclusion</li> <li>• Demonstrates enough accuracy in grammar, spelling, punctuation, and capitalization to communicate to a reader; may have some errors, but these should not get in the way of meaning</li> </ul>
<b>Proficient</b>	<ul style="list-style-type: none"> <li>• Provides effective and fully developed response</li> <li>• Uses analytical, evaluative, or creative thinking</li> <li>• Is coherent, using techniques such as a consistent theme, sequencing, and a clear introduction and conclusion</li> <li>• Includes details and elaborations that support and develop the main idea</li> <li>• Uses precise language</li> <li>• Uses variety in sentence structure</li> <li>• Contains few errors in grammar, spelling, punctuation, capitalization, and sentence structure; demonstrates a command of these elements and may use them for stylistic effect</li> </ul>
<b>Advanced</b>	<ul style="list-style-type: none"> <li>• Provides a mature and sophisticated response</li> <li>• Uses analytical, evaluative, or creative thinking</li> <li>• Is fully developed, incorporates details and elaboration that support and extend the main idea</li> <li>• Demonstrates use of literary strategies— anecdotes and repetition, for example—to develop ideas</li> <li>• Well crafted, organized, and coherent</li> <li>• Incorporates techniques such as consistency in topic or theme, sequencing, and a clear introduction and conclusion</li> <li>• Uses compelling language, precise word choice</li> <li>• Uses variety in sentence structure</li> <li>• Contains few errors in grammar, spelling, punctuation, capitalization, and sentence structure; demonstrates a sophisticated command of these elements and may use them for stylistic effect in their work</li> </ul>

Source: Adapted from *National Assessment of Educational Progress Achievement Levels 1992–1998 for Writing* by S. Loomis & M. Bourque (Eds.), 2001, Washington, DC: U.S. Department of Education.

Because more than half of American students score at or below basic on NAEP writing assessments (National Assessment of Educational Progress, 2003), I recommend using a 6-point scale. Scores of 0, 1, 2, and 3 help delineate exactly how much below basic a student might be. Otherwise, a student scoring at Level 1 who advances to Level 3 over time would still receive the identical ranking of below basic.

The NAEP assesses students at the 4th, 8th, and 12th grade levels in several subject areas—the arts, civics, economics, foreign language,



geography, mathematics, reading, science, U.S. history, world history, and writing. As the issue of national examinations heats up, it is inevitable that the NAEP will become a focal point for discussion. Over the years, the NAEP has gained a fine reputation as a reliable and valid indicator of national student achievement (Loomis & Bourque, 2001). The problem with the NAEP has never been the accuracy of its tests, but students' lackluster performance on them.

# 2

## Multisensory Learning, Engagement, and Achievement ■ ■ ■

*From the rich experiences that our senses bring, we construct the ideas, the concepts, the generalizations that give meaning and order to our lives.*

—Dale, 1969, p. 187

A few years ago, I asked a group of adolescents to keep a daily journal of their lives in high school—what they learned, how they were taught, what they did before and after school, how they felt about what they did. The overwhelming majority of these students characterized schoolwork as irrelevant, or as one student put it, “boring as crap and worthless.” However, outside of the classes—hanging out with friends or participating in team sports or school clubs—students enjoyed school. Some even found *flow*, the term psychology professor Mihaly Csikszentmihalyi (1991) uses to describe optimal experience, a situation where a person meets a challenge equal to the full extent of his or her abilities.

Exhaustive studies of student engagement in high school (Chaddock, 2005; High School Survey of Student Engagement, 2005; McGrath, 2005; National Center for Education Statistics, 2005; Olson, 2005) affirm that

most secondary students perceive classrooms as sterile environments where silence, docility, and amiability are valued and assertiveness and imagination are viewed with a certain amount of skepticism. Walking the halls of local schools, it is certainly much easier to find classrooms drowning in ennui than classrooms percolating with joy.

In a study of student attitudes toward high school, Gershman (2004) found that “Miraculous moments of learning and sincere support happen throughout the day, but overall there is a lot of time and money going into an effort that tends to fall flat—unless the intents of public education are to teach punctuality, politeness, orderliness, and respect for extrinsic reward systems—then in that case it is rather successful” (pp. 6–7). Ouch. In a study of adolescent boys, Smith and Wilhelm (2002) found students much preferred playing video games to doing anything at school (not much of a revelation for anyone who has children).

Concerns about student engagement have led to such efforts as the federal government’s Preparing America’s Future High School Initiative (2003) and the Bill & Melinda Gates Foundation–led National Education Summit on High Schools (Achieve, 2005), all of which seemed to arrive at the same conclusion—schools are failing. “As many as 40 percent of the nation’s high school graduates . . . are inadequately prepared to deal with the demands of employment and postsecondary education, putting their own individual success and the nation’s economic growth in peril” (Achieve, 2005).

What is wrong with U.S. schools?

A consensus among some researchers (Baines & Stanley, 2003; Bracey, 2000; Civil Society Institute, 2005; Sadowski, 2003) is that an overemphasis on testing is transforming schools—even elementary schools—into factoid factories, where passing the test takes precedence over genuine intellectual and social development.

The charge that schools promote static knowledge under contrived conditions is nothing new. More than 40 years ago, Coleman (1965) criticized schools for their lack of authenticity and vision. For an adolescent, the school’s “natural environment is not natural at all, but a sheltered and artificial one which prevents him from having contact with those very problems that can give him maturity. The task then, which I set as an ultimate goal, is to replace these artificial and sheltering environments with ones that reflect the consequences of the future” (p. xi).

Because rewards and punishments are meted out according to the average number of students performing at a basic level on multiple-choice tests, the distance between social, technological, and ethical problems of the real world and the sanctioned school curricula seems greater than

ever. Test scores may determine not only a school's level of funding, but also a teacher's salary, the graduation status of students, and the future of the school as an ongoing enterprise. By their nature, end-of-term assessments measure students' ability to recall and manipulate abstract knowledge. Most teachers feel an immense pressure to cover precisely the material that is expected to show up on the exam, no more and no less.

Yet, preparing students for higher test scores by subverting genuine intellectual development is irrational. A student who has fun while he is learning and actually retains the new information is likely to perform better on tests than a student who hates school and remembers nothing two seconds after a lesson. Perhaps it is a vestige of those humorless schoolmasters of the 19th century, epitomized by Mr. Gradgrind in Charles Dickens's *Hard Times*, that many Americans think schooling must involve some amount of drudgery. In the real world, learning can be challenging at times, certainly, but learning can also exhilarate and inspire.

## Promoting Engagement Through Direct Experiences

In fact, the relationship between a positive attitude toward a subject and academic achievement in that subject is one of the strongest correlations in educational research (Pintrich & Schunk, 2002). An attractive feature of multisensory learning is that the instructional techniques can pique a student's interest so that the desire to get involved can supersede the impulse to sit and do nothing.

Whether influenced by the emphasis on test scores or traditional practices, learning in schools is too often abstract and decontextualized. According to Bruner (1966), experience may be categorized in one of three ways: *enactive* experience, *iconic* experience, or *symbolic* experience. Enactive experience is direct experience. To have an enactive experience, you might walk to a local creek, take a sample of water, and go back to a science lab with an expert environmentalist where you run a series of tests to assess the purity of the water. Iconic experience is a step removed from enactive experience. To have an iconic experience, you might watch a film about an environmentalist who goes to a creek, takes a sample of the water, and runs a series of tests in a lab. A symbolic experience is yet another step removed from actual experience. For a symbolic experience, you would simply read an account of the event, perhaps an article from a naturalists' magazine such as *Orion*.

Because texts are widely available in books and over the Internet, the easiest instructional strategy will always involve the symbolic—in

essence, the textbook. Indeed, the textbook is the bastion of symbolic learning—materials are readily accessible, outputs are well defined, and the curriculum (having been sanctioned by the state or school district) is risk free. Nevertheless, because textbooks are dominated by text (verbal symbols), the intended outcomes may be actualized only by a select group of highly accomplished, independent readers. Often, students who have short attention spans or who may be poor readers reap nothing from assigned readings.

If a teacher wanted to teach students about hurricanes, which instructional approach would be best?

1. Require students to read a scientific explanation in a textbook describing how hurricanes form.
2. Combine a brief film clip of a recent hurricane with firsthand narrative accounts and photos.
3. Have students accompany the Hurricane Hunters as they fly jets into hurricanes to gather weather information for the U.S. government.

Undeniably, the third selection offers the most memorable learning experience. Few students are going to snooze or pass notes as their jet cuts through torrents of rain and gale force winds toward the eye of a hurricane. Of course, such an educational field trip would have to be weighed against factors of time, cost, and safety. Selection 2 offers a sensible, safe alternative. However, to execute this instructional approach, a teacher would have to locate an appropriate film, preview it, set it up in class (preferably by showing the film on a screen large enough for students to actually see it), clip newspaper articles, search for images related to hurricanes over the Internet, and figure out how to orchestrate all these individual pieces of information to maximize student learning. Selection 1, reading a purely textual account of a hurricane, is the easiest approach. This is the symbolic experience—the least engaging, least satisfying method of learning about almost anything, hurricanes included.

Now consider most subject matter that is taught in schools. From my experience, the overwhelmingly dominant instructional approach is as follows:

1. Assign a text to be read.
2. Discuss the text in class.
3. Have students respond to questions about the text.
4. Give an exam or a worksheet.

This method assumes that students actually read and understand the text (not a valid assumption in schools where I have worked), and the mode of instruction never ventures beyond the symbolic. Even though a teacher can communicate much information in a relatively brief period of time by delivering the message through the spoken word, such an approach can be meaning free for students, especially those who do not listen well.

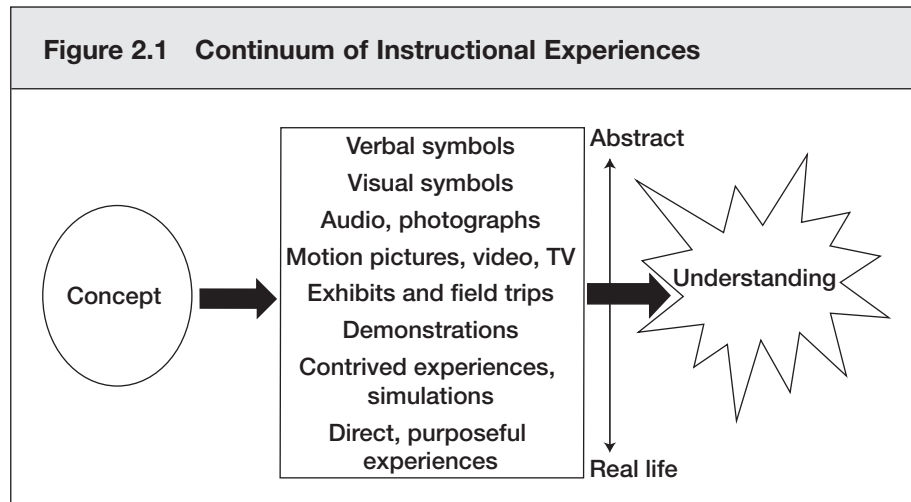
According to Moffett and Wagner (1991), classroom activities should move back and forth between personal experience and abstract language. “Sensations are inner coding of outer things. To verbalize them is to transform sensory experience into understandings. By helping learners sense more you may help them to say more” (p. 160).

Dunning (1974) argued that “when kids go out and see real things, the insides of classrooms change. . . . Bringing real world things into class is sometimes hard. But it’s the direction to go. Toward the real world.” In too many classes, the real world is considered relevant only to the extent that the information might show up on some future test.

In my first year as a teacher, I was given a handout at the school district’s teacher orientation. The handout read, “When I read, I remember 10 percent; when I hear, I remember 20 percent; when I see, I remember 30 percent; when I say, I remember 40 percent; when I do, I remember 50 percent. When I see, hear, say, and do, I remember 90 percent.” Although the amount learned through a specific sense may not be as precise as those percentages suggest, the idea behind the statement—that students learn more effectively when several senses are engaged—is difficult to dispute. After all, it is through our senses that we come to know the world. Invoking the senses allows our brains to latch on to something concrete, something substantial. By making experience concrete, teachers can provide the necessary scaffolding for students to gain mastery over abstract language.

Dale (1969) characterized the different states of experience in a hierarchy from most abstract (verbal symbols) to least abstract (direct, purposeful experience), as depicted in Figure 2.1.

In Dale’s configuration, a word is an example of a verbal symbol. There is nothing about a word itself (other than a word such as *Boom!*) that connotes its meaning. For example, we might know the word *hamburger*, but the word itself does not mimic any feature of something that is edible. If a person were unfamiliar with the English alphabet, she might find it difficult to distinguish between *hamburger* and words that looked vaguely similar—*Hamburg* (a town in Germany) or *humbug!* (something uttered by Scrooge in *A Christmas Carol*). For a writer to communicate to a reader, both parties must agree on what the verbal letters *h-a-m-b-u-r-g-e-r*



Source: From *Audiovisual methods in teaching* by E. Dale, 1969, New York: The Dryden Press.

symbolize. To make clear the different kinds of experiences represented by each category, I am going to extend the example of the hamburger. How does one come to understand the concept of a hamburger?

## Levels of Abstraction

Words are the most abstract representation of a concept. Visual symbols, which might include maps, logos, and graphic designs, are at the next highest level of abstraction. For example, although very young children do not know how to read, they can identify the McDonald's logo and recognize the character of Ronald McDonald. A local vegetarian restaurant I frequent has a sign on its door—an image of a hamburger encircled in red with a large line through the middle of it—meaning no meat is served here.

Recordings, radio, and still pictures are one-way sensory stimulations that communicate through either sound or image. A still photograph of a beef patty being cooked on a grill would be a more recognizable representation for hamburger than the golden arches, especially if a person had no knowledge of fast-food restaurants.

Film and television engage the ear and the eye, and thus are multisensory. More engaging than a photograph would be a film depicting how hamburgers are cooked and consumed at a local McDonald's restaurant.

Going to a culinary institute and witnessing firsthand a variety of ways to cook a hamburger would be superior to watching a film. After watching demonstrations by several cooks, the observer's ideas about hamburgers could be considerably enlarged.

Demonstrating knowledge by modeling appropriate techniques for preparing, cooking, and consuming a hamburger would be better still. This kind of knowledge—learning by teaching—can be quite effective, as the scholarly productivity of teachers and professors around the world attests.

Dramatized and contrived experiences are one step removed from real-life experiences and, accordingly, are very popular with the military. Spending a few days in a simulated battle maneuver in a desert in the southwestern United States would better prepare soldiers for the rigor of war in the Middle East than reading several pages of text or watching a film. Similarly, McDonald's sends most managers to Hamburger University, where they must pass muster in a simulated restaurant replete with cooks, crew, and customers.

Finally, direct and purposeful experiences invoke all the senses—sight, sound, taste and smell, and movement and touch—in real time. Learning about a hamburger using direct experience would involve participating in the work of a cattle ranch, acting as a cook where hamburgers are prepared, and eating hamburgers as a customer in a fast-food restaurant. When feasible, direct experience is the most effective way to learn, whether the subject is making hamburgers, learning how to write a persuasive essay, or solving a problem in physics.

As abstraction increases, sensory reception decreases. Yet most classrooms across the curriculum are dominated by teacher talk and quiet reading (Applebee, Langer, Nystrand, & Gamoran, 2003; Cazden, 1995), neither of which actively engages the senses. Although pure lecturing (meaning talk without accompanying illustrations or other sensory stimuli) can be effective for communicating large amounts of information to bright and willing students, such an instructional approach does not veer beyond the abstract. As Arnheim (1997) noted, “Human thinking cannot go beyond the patterns suppliable by the human senses. . . . language. . . argues loudly in favor of the contention that thinking takes place in the realm of the senses” (p. 233).

Unfortunately, most schools respond to struggling (or remedial) students by forcing them to spend even more time in the realm of the abstract—more work on textual comprehension, more worksheets, more of the back-to-basics approach. Instead of repeated exposure to a narrowed, abstract approach, remedial students might be better served by moving down the continuum of experience shown in Figure 2.1 to activities that are closer to real life. Once students have gathered enough sensory experience in an area, they would be more able to move back to the



abstract for analysis and reflection. But many teachers, especially teachers of remedial students, tend to begin their teaching in the abstract and stay there for the duration of the year.

Let me provide an example. Once, I had a student named David who was reading at the 3rd grade level in a 9th grade English class. When I began a unit on *Romeo and Juliet*, I knew from the first day that David would understand little of the plot, vocabulary, or themes. As the unit developed, David failed to turn in most assignments. On the assignments he managed to turn in, he displayed an utter lack of understanding.

Rather than demand that David repeatedly scale the mountain of Shakespearean language, I could have helped him approach Shakespeare from a different perspective. For example, I could have shown a few film clips from the 30 or so filmed versions of the play; shown portraits of the characters of *Romeo and Juliet* rendered by artists such as William Blake, Ford Madox Brown, Frank Dicksee, John Millais, John Stanhope, and John Waterhouse; or played Nino Rota's music based on the play, rock music from Baz Luhrman's 1996 MTV-style film adaptation, Tchaikovsky's *Romeo and Juliet*, Berlioz's *Roméo et Juliette*, or the Prokofiev ballet. I could have also involved David with field trips to see *Romeo and Juliet* being performed on a local stage, or asked that David rehearse the part of Romeo with a classmate in anticipation of a reader's theater presentation. Once David accumulated enough sensory experiences, he might eventually have come to understand the play and been able to comment on its themes. Expecting David to suddenly gain mastery over such sophisticated language and convoluted plot without first giving him some context was ludicrous.

One of the greatest benefits of using multisensory stimuli is that they have the potential to involve students more fully in the learning experience. Imagine that you wanted to learn how to play the piano. If piano were taught as other courses in secondary school are taught, a student would listen to lectures about the history of the piano, read essays about the great composers, analyze famous compositions, and occasionally refer to a diagram of a keyboard. However, a student might not get to touch an actual piano until after the midterm period. By then, the student's interest in the piano likely would have dissipated to nothing.

## **The Roots of Multisensory Learning**

Common sense suggests that students learn in different ways. One of Howard Gardner's (1999) great contributions through the theory of multiple

intelligences is the acknowledgment that students are differentially talented. A student can be a brilliant logical thinker but a poor speaker; a superb athlete but an inept architect.

The learning styles movement (Dunn, 1984; Dunn & Dunn, 1989) classifies students according to a preferred way of absorbing and recalling information: auditory, visual, tactile, and kinesthetic. Students who learn best by listening are at an advantage in classrooms dominated by teacher talk. Students who learn best through watching are at an advantage in classrooms where teachers use plenty of visuals. Although some empirical data suggest that a teacher can be more effective if she teaches expressly toward a student's preferred learning style (Dunn, Griggs, Olson, Gorman, & Beasley, 1995), trying to match individual learning styles with instructional strategies would seem logistically impossible in light of a teacher's other responsibilities. Keeping track of the day's lessons; coding individualized education programs (IEPs are required of every student in special education); serving Code 504 students (underperforming students not covered by special education); and assessing the progress of 150 or so other students would be taxing enough for Wonder Woman, let alone most mortals. Under the circumstances, trying to customize instructional strategies to meet individual students' learning preferences or a particular intelligence is not a realistic expectation.

On the other hand, when a teacher uses multisensory techniques, preferred learning styles are invoked as a matter of course—without forcing the teacher into the time-consuming and tedious role of bookkeeper. At its core, multisensory learning is a way of teaching that requires students to activate their full faculties—seeing, hearing, smelling, tasting, moving, touching, thinking, intuiting, enjoying—in a variety of situations.

The Suzuki method, successful with generations of musicians, has long used multisensory techniques. This method requires students to record and listen to their practice sessions, observe other pupils' lessons, watch their teacher demonstrate correct playing techniques, and attend local music events. In fact, all of the strategies of the Suzuki method—field trips, demonstrations, simulations, and real experiences—can be found in the middle to lower part of the continuum of experience, which is closest to real life. Indeed, the Suzuki method encourages students to learn by jumping in. That is, students learn to play by ear first; verbal and visual symbols come only after the student has come to know the joy of playing a song by heart.

Multisensory approaches are also common among teachers of very young children. Fernald (1987), Gillingham and Stillman (1997),

Orton (as cited in Rawson, 1987), and Slingerland (1977) advocate multisensory approaches for teaching phonics and letters to young children. These approaches often involve children seeing a word, tracing its letters with their fingers, and trying to pronounce the word using their knowledge of the sounds of letters. Lacerda (2003) describes this phenomenon in academic terms: "As the number of stored multisensory representations increases, more fine detailed relationships between the acoustic and the other sensory inputs emerge spontaneously from the available correlations between sensory dimensions" (p. 57). By putting together visual cues (the written word), auditory stimuli (pronouncing the word), and kinesthetic activity (tracing the word), children become readers (Henry, 1998; Josh, Dahlgren, & Boulware-Gooden, 2002).

Teachers of students with disabilities have started experimenting with multisensory approaches as well. Originally designed for autistic persons or institutionalized older adults with Alzheimer's disease who did not respond to medication, Snoezelen (pronounced *Sno-zuh-len*) rooms were developed in Holland in the 1970s. The idea was to create an environment where patients could experience stimulation, relaxation, and enjoyment in a completely nondemanding way.

Typical early Snoezelen rooms were equipped with lava lamps, stuffed animals, soothing music, ambient lighting, and a projector displaying images. More recently, Snoezelen rooms have been adapted to meet specific therapeutic and educational goals. For example, some researchers have used Snoezelen rooms to teach life skills to severely disabled school-aged children (Douglas et al., 1998) or to help students with sensory interaction (Pagliano, 1999).

Because Snoezelen became a trademark associated with ROMPA Ltd. of Derbyshire, England, in 1992, most researchers have stopped using the term *Snoezelen* and started using the more generic term multisensory environment (MSE) to refer to any room that has been expressly developed for multisensory interactions. Among severely disturbed patients, Mitchell and Van der Gaag (2002) found that multisensory rooms foster "changes in tolerance levels, group integration, range of vocabulary used, and . . . positive changes in the number and context of interactions" (p. 164). Others (Hope, 1997; Hutchinson & Kewin, 1994; Pagliano, 1999) have documented the positive effects of multisensory rooms on academic and attitudinal benefits for severely disabled and emotionally disturbed students, as well as for students not necessarily classified as needing special services.

Obviously, the ameliorative effects of a welcoming, multisensory environment have implications for the regular classroom. After all, children

are “affected by environmental conditions of temperature, light, sound, and the spatial qualities of their classroom settings, as well as by such aesthetic elements as color and texture” (Taylor, Wise, & Wise, 1990, p. 38).

The physical environment of a classroom and the interactions among students, teachers, and materials significantly affect the quality of learning. Neuroscientists have documented “the capacity of brain cells to rewire themselves radically—forming new synaptic connections and dissolving old ones—in response to stimulation” (Horgan, 2004). Because the brain processes information in a compartmentalized manner, different parts of the brain become active when a person reads, speaks, listens, or thinks (Grandin, 1998, 2006a).

Designing relevant and engaging interactions not only enhances student learning, it also affects students’ long-term intellectual development. Using multisensory stimuli in instruction increases engagement, promotes deeper participation, and advances the prospect that learning can be fun. According to Paige (2006), “You wouldn’t be able to survive without your senses working together.” The benefits of multisensory stimuli seem substantial, especially in contrast to the current practice of teaching to the test. Of course, if the score is the goal, multisensory learning can dramatically improve performance on standardized tests, too.

Indeed, a recent, exhaustive report on teaching reading in the United Kingdom found that multisensory appeals were essential tools for maximizing student achievement. “The best teaching . . . was at a brisk pace, fired children’s interest, often by engaging them in multisensory activities, drew upon a mix of stimulating resources, and made sure that they received praise for effort and achievement” (Rose, 2006, p. 16).

In a series of experiments over a period of several years, Diamond (Diamond, 1988; Diamond & Hopson, 1998) found that animals (rats, cats, and monkeys) raised in sensory-rich environments developed higher levels of intelligence and lived longer than animals raised in sensory-deprived environments. Furthermore, the physical brains of the animals in sensory-rich environments were larger and healthier than the brains of animals raised in sensory-deprived environments. The link between sensory processing and brain development—in humans and animals—develops in accordance with the quality and nature of the stimuli in the environment (Society for Neuroscience, 2005; Striedter, 2006).

Yet the dominant instructional approach remains the delivery of abstract information in a sensory-deprived environment. A more scientifically valid and infinitely more engaging approach would be to think of the classroom’s physical space as a kind of sensory representation of the subject matter and to view the world outside its walls as the laboratory.

Then the curriculum could become not a series of assignments delivered across some dimension of time, but a series of carefully choreographed experiences. The teacher who purposefully crafts multisensory experiences to foster students' social and intellectual development is teaching, whereas the teacher who asks students to read and answer questions is merely assigning.