



The  
Windward  
School

# The Beacon

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# Putting Students on the Path to Learning: The Case for Fully Guided Instruction

by Richard E. Clark, Paul A. Kirschner, and John Sweller

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*This article summarizes sections of "Why Minimal Guidance During Instruction Does Not Work: An Analysis of the Failure of Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching," which was originally published in Educational Psychologist 41, no. 2 (2006): 75-86.*

**D**isputes about the impact of instructional guidance during teaching have been ongoing for more than a half century<sup>1</sup>. On one side of this argument are those who believe that all people—novices and experts alike—learn best when provided with instruction that contains unguided or partially guided segments. This is generally defined as instruction in which learners, rather than being presented with all essential information and asked to practice using it, must discover or construct some or all of the essential information for themselves<sup>2</sup>. On the other side are those who believe that ideal learning environments for experts and novices differ: while experts often thrive without much guidance, nearly everyone else thrives when provided with full, explicit instructional guidance (and should not be asked to discover any essential content or skills).<sup>3</sup>

Our goal in this article is to put an end to this debate. Decades of research clearly demonstrate that for novices (comprising virtually all students), direct, explicit instruction is more effective and more efficient than partial guidance.<sup>4</sup> So, when teaching new content and skills to novices, teachers are more effective when they provide explicit guidance accompanied by practice and feedback, not when they require students to discover many aspects of what they must learn. As

we will discuss, this does not mean direct, expository instruction all day every day. Small group and independent problems and projects can be effective—not as vehicles for making discoveries, but as a means of practicing recently learned content and skills.

Before we describe this research, let's clarify some terms. Teachers providing explicit instructional guidance fully explain the concepts and skills that students are required to learn. Guidance can be provided through a variety of media, such as lectures, modeling, videos, computer-based presentations, and realistic demonstrations. It can also include class discussions and activities—if the teacher ensures that through the discussion or activity, the relevant information is explicitly provided and practiced. In a math class, for example, when teaching students how to solve a new type of problem, the teacher may begin by showing students how to solve the problem and fully explaining the how and why of the mathematics involved. Often, in following problems, step-by-step explanations may gradually be faded or withdrawn until, through practice and feedback, the students can solve the problem themselves. In this way, before trying to solve the problem on their own, students would already have been walked through both the procedure and the

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**HEAD LINES**

## The Demand for a Windward Education

*Dr. John J. Russell, Head of School*

**Y**ear after year, The Windward School receives far more applications than the number of seats available. As a result, a significant number of students who meet Windward's strict criteria for admissions and who desperately need a Windward education are denied one simply because the School does not have the capacity to accept them. At virtually every grade level, applications consistently exceed the number of seats available by a more than 3 to 1 ratio. Last year was typical; the

**“THE FACT THAT OVER 650,000 GENERAL EDUCATION STUDENTS CANNOT READ PROFICIENTLY PROVIDES OVERWHELMING EVIDENCE OF THE DIRE NEED TO INCREASE THE WINDWARD SCHOOL’S CAPACITY TO EDUCATE MORE STUDENTS.”**

admissions office stopped reviewing applications for grades 5 through 9 in October because by that early date, the Middle School was already at capacity for the following year.

Windward has responded to this pressing need to help more children through several significant initiatives. Over the last few years, the School has found ways to create additional classrooms within the “four walls” of each campus. In 2009, the original wing of the Lower School, which dates from 1929, was re-constructed to modernize classrooms and create additional small group instruction rooms. This summer, the large lecture room in the Middle School that was used for Windward Teacher Training Institute courses was converted into two additional classrooms. These changes, as well as the redesign of other spaces within both school buildings, allowed the School's enrollment to grow from 477 to 556 over the last seven years.

This increase in enrollment resulted in the need to train more Windward teachers. The Board of Trustees has responded to this requirement by authorizing the construction of the Judith C. Hochman building that houses Windward Teacher Training Institute. This project provides the facilities necessary to develop the next generation of Windward teachers and to

train teachers from the tri-state area and beyond in the proven Windward pedagogy. The Judith C. Hochman building was formally dedicated this September and will be in full operation this school year.

Even with these efforts, The Windward School still cannot meet the demand for a Windward education. The scope of the problem is enormous. In schools across the country, bright, capable, learning disabled students endure academic frustration and plummeting self-confidence simply because they are not receiving appropriate research-based instruction. In New York City, there are approximately 1.3 million students. Researchers estimate that between 10 and 20% of these students have learning disabilities. Despite the fact that there are at least 130,000 students in New York City with learning disabilities, there are only 1,200 seats available in specialized schools for students with disabilities. Equally important, standardized test scores of general education students in New York City public schools leave no doubt that far too many general education students in the city's schools are not acquiring the reading skills that are absolutely necessary to be successful academically. On the most recent administration of the New York State English Language Arts test, over 50% of all New York City public school students in grades three through eight and 85% of the students with disabilities were found to be below proficient in their reading skills.

The large number of students in New York City with learning disabilities, coupled with the fact that over 650,000 general education students in grades three through eight cannot read proficiently,

provides overwhelming evidence of the dire need to increase The Windward School's capacity to educate more students and to train more teachers in its proven, scientifically-based pedagogy. After more than three years of extensive research that clearly established the critical need to increase the School's capacity to serve students with language-based learning disabilities, the Board of Trustees adopted a strategic plan that includes a goal to expand program participation by opening new campuses in the New York metropolitan area. The Board's Real Estate Committee reviewed a number of proposed lease and purchase options in Manhattan over the past several months, coming very close to settling on a settling on a property several times. Recently, the School agreed to summary terms to develop a property on the Upper East Side of Manhattan, between 92nd and 93rd Streets, just east of Third Avenue. The proposed building will have a residential tower with an entrance on 92nd Street, and a school with an entrance on 93rd Street. Windward is in the process of developing preliminary drawings for a school building of approximately 57,000 square feet that will house 350 students at full enrollment. This newest Windward campus is scheduled to open in September 2015.

Establishing a school in Manhattan is one of the most significant initiatives in Windward's 86-year history. I will be providing regular updates to the Windward community as the School moves ahead with this momentous plan to achieve its vision of transforming the lives of more students and training more teachers in Windward's research-based practices.

**Academics at Windward:**

A Middle School student uses a Multiple Paragraph Outline to complete a writing assignment in her language arts class. The School's plans for a third campus in New York City will allow more students to receive the same excellent education.



*Continued from page 1*

concepts behind the procedure.

In contrast, those teachers whose lessons are designed to offer partial or minimal instructional guidance expect students to discover on their own some or all of the concepts and skills they are supposed to learn. The partially guided approach has been given various names, including discovery learning,<sup>5</sup> problem-based learning,<sup>6</sup> inquiry learning,<sup>7</sup> experiential learning,<sup>8</sup> and constructivist learning.<sup>9</sup> Continuing the math example, students receiving partial instructional guidance may be given a new type of problem and asked to brainstorm possible solutions in small groups with or without prompts or hints. Then there may be a class discussion of the various groups' solutions, and it could be quite some time before the teacher indicates which solution is correct. Through the process of trying to solve the problem and discussing different students' solutions, each student is supposed to discover the relevant mathematics. (In some minimal guidance classrooms, teachers use explicit instruction of the solution as a backup method for those students who did not make the necessary discoveries and who were confused during the class discussion.) Additional examples of minimally guided approaches include (1) inquiry-oriented science instruction in which students are expected to discover fundamental principles by mimicking the investigatory activities of professional researchers,<sup>10</sup> and (2) medical students being expected to discover well-established solutions for common patient problems.<sup>11</sup>

Two bodies of research reveal the weakness of partially and minimally guided approaches: research comparing pedagogies, and research on how people learn. The past half century of empirical research has provided overwhelming and unambiguous evidence that, for everyone but experts, partial guidance during

**“RESEARCH HAS PROVIDED OVERWHELMING EVIDENCE THAT, FOR EVERYONE BUT EXPERTS, PARTIAL GUIDANCE DURING INSTRUCTION IS SIGNIFICANTLY LESS EFFECTIVE THAN FULL GUIDANCE.”**

instruction is significantly less effective and efficient than full guidance. And, based on our current knowledge of how people learn, there is no reason to expect that partially guided instruction in K-12 classrooms would be as effective as explicit, full guidance.

### I. RESEARCH COMPARING FULLY GUIDED AND PARTIALLY GUIDED INSTRUCTION

Controlled experiments almost uniformly indicate that when dealing with novel information (i.e., information that is new to learners), students should be explicitly shown what to do and how to do it, and then have an opportunity to practice doing it while receiving corrective feedback.<sup>12</sup> A number of reviews of empirical studies on teaching novel information have established a solid research-based case against the use of instruction with minimal guidance. Although an extensive discussion of those studies is outside the scope of this article, one recent review is worth noting: Richard Mayer (a cognitive scientist at the University of California, Santa Barbara) examined evidence from studies conducted from 1950 to the late 1980s comparing pure discovery learning (defined as unguided, problem-based instruction) with guided forms of instruction.<sup>13</sup> He suggested that in each decade since the mid-1950s, after empirical studies provided solid evidence that the then-popular unguided approach did not work, a similar approach soon popped up under a different name with the cycle repeating itself. Each new set of advocates for unguided approaches seemed unaware of, or uninterested in, previous evidence that unguided approaches had not been validated. This pattern produced discovery learning, which gave way to experiential learning, which gave way to problem-based and inquiry learning, which has recently given way to constructivist instructional techniques.



**Academics at Windward:** *A Middle School science teacher leads his class in a lesson. All Windward subjects, not solely Language Arts, are taught via the direct instruction, multisensory model of teaching that is the School's hallmark.*

Mayer concluded that the “debate about discovery has been replayed many times in education, but each time, the research evidence has favored a guided approach to learning.”<sup>14</sup> (To learn about these effective guided approaches, please see the companion article by Barak Rosenshine. See *Editor's Note*.)

Evidence from well-designed, properly controlled experimental studies from the 1980s to today also supports direct instructional guidance.<sup>15</sup> Some researchers<sup>16</sup> have noted that when students learn science in classrooms with pure-discovery methods or with minimal feedback, they often become lost and frustrated, and their confusion can lead to misconceptions. Others<sup>17</sup> found that because false starts (in which students pursue misguided hypotheses) are common in such learning situations, unguided discovery is most often inefficient. In a very important study, researchers not only tested whether science learners learned more via discovery, compared with explicit instruction, but

also, once learning had occurred, whether the quality of learning differed.<sup>18</sup> Specifically, they tested whether those who had learned through discovery were better able to transfer their learning to new contexts (as advocates for minimally guided approaches often claim). The findings were unambiguous. Direct instruction involving considerable guidance, including examples, resulted in vastly more learning than discovery. Those relatively few students who learned via discovery showed no signs of superior quality of learning.

In real classrooms, several problems occur when different kinds of minimally guided instruction are used. First, often only the brightest and most well-prepared students make the discovery. Second, many students, as noted above, simply become frustrated. Some may disengage, others may copy whatever the brightest students are doing—either way, they are not actually discovering anything. Third, some students believe they have discovered the correct information or solution, but they are mistaken and so they learn a misconception that can interfere with later learning and problem solving.<sup>19</sup> Even after being shown the right answer, a student is likely to recall his or her discovery—not the correction. Fourth, even in the unlikely event that

problem or project is devised that all students succeed in completing, minimally guided instruction is much less efficient than explicit guidance. What can be taught directly in a 25-minute demonstration and discussion, followed by 15 minutes of independent practice with corrective feedback by a teacher, may take several class periods to learn via minimally guided projects and/or problem solving.

As if these four problems were not enough cause for concern, there is one more problem that we must highlight: minimally guided instruction can increase the achievement gap. A review<sup>20</sup> of approximately 70 studies, which had a range of more—and less-skilled students as well as a range of more—and less-guided instruction, found the following: more-skilled learners tend to learn more with more-guided instruction, but less-skilled learners tend to learn more with more-guided instruction. Worse, a number of experiments found that less-skilled students who chose or were assigned to less-guided instruction received significantly lower scores on posttests than on pretest measures. For these relatively weak students, the failure to provide strong instructional support produced a measurable loss of learning. The

implication of these results is that teachers should provide explicit instruction when introducing a new topic, but gradually fade it out as knowledge and skill increase.

Even more distressing is evidence<sup>21</sup> that when learners are asked to select between a more-guided or less-guided version of the same course, less-skilled learners who choose the less-guided approach tend to like it even though they learn less from it. It appears that guided instruction helps less-skilled learners by providing task-specific learning strategies. However, these strategies require learners to engage in explicit, attention-driven effort and so tend not to be liked, even though they are helpful to learning.

Similarly, more-skilled learners who choose the more-guided version of a course tend to like it even though they too have selected the environment in which they learn less. The reason more guidance tends to be less effective with these learners is that, in most cases, they have already acquired task-specific learning strategies that are more effective for them than those embedded in the more-guided version of the course. And some evidence suggests that they like more guidance because they believe they will achieve the required learning with minimal effort.

If the evidence against minimally guided approaches is so strong, why is this debate still alive? We cannot say with any certainty, but one major reason seems to be that many educators mistakenly believe partially and minimally guided instructional approaches are based on solid cognitive science. Turning again to Mayer's review of the literature, many educators confuse "constructivism," which is a theory of how one learns and sees the world, with a prescription for how to teach.<sup>22</sup> In the field of cognitive science, constructivism is a widely accepted theory of learning; it claims that learners must construct mental representations of the world by engaging in active cognitive processing. Many educators (especially teacher education professors in colleges of education) have latched on to this notion of students having to "construct" their own knowledge, and have assumed that the best way to promote such construction is to have students try to discover new knowledge or solve new problems without explicit guidance from the teacher. Unfortunately, this assumption is both widespread and incorrect. Mayer calls it the "constructivist teaching fallacy." Simply put, cognitive activity can happen with or without behavioral activity, and behavioral activity does not in any way guarantee cognitive activity. In fact, the type of active cognitive processing that students need to engage in to "construct" knowledge can happen through reading a book, listening to a lecture, watching a teacher conduct an experiment while simultaneously describing what he or she is doing, etc. Learning requires the construction of knowledge. Withholding information from students does not facilitate the construction of knowledge.

## II. THE HUMAN BRAIN: LEARNING 101

In order to really comprehend why full instructional guidance is more effective and efficient than partial or minimal guidance for novices, we need to know how human brains learn. There are two essential components: long-term memory and working memory (often called short-term memory). Long-term memory is that big mental warehouse of things (be they words, people, grand philosophical ideas, or skateboard tricks) we know. Working

memory is a limited mental "space" in which we think. The relations between working and long-term memory, in conjunction with the cognitive processes that support learning, are of critical importance to developing effective instruction.

One understanding of the role of long-term memory in human cognition has altered dramatically over the last few decades. It is no longer seen as a passive repository of discrete, isolated fragments of information that permit us to repeat what we have learned. Nor is it seen as having only peripheral influence on complex cognitive processes such as critical thinking and problem solving. Rather, long-term memory is now viewed as the central, dominant structure of human cognition. Everything we see, hear, and think about is dependent on and influenced by our long-term memory.

A seminal series of studies<sup>23</sup> on chess

### **"IF THE LEARNER HAS NO RELEVANT CONCEPTS IN LONG-TERM MEMORY, THE ONLY THING TO DO IS BLINDLY SEARCH FOR SOLUTIONS. NOVICES CAN ENGAGE IN PROBLEM SOLVING FOR EXTENDED PERIODS AND LEARN ALMOST NOTHING."**

players, for example, demonstrated that expert players perform well even in "blitz" games (which are played in five minutes) because they are not actually puzzling through each move. They have tens of thousands of board configurations, and the best move for each configuration stored in long-term memory. Those configurations are learned by studying previous games for 10 years or more. Expert players can play well at a fast pace because all they are doing is recalling the best move—not figuring it out. Similar studies of how experts function have been conducted in a variety of other areas.<sup>24</sup> Altogether, the results suggest that expert problem solvers derive their skill by drawing on the extensive experience stored in their long-term memory in the form of concepts and procedures, known as mental schemas. They retrieve memories of past procedures and solutions, and then quickly select and apply the best ones for solving problems. We are skillful in an area if our long-term

memory contains huge amounts of information or knowledge concerning the area. That information permits us to quickly recognize the characteristics of a situation and indicates to us, often immediately and unconsciously, what to do and when to do it. (For instance, think about how much easier managing student behavior was in your fifth year of teaching than in your first year of teaching.) Without our huge store of information in long-term memory, we would be largely incapable of everything from simple acts such as avoiding traffic while crossing a street (information many other animals are unable to store in their long-term memory), to complex activities such as playing chess, solving mathematical problems, or keeping students' attention. In short, our long-term memory incorporates a massive knowledge base that is central to all of our cognitively based activities.

What are the instructional consequences of long-term memory? First and foremost, long-term memory provides us with the ultimate justification for instruction: the aim of all instruction is to add knowledge and skills to long-term memory. If nothing has been added to long-term memory, nothing has been learned.

Working memory is the cognitive structure in which conscious processing occurs. We are only conscious of the information currently being processed in working memory and are more or less oblivious to the far larger amount of information stored in long-term memory. When processing novel information, working memory is very limited in duration and capacity. We have known at least since the 1950s that almost all information stored within working memory is lost within 30 seconds<sup>25</sup> if it is not rehearsed and that the capacity of working memory is limited to only a very

small number of elements.<sup>26</sup> That number is usually estimated at about seven, but may be as low as four, plus or minus one.<sup>27</sup> Furthermore, when processing (rather than merely storing) information, it may be reasonable to conjecture that the number of items that can be processed may only be two or three, depending on the nature of the processing required.

For instruction, the interactions between working memory and long-term memory may be even more important than the processing limitations.<sup>28</sup> The limitations of working memory only apply to new, to-be-learned information (that has not yet been stored in long-term memory). When dealing with previously learned, organized information stored in long-term memory, these limitations disappear. Since information can be brought back from long-term memory to working memory as needed, the 30-second limit of working memory becomes irrelevant. Similarly, there are no known limits to the amount of such information that can be brought into working memory from long-term memory.

These two facts—that working memory is very limited when dealing with novel information, but that it is not limited when dealing with organized information stored in long-term memory—explain why partially or minimally guided instruction typically is ineffective for novices, but can be effective for experts. When given a problem to solve, novices' only resource is their very constrained working memory. But experts have both their working memory and all the relevant knowledge and skill stored in long-term memory.

One of the best examples of an instructional approach that takes into account how our working and long-term memories interact is the "worked-example effect." A worked example is just what it sounds like: a problem that has already been solved (or "worked out") for which every step is fully explained and clearly shown; it constitutes the epitome of direct, explicit instruction. (For a short YouTube video of a worked example, go to <http://bit.ly/xa0TYQ> and see Shaun Errichello, who teaches seventh-grade math at the Salk School of Science (M.S. 225) in New York City, work through a word problem with fractions.)

The "worked-example effect" is the

name given to the widely replicated finding that novice learners who try to learn by being required to solve problems perform worse on subsequent test problems, including transfer problems different from the ones seen previously, than comparable learners who learn by studying equivalent worked examples.

The worked-example effect was first demonstrated in the 1980s.<sup>29</sup> Researchers found that algebra students learned more by studying worked examples than by solving equivalent problems. Since those early demonstrations of the effect, it has been replicated on numerous occasions using a large variety of learners studying an equally large variety of materials—from mathematics and science to English literature and world history.<sup>30</sup> For novices, studying worked examples seems invariably superior to discovering or constructing a solution to a problem.

Why does the worked-example effect occur? The limitations of working memory and the relations between working memory and long-term memory discussed earlier can explain it. Solving a problem requires searching for a solution, which must occur using our limited working memory. If the learner has no relevant concepts or procedures in long-term memory, the only thing to do is blindly search for possible solution steps that bridge the gap between the problem and its solution. This process places a great burden on working-memory capacity because the problem solver has to continually hold and process the current problem state in working memory (e.g., Where am I right now in the problem-solving process? How far have I come toward finding a solution?) along with the goal state (e.g., Where do I have to go? What is the solution?), the relations between the goal state and the problem state (e.g., Is this a good step toward solving the problem? Has what I've done helped me get nearer to where I need to go?), the solution steps that could further reduce the differences between the two states (e.g., What should the next step be? Will that step bring me closer to the solution? Is there another solution strategy I can use that might be better?), and any subgoals along the way. Thus, searching for a solution overburdens limited working memory and diverts working-memory

resources away from storing information in long-term memory. As a consequence, novices can engage in problem-solving activities for extended periods and learn almost nothing.<sup>31</sup>

In contrast, studying a worked example\* reduces the burden on working memory (because the solution only has to be comprehended, not discovered) and directs attention (i.e., directs working-memory resources) toward storing the essential relations between problem-solving moves in long-term memory. Students learn to recognize which moves are required for particular problems, which is the basis for developing knowledge and skill as a problem solver.<sup>33</sup>

It is important to note that this discussion of worked examples applies to novices—not experts. In fact, the worked-example effect first disappears and then reverses as the learners' expertise increases. That is, for experts, solving a problem is more effective than studying a worked example. When learners are sufficiently experienced, studying a worked example is a redundant activity that places a greater burden on working memory than retrieving a known solution from long-term memory.<sup>34</sup> This reversal in effectiveness is not limited to worked examples; it's true of many explicit, fully guided instructional approaches and is known as the "expertise reversal effect."<sup>35</sup> In general, the expertise reversal effect states that "instructional techniques that are highly effective with inexperienced learners can lose their effectiveness and even have negative consequences when used with more experienced learners."<sup>36</sup> This is why, from the very beginning of this article, we have emphasized that guidance is best for teaching novel information and skills. This shows the wisdom of instructional techniques that begin with lots of guidance and then fade that guidance as students gain mastery. It also shows the wisdom of using minimal guidance techniques to reinforce or practice previously learned material.

Recommending partial or minimal guidance for novices was understandable back in the early 1960s, when the acclaimed psychologist Jerome Bruner<sup>37</sup> proposed discovery learning as an instructional tool. At that time, researchers

knew little about working memory, long-term memory, and how they interact. We now are in a quite different environment; we know much more about the structures, functions and characteristics of working memory and long-term memory, the relations between them, and their consequences for learning, problem solving and critical thinking. We also have a good deal more experimental evidence as to what constitutes effective instruction: controlled experiments almost uniformly indicate that when dealing with novel information, learners should be explicitly shown all relevant information, including what to do and how to do it. We wonder why many teacher educators who are committed to scholarship and research ignore the evidence and continue to encourage minimal guidance when they train new teachers.

After a half century of advocacy associated with instruction using minimal guidance, it appears that there is no body of sound research that supports using the technique with anyone other than the most expert students. Evidence from controlled, experimental (a.k.a. “gold standard”) studies almost uniformly supports full and explicit instructional guidance rather than partial or minimal guidance for novice to intermediate learners. These findings and their associated theories suggest teachers should provide their students with clear, explicit instruction rather than merely assisting students in attempting to discover knowledge themselves.

### Editor’s Note

The article by Barak Rosenshine can be found on page 12 of the spring 2012 issue of *American Educator*.

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## ALUMNI CORNER

# Lindsay Olzerowicz ’03



*Lindsay Olzerowicz ’03, pictured with her mother, Sharon, and Chris Eberhard, the Assistant Head of the Middle School, attended the School’s benefit in April. Lindsay works for a nonprofit in Washington, D.C., which supports women entrepreneurs.*

There is one particular memory from my elementary years that has remained with me: I am sitting on my bed at home, reading a book aloud to my dad. I remember trying my hardest to read through all the words and make him proud; however, I struggled through every word, and my dad had tears streaming down his face. This was in fifth grade. I had the reading level of a second grader.

I had started the first grade at a public school, but right away the school realized that it could not accommodate me, as I had been diagnosed with both dyslexia and attention deficit disorder. My parents and I then visited various private schools that would offer me one-on-one reading support, and I enrolled for the second half of my first grade year at Tuxedo Park School in Tuxedo Park, NY. The school’s reading teacher, Mrs. Betty, spent an hour each day helping me with my reading comprehension and writing skills while the rest of my classmates were in foreign language class. Not only did I meet with Mrs. Betty every day, I also spent time after school with a tutor, who helped me with my homework. Although I had a great support system, it was a struggle to get to the reading level of my classmates.

My tutors and teachers helped as best they could, but it wasn’t enough. My parents and I had heard of The Windward School, and we knew it could help me move through the next phase of my education. During the

my thoughts into words, how to write a paper and how to study.

Unfortunately, at the beginning of my sophomore year at Windward, we received the news that the Upper School would be closing due to the mandate for standardized testing imposed by the state. I knew that I wanted to transition back to public school, and I was determined to enter a mainstream school and succeed there with the tools that Windward’s amazing faculty gave me. I was so driven to do this that I visited my local public school in the middle of the school year and made the switch. Everyone was worried that I would fail there and that I would have to return to Windward, but I was driven to succeed. I spent the rest of my high school career in public school, and received honors in all my classes. Upon graduation in 2003, I went to Quinnipiac University in Connecticut, where I earned both my undergraduate degree and a master’s degree in management in only five years. I achieved honors in both degrees, and I was able to be successful thanks to Windward and the skills the teachers instilled in me.

Once out of school, I started working in the management training program at Target, but quickly discovered that I wanted to work supporting women and minorities in a business environment. I went on to work for the Women Presidents’ Organization, a nonprofit organization in New York City aimed at improving business conditions for and promoting the advancement of women in business, and was there for two years. I recently accepted a position as a Senior Program Manager at the Women’s Business Enterprise National Council in Washington, D.C.; it is one of the largest certifiers of businesses owned and operated by women in the United States. I am working with WBENC’s educational programs and with their certification process to help women business owners. I have found my calling professionally in helping women succeed in business, but I know that it would not have been possible without Windward and the support of my parents, who never gave up on me. From the time when I struggled to read the word “the,” to my parents’ tears of joy as I received my degrees with honors, I would not be where I am today without the help of The Windward School.

Windward was different. I felt an instant connection with my classmates, who were going through the same struggles as I was when it came to reading. Each day, I hopped in my carpool with several other students from my town in New Jersey and made the hour and a half ride to the School in White Plains, NY.

I started to blossom. I got involved in sports and theatre at Windward, even with my lack of hand-eye coordination; I was not turned away from any of the teams. I was so excited about being in the right place for my education that I even got involved with the boys’ sports teams as the assistant for the boys’ lacrosse team!

When it was time for high school, my classmates and I moved from the Middle School to Windward’s Upper School, located on Rosedale Avenue in White Plains, where we only had classes of about 20 people per grade. We were a close group, and the teachers devoted more than enough time and attention to each student. I was learning skills I never knew existed. I learned how to put

**“WINDWARD WAS DIFFERENT... I WOULD NOT BE WHERE I AM TODAY WITHOUT THE WINDWARD SCHOOL.”**

## FACULTY PROFILE: DIANE KESSLER

### Bringing Science to Windward's Youngest Students

**D**iane Kessler's science classroom overlooks the Lower School's expansive front field, which is replete with carefully tended, large trees that her students quickly discover are more than simple trees. They are actually plants, albeit rather large plants, but still very much like the ones they would see in a garden. For Windward's third and fourth grade students, the discovery that the very trees which grace their playing field are more than they seem is just one of many scientific discoveries they make under Ms. Kessler's tutelage.

"Windward's science curriculum helps children explore how their world functions," said Ms. Kessler, who has spent the past four years providing Windward's third and fourth grade students with a detailed look into the natural world. "This really needs to be done in a hands-on way; it can't be done on a computer."

This dedication to multisensory scientific inquiry is part of what drew Ms. Kessler to The Windward School. An enthusiastic educator, she spent her entire pre-Windward career teaching science to elementary school students, both in the classroom and in community settings. Her love of all things science was formed during

**Science is Everywhere:** *Two Lower School children examine sticks and a bug (not pictured) while playing at recess. Ms. Kessler works hard to impress upon her students that the natural environment is not always as scary as it sometimes appears.*



childhood vacations with her parents, who made sure their family trips featured lots of time spent enjoying the outdoors.

"My parents always took us on vacations that including learning about the great outdoors," said Ms. Kessler, whose childhood dream was to become a geologist. "We were encouraged to explore in the yard and in the forest. I thought science was the best thing in the world."

Ms. Kessler's college years at Hofstra University on Long Island, NY found her pursuing not her childhood dreams of geology but bachelor's degrees in English and elementary education. She continued her academic career at Wheelock College in Boston, a school focused on preparing its students for careers that improve the lives of children and their families. She earned a Master of Science degree in early childhood education and returned to New York, where she taught first and second grades in the Bedford Central School District for several years before electing to stay home with her children.

During that time, Ms. Kessler continued to bring the fascinating world of science to elementary school children. She served as a volunteer naturalist at Teatown Lake Reservation, a nature preserve and education center in Ossining, NY, which Windward's fourth grade students visit every spring. While there, she was awarded a scholarship to enroll in an ecology course at Audubon Greenwich, the Greenwich, CT branch of the National Audubon Society, whose mission is to conserve natural ecosystems. Following the course, Ms. Kessler founded *Adventures in Science*, a series of science enrichment workshops she presented in area elementary schools and libraries; she also ran a science program at six nursery schools in Westchester County, NY. In the midst of this, she also returned to the classroom as a teacher, serving as a substitute in the Chappaqua and Katonah-Lewisboro School Districts.

When Ms. Kessler joined the

Windward faculty in 2008, she was struck by the School's multisensory approach to the teaching of language arts and its commitment to integrating that approach in all academic areas, including science.

"They really support giving children the gift of time to learn what they really need to learn," Ms. Kessler said. "They value that. I felt that public schools were not providing the time for children to engage as much, and this school thinks it's important."

It goes without saying that Ms. Kessler thinks it is important, too. Her state-of-the-art science classroom, complete with lab tables and stools onto which the Lower School children eagerly ensconce themselves at the start of every class, is the sort of space that most students do not encounter until secondary school. A fully-functioning science laboratory, she believes, is important to helping young children tackle the basics of scientific study.

"We are broadening their horizons," she said of the curriculum Windward's science department delivers each year. "There are so many different kinds of science, and it impacts everything in life; it's not just about fun and games."

To that end, Ms. Kessler is committed to teaching a comprehensive science program that gives students the tools they need to undertake curious, successful scientific inquiry. All Lower School children are taught earth, life and physical science, but the presentation of these units varies according to grade level. Lessons for first and second grade children introduce them to the world of science and scientific study and set the stage, both in terms of concepts and vocabulary, for the material they will encounter as they advance in their schooling. Third and fourth grade children study a number of topics under Ms. Kessler's tutelage, and her lessons both advance the Lower School's scientific curriculum while reinforcing concepts with which the children are already familiar.

**"A COLLECTION OF BEETLES, MILLIPEDES AND SOW BUGS ARE ALSO INTRODUCED TO BRING THE WORLD OF ARTHROPODS, THOSE INVERTEBRATES OTHERWISE KNOWN AS INSECTS, ARACHNIDS AND CRUSTACEANS, TO THE CHILDREN'S ATTENTION."**

"Everything flows throughout the year," she explained. "The chemistry unit reinforces the scientific method, and we discuss the unique properties of liquids, solids and gasses, and the density of molecules and atoms." Ms. Kessler illustrates this complicated topic for the children with a lesson on water and its properties. "Objects that float are less dense than water," she said. "This helps them understand why water acts the way it does."

Third and fourth grade students also undertake study in physics in Ms. Kessler's classroom. While they may not ponder Einstein's equations during their lessons, their inquiry into the world of force and motion is no less detailed than that of older students. At the conclusion of a unit on balance and motion, Ms. Kessler helped the students visualize these concepts via the construction of an in-classroom rollercoaster for a set of marbles. Applying what they had learned in class, students designed their own rollercoaster for the marbles, fashioning the ramps out of Styrofoam and observing the manner in which the marbles coursed down the track. The opportunity for such hands-on work can tap a child's scientific interest.

Ms. Kessler recalled two students, whose experience with the physics unit changed their outlook on science. She recalled that while they had not expressed much interest in science prior to those lessons, their work on the rollercoaster project was exceptional. "Their rollercoaster went past the windows and looped all the way around the sink," she said. "I was teaching them to be

introspective and to problem-solve, and they did a phenomenal job." Thanks to Ms. Kessler's encouragement, the children became so enamored of science that they joined the Lower School's Science Club, which meets in Ms. Kessler's classroom during student lunch and recess periods.

"Children are playing differently now due to technology," she said, "and hands-on activities have fallen by the wayside. The Club provides children with the opportunities to explore principles they wouldn't otherwise explore." Students have studied everything from the dynamics of paper airplane design to catapults as a means of understanding levers and motion. Club members are encouraged to bring friends to the meetings.

But one need only visit Ms. Kessler's classroom in the springtime to realize the study of life science keeps the students occupied just as much as their inquiries into the world of physics. The botany unit finds Ms. Kessler raiding her daffodil garden at home; over 200 daffodils are sacrificed each year so students can dissect them ("It's not about hacking plants apart; it's different than cutting your dinner," states Ms. Kessler) and study the different parts of the plant. A collection of beetles, millipedes and sow bugs are also introduced to bring the world of arthropods, those invertebrates otherwise known as insects, arachnids and crustaceans, to the children's attention. Although Ms. Kessler has to help some students overcome an initial squeamishness with the small visitors, the lessons on arthropods are annual favorites.

**Academics at Windward:** *Diane Kessler answers questions from a group of Lower School students during a lesson in the science lab at the Windward Avenue campus. Ms. Kessler was presenting a unit on the properties of small solids.*



"They live in the classroom, and the children can handle them and see how they live. While there's definitely an 'I'm not within 10 feet of bugs' syndrome that happens, part of this lesson is teaching the students that animals are not always as scary as they look, and that they can be really intriguing," she said. "I let them know that I will help them explore something new in a safe environment." The study of the characteristics and properties of living creatures is taken to another level during the Lower School's annual trip to the Bronx Zoo at the conclusion of the school year. At the famous zoo, Ms. Kessler leads the students in looking at the manner in which scientists classify the various animals, from the large elephants to the smallest tropical bird and butterfly.

In keeping with her commitment to her students, Ms. Kessler's classroom is always open to children who have a question or wish to explore their science in further detail. Students have come together to study rocks, peruse the physics equipment and even explore the world of archeology.

"We had a little archeology team one year," Ms. Kessler said, recalling fondly how she guided a group of children in their study of the subject after they brought her a spoon they had dug up on the Lower School's playground. "We researched the spoon and discovered that its pattern was from the 1920's. They also brought me an inkwell, and I thought they were going to dig up the entire yard!"

Ms. Kessler's dedication to her students is second only to her dedication to the School that serves them "There are so many wonderful aspects to teaching at Windward," she said. "I am encouraged to take elementary-school science seriously, I get to see the students learning and growing, and the appreciation and gratitude the administration shows is tremendous. Sometimes all that happens in the same day; it's the best job in the world."

But despite the professional accolades, nothing makes Ms. Kessler happier than sharing the basics of science with the children. She often greets the children at the front door in the morning, bearing a scientific artifact she knows will pique their interest.

"It's wonderful to see," she said. "The students here are really brilliant, and to see them make wonderful science observations and connections is great."

## FACULTY NEWS: EVERYONE RESEARCHES

### Windward Faculty Present at 39<sup>th</sup> Annual *Everyone Reading* Conference

The 39th annual *Everyone Reading* Conference on Dyslexia and Related Learning Disabilities, held this past spring at New York University's Kimmel Center, attracted a number of distinguished educators and literacy researchers from around the country. Among the group were Lisa Bambino, Windward's Social Studies and Library Services Coordinator, and Stephanie Dunn, a member of the Middle School faculty. Ms. Bambino and Ms. Dunn gave a presentation titled *Teaching Research Using a Direct Instruction, Multisensory Approach*, which introduced Windward's strategies for teaching the best research methods to its students.

Designed to instruct and inform educators of children with language-based learning disabilities, the *Everyone Reading* Conference was the ideal forum for Ms. Bambino and Ms. Dunn to present Windward's approach to the teaching of research, an approach which is markedly different from that used by many schools. A vital component of the Windward curriculum, research skills are taught to all students in grades four through nine during their weekly library skills classes. Ms. Bambino and Ms. Dunn highlighted the important manner in which the research process is used at Windward to support and enrich students' work in their language arts and social studies classes, as well as the key role the process plays in creating informed students. They also provided conference attendees with a suitable guide for implementing Windward's direct instructional model in a wide range of classroom settings, from the elementary grades to the high school level.

Ms. Bambino and Ms. Dunn explained that Windward students do not simply conduct library research on their own; rather, they are taken through this

process via a teacher-driven, direct instruction model designed to guide them, one step at a time, through the process of researching a topic or a question. The ultimate goal is to have the students complete various research tasks independently. Their presentation highlighted the fact that students cannot conduct research properly and succinctly unless they are explicitly taught the best methods for doing so. Particularly as students advance into the upper grades, more detailed projects and research papers will be expected of them, and they need to know how to locate and determine reliable resources to complete those projects.

In addition, students need to know how to synthesize appropriate information from these resources, and Windward's research program teaches them to do this with efficiency. The program's direct instruction model takes away the overwhelming nature of most research tasks by breaking them down into components that students of all ages and ability levels can understand and master. Students in the Lower School's upper grades, for example, are taught important foundational research skills, such as how to distinguish fiction from non-fiction; the differences between important resources such as the atlas, the dictionary and the encyclopedia; and how to research specific people, places and events that they learn about in their social studies classes. Once this base of foundational knowledge has been established, Windward's Middle School students are given direct instruction in how to access and locate print and online research material; how to answer important question words (*who, what, where and when*) while researching a given topic; and how to properly cite resources and organize gathered facts into outlines.

Since so much of the research process

Windward Presents: Lisa Bambino, pictured at the podium, gives an overview of Windward's study skills program at the School's annual "Windward Today" program, offered to new parents each fall. The study skills program was presented at the "Everyone Reading" Conference.



for today's students is Internet-based, Ms. Bambino and Ms. Dunn discussed how Windward's research program makes a concentrated effort to assist students in determining the reliability of the resources they utilize. Assessing that too much trust in the wrong online sources can lead to the propagation of misinformation, the pair highlighted how Windward's students are urged to shun the ever-popular Wikipedia as a primary source and focus instead on gleaning information from reliable print and online resources, such as academic databases and encyclopedias. To assist students in determining which sources are reliable and which are not, students are directly taught how to evaluate a website. Websites ending in .org, .edu or .gov, as well as university websites, tend to maintain credible information. Students are also versed in how to "Google" responsibly and how to conduct online searches using keywords and phrases appropriate to the topic at hand.

At the close of their presentation, Ms. Bambino and Ms. Dunn took questions from their audience, and provided them with sample lesson plans and materials they could use in their own classrooms. The School was fortunate to have both these faculty members present a vital aspect of Windward's program at the conference.

**"WINDWARD'S STUDENTS ARE URGED TO SHUN THE EVER-POPULAR WIKIPEDIA AS A PRIMARY SOURCE AND FOCUS INSTEAD ON GLEANING INFORMATION FROM RELIABLE PRINT AND ONLINE RESOURCES, SUCH AS ACADEMIC DATABASES AND ENCYCLOPEDIAS."**

## FACULTY NEWS: PROFESSIONAL DEVELOPMENT

### Language Arts Professional Development Does Not Take a Summer Holiday at The Windward School

During the summer months, the faculty and staff of The Windward School's Language Arts department spent a great deal of time preparing for the upcoming academic year. In addition to ensuring that the department's student curricula were ready for the first day of school in September, the staff prepared professional development opportunities for its faculty. The department's administration worked assiduously to ensure that the schedule of programs for the new school year was concise and informative for the teachers.

The Language Arts department, which includes Betsy Duffy, the Director of Language Arts; Diane Happas, the Coordinator of Language; Kaarina Bauerle, the Lower School Language Arts Coordinator; Lisa Bambino, the Coordinator of Social Studies and Library Services; and Jill Fedele and Alexis Pochna, the Coordinator and Assistant Coordinator of Middle School Language Arts, respectively, spent time crafting a series of comprehensive presentations centering on classroom discourse, direct instruction and multisensory lesson planning. These presentations are given to the faculty as part of their regular staff development sessions on Friday afternoons. Every Friday during the school year, Windward students are dismissed early and, following their departure, the faculty gathers as a group for a variety of presentations aimed at increasing their knowledge of multi-sensory structured language instruction and language-based learning disabilities. Both Windward faculty and outside consultants are invited to present to the staff on these topics.

In addition, members of the Language Arts department spent the summer months preparing workshops for the School's language arts teachers. Designed to



**Teaching at Windward:** Professional development in all departments is an important part of The Windward School's mission, allowing its teachers to provide the best instruction possible to their students. In this photo, a Middle School teacher corrects a student's dictation work during a language arts class.

supplement the extensive coursework offered by Windward Teacher Training Institute (WTTI), the department developed workshops aimed at giving teachers training in specific instructional strategies and a solid background in the research that supports Windward's curriculum. The workshops include a series of presentations and model lessons for the language arts faculty on topics ranging from writing strategies based on the *Teaching Basic Writing Skills* program, developed by WTTI founder Dr. Judith C. Hochman, to reading comprehension strategies outlined by the National Reading Panel. These workshops are held every other week and build upon the skills that teachers have already acquired via WTTI's courses, which are offered at the School's Judith C. Hochman Building throughout the year.

The Language Arts department is also committed to presenting to audiences

beyond the Windward faculty. Ms. Happas and Ms. Duffy regularly give presentations about aspects of the language arts program to parents at the monthly parent seminars, which are designed by WTTI to give the parent community an understanding of the School's academic curriculum and the field of language-based learning disabilities in general. This fall finds members of the department presenting at prominent conferences: Ms. Bauerle and Ms. Fedele presented Windward's *Teaching Basic Writing Skills* program at the 85<sup>th</sup> Annual ERB Conference, held in San Diego, CA, while Ms. Duffy, Ms. Pochna and Ms. Happas will attend the 63<sup>rd</sup> Annual International Dyslexia Association Conference in Baltimore, MD. They will address their fellow attendees regarding Windward's study skills program, while Ms. Duffy will give a separate presentation on vocabulary learning.

**"THE DEPARTMENT'S ADMINISTRATION WORKED ASSIDUOUSLY TO ENSURE THAT THE SCHEDULE OF PROGRAMS FOR THE NEW SCHOOL YEAR WAS CONCISE AND INFORMATIVE FOR THE TEACHERS."**

**NEWS FROM WTTI**

# The Judith C. Hochman Building: A New Home for Windward Teacher Training Institute

*One Building, Two Views: A September 2012 shot of the Judith C. Hochman Building, below center, taken at the dedication ceremony. A view from the building's outdoor plaza is shown in a photo from August 2012, below right.*



**Heads of School:** Dr. John J. Russell and Dr. Judith C. Hochman at the dedication of the Hochman Building on September 20, 2012.



**D**uring the past year, The Windward School has been involved in a building project designed to provide a new, state of the art facility for Windward Teacher Training Institute (WTTI). Founded in 1988 by Dr. Judith C. Hochman, a former head of school, WTTI provides professional development based on scientifically validated research in child development, learning theory and pedagogy. WTTI's new facility at the Red Oak Lane campus was named for Dr. Hochman in recognition of her dedication to the School and steadfast support of WTTI's mission. Each year, WTTI's courses, workshops and lectures draw hundreds of professionals from the tri-state area and around the world.

The Judith C. Hochman Building was constructed thanks to the vision and dedication of the School's administration and Board of Trustees. Construction commenced in May 2011 with a special groundbreaking ceremony led by Dr. John J. Russell, Windward's Head of School, and attended by Trustees and Middle School faculty and students. Construction continued into the summer months and progressed steadily throughout the 2011-12 academic year. The building was officially dedicated on September 20, 2012 in a ceremony attended by Dr. Russell; Dr. Hochman; Devon

Fredericks, President of the Board of Trustees; Sandra Schwarz, Director of WTTI; and members of the School's administration, along with Trustees and donors whose generosity helped the make the building a reality.

The addition of the Judith C. Hochman Building will allow WTTI to continue to transform the lives of children with language-based learning disabilities. The facilities include an auditorium and extensive classroom space in which WTTI can host a greater number of courses, lectures and workshops aimed at training not only current faculty, outside professionals and Windward parents, but future faculty members in the School's proven, multisensory instructional program. A greater number of professionally trained teachers will enable the School to move forward with its plans to establish a third campus in New York City. Once established, this campus will be staffed with expert faculty prepared to teach students with language-based learning disabilities the strategies they need to be successful. The Judith C. Hochman Building promises to be an outstanding addition to the School, one which will enable it to continue transforming the lives of future students in need of a Windward education.



**Under Construction:** The Judith C. Hochman Building, shown in this April 2012 photo, rises above the amphitheater at the Red Oak Lane campus. The building was constructed to house an expanded space for WTTI.



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# The Beacon

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## BE INFORMED. BE INSPIRED. TRANSFORM LIVES.

Windward Teacher Training Institute provides professional development based on scientifically validated research in child development, learning theory and pedagogy. The IMSLEC-accredited training program leads to national certification in multisensory structured language education.



### Courses, Programs and Workshops

- Multisensory Reading Instruction • Expository Writing Instruction
- National Certification in Multisensory Structured Language Education
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- RAVE-O Training-November 2012 • Singapore Math-April 2013

### Robert J. Schwartz Memorial Lecture

Dr. Maryanne Wolf • *Wednesday evening, April 10, 2013*



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Windward Teacher Training Institute is a division of The Windward School, an independent school for students with language-based learning disabilities, located in White Plains, NY.