Scientifically-Based Evidence for

# NewPath Learning's
# Curriculum Mastery Program

By Bonnie A. Lesley, Ed.D.

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Bonnie A. Lesley, Ed. D., the author, holds a bachelor's degree in English from the University of North Texas, a master's degree in English from West Texas A&M, administrator certification and other course credits from the University of Texas at El Paso, and a doctorate in education administration from Baylor University.  She taught at the elementary, middle, and high school levels for 17 years, and she has also taught as an adjunct professor at the undergraduate and graduate levels in four universities.  She was the chief instructional officer in five urban school districts and a state department of education located in Texas, Delaware, Kansas, and Arkansas.

# Scientifically-Based Evidence for NewPath Learning's Curriculum Mastery Program

## NewPath History and Program Features

NewPath Learning (NPL) was founded in 2006 with the express mission of developing innovative, interactive materials for curriculum review and comprehensive assessment preparation based on the most current academic standards.  NewPath's products are developed by teachers using research-based principles and are classroom tested.  The company's product line consists of an array of proprietary games, workbooks, posters, and other print materials—each supplemented with electronic versions, web-based activities, and assessments to provide an engaging means of educating students on key, standards-based topics.  These products are specifically designed for easy customization and total alignment to applicable state and national standards for English language arts, mathematics, science, and social studies.  A careful review of the activities reveals an emphasis on the development of content vocabulary—the academic language that is critical for school success.

NewPath recommends its products for in-class topic reviews for grades 1-8, supplemental Tier I-II interventions for Response-to-Intervention (RTI), home schooling and independent study, tutoring and assessment preparation, after-school and summer programs, Title I and English-language learner programs, dyslexia and dyscalculia interventions, learning centers, and youth activity programs.  Its assessments are also appropriate for continuous progress monitoring, topic and unit quizzes, item generation for comprehensive examinations, and benchmarking progress toward standards mastery.

Comprehensive access to all the assessment preparation activities, grades 1-8, for English language arts, mathematics, science, and social studies is available on the NewPath Learning website.  Participation is through annual subscriptions for individual teachers or parents.  Teachers/parents can use the default activities built into the system for each grade-level topic derived from the curriculum standards—or they can customize their own activities and/or assessments so that individual students or groups of students can participate in individualized/differentiated activities.  The website includes several other teacher tools, including a template for lesson plans (again for whole class, small group, or individuals) that incorporate NPL activities, teacher-designed activities, and/or links to other web-based materials.  Students can access these lesson plans and activities from any internet-connected computer.

The web-based subscription program also includes a learning manager that collects data on individual student performance and makes reports available to the teacher/parent that have a variety of uses.  For instance, scores might be used for homework or classwork grades; daily or frequent quiz grades; mastery assessment grades for curriculum topics; and/or benchmarks to check progress in mastering the knowledge and skills necessary for proficient performance on state assessments.  Performance scores might also be part of the data to make decisions about referrals of students for Tier II-III interventions for RTI and/or to measure whether their response to other interventions is moving them forward in mastering the curriculum standards.  Data may also be helpful in making exit decisions from such programs as Title I or English-as-a-Second Language.

## Purpose of This Study

The purpose of this study is to provide educators with the scientifically-based and other research evidence in which NewPath Learning materials are solidly grounded—their content, lesson model, assessment activities, instructional features, and activity strategies. No Child Left Behind (NCLB) guidance on how to identify effective programs makes it clear that when the components of an intervention are grounded in scientifically based research, then the program itself can be said to be grounded in scientific evidence (United States Department of Education, 2003; United States Department of Education, Jan. 7, 2004). This study will, therefore, document the scientific evidence underlying each product feature.

## Standards-Based Content

Both NCLB and IDEA, plus the laws and policies of almost all the states, mandate that schools teach standards-based curricula, and from these established standards the various state assessments and even the National Assessment of Educational Progress (NAEP) tests are derived. Publications of the standards, whether from professional organizations, such as the National Council of Teachers of Mathematics (NCTM) or from state departments of education, almost always preface their compilations with statements that their standards are grounded in research. For example, the Texas Education Agency (2001, p. 5) states that their Texas Essential Knowledge and Skills (TEKS) "is a comprehensive research-based instructional program for grades k-12." Using this rationale, then, the degree to which a curriculum program is correlated with those standards, its content is research-based.

NPL points out that their recently developed materials are specifically developed to meet current standards adopted by all the states for English-language arts, mathematics, science, and social studies, grades 1-8. They differentiate themselves from scores of other publishers that, instead, worked backwards to show correlations with the standards from the content they were already using. Each of the 25 curriculum topics for each subject area at each grade level in the numerous NPL activities, both print-based and web-based, includes 30 assessment items that are used in a variety of ways to help students achieve curriculum mastery.

## Content Vocabulary and Academic English

Of singular importance in the NPL materials is its emphasis on content vocabulary in the construction of its thousands of assessment items. Marzano, Kendall, & Gaddy's 1999 remarkable publication of Essential Knowledge: The Debate Over What American Students Should Know includes an extensive discussion of the research basis for including attention to vocabulary: "The critical relationship vocabulary has to reading in particular, and learning in general, explains why some students have great difficulty in school from the day they first walk through the classroom door" (p. 143). They cite scores of research findings that led Marzano & Marzano (1988) "to assert that vocabulary instruction should be a focal point of education, especially for students from more disadvantaged backgrounds" (p. 143). Another study they cite from Stahl and Fairbanks (1986) "indicates that student achievement will increase by 33 percentile points when vocabulary instruction focuses on specific words that are important to what they are learning" (p. 147). They conclude that "teaching vocabulary provides educators with an efficient way to expose students to the content within all the standards and benchmarks identified by subject-matter experts" (p. 148).

Vocabulary is, of course, also one of the five critical components of reading instruction identified by the National Reading Panel (2000). Other researchers also strongly concur that teaching vocabulary leads to gains in reading comprehension across the curriculum (Bruer, 1993, p. 190; Snow, Burns, & Griffin, 1998, p. 322; Adams, 1990, p. 146; Kamil, 2004, p. 10; Lehr, Osborn, & Hiebert, n.d., p. 20; and Mercer & Mercer, 2005, p. 289) and is critical to schools' efforts to close the achievement gaps (Hart & Risley, 1995, p. 160; Graves & Watts-Taffe, 2002, p. 145, and American Educational Research Association, Winter 2004, p. 2). Vocabulary is also important in the content areas. Marzano (1998) notes that "At a practical level, it is fairly obvious that students must understand a certain amount of the basic vocabulary in a subject area before they can understand facts, generalizations, and concepts within a content area" (p. 29).

English-language learners are among the subgroups with critical needs to learn "academic English," including the content vocabulary to understand instruction and the assessment items (Barone, 1998, pp. 62-63). According to the American Educational Research Association (2004), "they will never catch up with native speakers unless they develop a rich vocabulary" (p. 2).

## Lesson Models

Two well-researched lesson models, direct instruction and mastery learning, have been found in repeated studies over time to have significant impact on student learning (Walberg & Paik, n.d, p. 12; Torgesen, 2004, p. 359; Grossen, 2000, p. 5; United States Department of Education, 1986, p. 35; Sousa, 2001, p. 22; Alliance for Excellent Education, Jan. 2004, pp. 2-3; Kamil, 2004, p. 9; Schug, Tarver, & Western, Mar. 2001, p. 1; Levin & Long, 1981, p. 7; Piotrowski & Reason, 2000, p. 51; Ellis & Fouts, 1997, p. 185; and Bloom, 1984, p. 5), especially for those students who require more time and more practice to master curriculum knowledge and skills. Direct instruction and mastery learning have similar steps or phases in their lesson design. They are:

- goal-focused,
- present new material in small chunks,
- include both guided and independent practice,
- involve frequent assessments to monitor progress, and
- incorporate immediate corrective feedback (Alliance for Curriculum Reform and the Educational Research Council, 1999, p. 14; Mercer and Mercer, 2005, p. 149; Simmons, Fuchs and Fuchs, 1991; Walberg & Paik, n.d., p. 12; Piotrowski & Reason, 2000, p. 51; & Alliance for Curriculum Reform, 1995, p. 16).

Although NPL materials are not used to present the initial instruction of the the standards-based curriculum, they provide teachers with all the tools that they need in the other practice and assessment components of a good lesson grounded in these research-based models. They

- focus on the goal of curriculum mastery—the performance necessary for students to perform successfully in the classroom and to score at the proficient level on state assessments (Alliance for Curriculum Reform, 1995, p. 83);

- include a variety of engaging games, worksheets, flashcards, and other activities that provide as much and as varied practice as is required in both the guided and independent practice phases of the total lesson (see section of this study relating to practice/repetition);

- incorporate teacher observation of student performance on games and other print materials (Levine, 2002, p. 310; Levine & Swartz, 1995, p. 6) and assessment and benchmarking activities available on the web-based program provide the continuous progress monitoring or frequent review of progress that research verifies as effective in promoting student learning (Dixon-Krauss, 1996, p. 129; Davidson, 1994, p. 185; Educational Research Service, 2002, p. 79; Alliance for Curriculum Reform, 1995, p. 83; Alliance for Excellent Education, 2004, p. 4; & Bonstingl, 1992, p. 19);

- provide opportunities for immediate corrective feedback both in use of the print materials and on the web-based program (Cotton, 2000, p. 24; Levin & Long, 1981, p. 18; Marzano, Pickering, & Pollock, 2001, pp. 96-98; Gagne, 1985, p. 254; & United States Department of Education, 1986).

## Assessments

In 1986 the United States Department of Education wrote that "Frequent and systematic monitoring of students' progress helps students, parents, teachers, administrators, and policymakers identify strengths and weaknesses in learning and instruction" (p. 43). Two decades later, practice begins to reflect the findings of research. A critical component of the federal government's Reading First program in NCLB and most recently in RTI as established in the 2004 reauthorization of IDEA is continuous progress monitoring (also known as "dynamic assessments," "informal assessments," "benchmarking," or "formative assessments").

What educators have learned over the years is that the annual formal assessments do little, if anything, to help individual students. At best, they provide data to make judgments about the effectiveness of curriculum and instruction, but the scores rarely change what happens to an individual student. Instead, good teachers constantly observe student performance, administer all kinds of checks to measure their progress, and use the data to inform the next day's instructional decisions—for the whole class, for small groups, and for individuals. These ongoing assessment strategies are what works in improving learning (Alliance for Curriculum Reform, 1995, p. 83; Mercer & Mercer, 2005, p. 84; Sherman, Richardson, & Yard, 2005, p. 1; Wolfe, 2005, p. 1; Levine, 2002, p. 210; Dowker, 2004, p. 19; Erlauer, 2003, p. 117; Donovan & Bransford, 2005, p. 16; Dixon-Krauss, 1996, p. 125; McEwan, 2000, p. 56; Rose & Meyer, 2002, p. 83; Jones, Wilson, & Bhojwani, 1997, p. 158; and Stumbo & Lusi, 2005, p. 7). Wolfe (2005) summarizes the situation as follows:

> Teaching without assessing is like driving with your eyes closed. Knowing when to stop and when to proceed, noticing warning signs, and avoiding obstacles are all key components in successful teaching and safe driving. Everyone is aware of the importance of real-time feedback while driving, but not everyone understands the importance of real-time assessment in instruction (p. 1).

She adds:

> Research shows that the use of diagnostic and formative assessments—assessments occurring before and during instruction—has a positive effect on student achievement. This positive effect is documented by externally mandated assessments, as well as other measures of student achievement. Not only is achievement improved overall, but the difference in achievement between high and low achievers is narrowed because formative assessment helps low achievers even more than other students (p. 1).

Schools and districts with a focus on standards-based content and instruction move toward benchmark assessments to measure progress.  A major barrier in doing so is the time that is required to write, test, administer, and score these additional tests.  O'Shea (2005) states that

> A well-designed benchmark-testing program complements the daily assessment of the standards and collaborative evaluation of students' work.  The district's teachers can replace some unit and semester exams with the benchmark tests.  This decision allows teachers to incorporate standards assessment into the classroom routine and avoid allocating additional days to assessment (p. 115).

Results of such benchmarking, says O'Shea, can be used "to inform students, parents, teachers, and principals of the progress that students are making toward standards achievement" (p. 115).

The NPL materials are basically, in all the different activities, forms of benchmark assessments that are grounded in the content of the curriculum standards.  The same activities that can be used for practice and repetition can, in another format or setting, be used as assessments to measure progress.  Teachers have the tools and materials that they need quickly to construct assessments (or just use the defaults) to use on a daily, weekly, or periodic basis to benchmark progress against the standards—and, thus, to help them predict which students need additional help if they are to master the state assessments.  Too, such assessments are useful in helping to identify students for Tier II-III interventions as schools implement RTI.  The savings in time and money required for schools to create such assessment items from scratch greatly exceed the cost of the NPL products.

One user of the NPL online materials commented that she was more than willing to pay the subscription cost out of her own pocket just to have access to the tools for formative assessments, so that, she said, she could measure exactly where her students are at all times in their journey to master the curriculum standards.

## Motivation to Learn

Csikszentmihalyi (1991), one of the foremost authorities on motivation, says we all want more of what he calls "flow," or "the optimal experience" that is the result of a series of conditions:

> When people reflect on how it feels when their experience is most positive, they mention at least one, and often all of the following:  First, the experience usually occurs when we confront tasks we have a chance of completing.  Second, we must be able to concentrate on what we are doing.  Third and fourth, the concentration is usually possible because the task undertaken has clear goals and provides immediate feedback.  Fifth, one acts with a deep but effortless involvement that removes from awareness the worries and frustrations of everyday life.  Sixth, enjoyable experiences allow people to exercise a sense of control over their actions.  Seventh, concern for the self disappears, yet paradoxically the sense of self emerges stronger after the flow experience is over.  Finally, the sense of the duration of time is altered; hours pass by in minutes, and minutes can stretch out to seem like hours.  The combination of all these elements causes a sense of deep enjoyment that is so rewarding people feel that expending a great deal of energy is worthwhile simply to be able to feel it (p. 49).

He adds, then, that if schools wish to increase learning, they need to create more flow-like experiences for students. NPL's game-based learning is one of the ways to do that:

(1)  The NPL games can be completed in a reasonable amount of time;
(2)  Students are sufficiently engaged to be able to concentrate on what they are doing;

(3) The purpose of the game is to master the standards-based content, and that goal is clear to students.

(4) The student learns immediately whether he or she has accurately recalled the needed information, so feedback is immediate and corrective;

(5) Participation in the games is fun and different from most other classroom activities and assessments, so the student forgets the frustrations that may be his or her usual experience;

(6) Students enjoy the games and feel a sense of control;

(7) The student does not have to focus on self, but his or her growing sense of mastery contributes to an overall sense of satisfaction and pleasure once the activity is completed;

(8) Time undoubtedly passes faster for students participating in a game in contrast to how they may feel about usual classroom activities.

Kujala, Karma, et al. (2001) noted that "As previous studies have shown, attention and motivation are important factors in causing plastic neural changes in the brain" (p. 7). Activities, then, that foster motivation both directly and indirectly contribute to improved learning. Tileston (2000) adds to the conversation:

> Jenson believes that enrichment in the classroom comes primarily from challenge and feedback.
> He warns that too little challenge in the classroom breeds boredom and that too much can intimidate.
> Challenge should be filtered so that it provides stimulating and fun experiences that match the ability
> of the student without causing frustration (p. 5).

According to Garris, Ahlers, & Griskell (2002), "feedback provides an assessment of progress toward goals that drives the motivated performer to expend more effort, to persist, and to focus attention on the task" (p. 454).

The power of immediate corrective feedback cannot be overstated, according to the research. Marzano, Norford, Paynter, Pickering, & Gaddy (2001) provide the following research synthesis:

> Some education researchers believe providing feedback is the most powerful thing that a classroom
> teacher can do to enhance student achievement. After considering the findings from almost 8,000
> studies, researcher John Hattie (1992) commented: "The most powerful single modification that
> enhances achievement is feedback. The simplest prescription for improving education must be 'dollops
> of feedback'" (p. 185).

NPL's game-based learning provides a perfect opportunity for teachers to employ both sufficient challenge and necessary feedback for learning to occur. Students receive those "dollops of feedback" from their peers as they play the games, from the teacher as she observes performance, from the progress reports (for the online versions), and from the parents when they are informed of their child's progress.

## Game-Based Learning

Gredler (2004) has several publications relating to the research on using games and their relationships to learning. She notes that "Educational games and simulations are experiential exercises that transport learners to another world" where they can apply "their knowledge, skills, and strategies" (p. 571). The use of games in learning dates back to the 1600's, she says, when war games were invented. The agreed-upon definition of games by many researchers follows: "Briefly, games are competitive exercises in which the objective is to win and players must apply subject matter or other relevant knowledge in an effort to advance in the exercise and win" (p. 571).

"Academic games," states Gredler, "may fulfill any of four purposes: (a) to practice and/or refine already-acquired knowledge and skills, (b) to identify gaps or weaknesses in knowledge or skills, (c) to serve as a summation or review, and (d) to develop new relationships among concepts and principles" (p. 572). She adds that games may also be used as "a reward for students for working hard or as a change of pace in the classroom" (p. 572).

Her research synthesis also includes design criteria for games. "Well-designed games are challenging and interesting for the players while, at the same time, requiring the application of particular knowledge or skills" (p. 572). Other criteria follow:

1. Winning should be based on knowledge or skills, not random factors.
2. The game should address important content, not trivia.
3. The dynamics of the game should be easy to understand and interesting for the players but not obstruct or distort learning.
4. Students should not lose points for wrong answers (they simply do not advance in the game).
5. Games should not be zero-sum exercises (should provide for several winners) (pp. 572-573).

She further concludes that "Advantages of games in the classroom are that they can increase student interest and provide opportunities to apply learning in a new context" (p. 573). Garris, Ahlers, & Driskell (2002) concur in their research synthesis:

> In a review of research on educational games, Randel, Morris, Wetzel, and Whitehill (1992) concluded that games are consistently perceived as more interesting than traditional instruction. For example, Cohel (1969) found that 87% of students tested reported greater interest for educational games than for classroom approaches. Pierfy (1977) found that seven or eight studies that measured student interest reported greater interest from game use than conventional instruction (p. 452).

Using these criteria, it is clear that the NPL board games (and those simulated in the online product) meet the criteria for well-designed academic learning games. The games are based on the knowledge and skills identified in the curriculum standards for the subject matter and grade-level being taught and assessed. The rules are simple and easy to understand—and easy to amend, as students become familiar with them and want to make them more challenging or more interesting. If students give the wrong answers to the assessment items, then they simply do not advance. Also, the games allow for more than one winner—the one who answers the most questions, the one who finishes the game first, and so forth. Students can also play in teams, making it possible to foster more cooperation and collaboration. Too, the teacher can set up tournaments, providing opportunities for teams to win, not just individual students.

## Time-on-Task

The Alliance for Curriculum Reform (1995) documented more than 130 studies that "support the obvious idea that the more students study, other things being equal, the more they learn." They added that "it is one of the most consistent findings in educational research, if not all psychological and social research" (p. 11). Mercer and Mercer (2005) stated in their research synthesis the following:

The finding that academic learning time is related positively to more student learning is consistent in the research for both general education students and students with learning problems. To foster a positive and productive learning environment, students should spend as much time as possible engaged in meaningful academic tasks (p. 34).

Other researchers finding importance in time-on-task include Snow, Burns, & Griffin, 1998, p. 129; Biancarosa & Snow, 2004, p. 20; the United States Department of Education, 1986, p. 34; Levin & Long, 1981, p. 2; Gagne, 1985, p. 256; Torgesen, 2004, p. 364; and Shellard, 2001, p. 7.

NewPath Learning provides the materials and other tools to facilitate additional time and exposure to the curriculum. Whether the teacher decides to use the board games, worksheets, flashcards, or other materials for guided and independent practice, the entire class, small groups, and/or individuals can receive exactly the practice opportunities that they need for curriculum mastery. Practice can occur within the school day in time reserved as a part of a teacher's lesson plan; as homework using the NPL Take-Home Edition of the board games or the web-based activities; in before- or after-school tutoring programs; and/or in pull-out interventions for such programs as Title I, ESL, special education, and/or RTI.

## Engaged Time

Research is also plentiful on the importance of student engagement in order for learning to be effective—and if additional time on task is to be meaningful. As early as 1981, Levin and Long concluded that "Studies generally demonstrate that, within a classroom, students who are more involved in their learning have higher achievement than students who are less involved in classroom learning activities" (p. 2). They cited a study that showed that "direct interaction with the learning materials and the teacher produced higher levels of achievement than merely listening to or watching the interaction" (p. 5). Alvermann (2001) summarized his research as follows: "the level of student engagement (including its sustainability over time) is the mediating factor or avenue, through which classroom instruction influences student outcomes" (p. 7).

NPL materials are, of course, highly engaging and fun to use. The game format itself encourages and allows every student to participate actively, and it fosters not only healthy competition, but also cooperation, social skills, and communication. The activities are also interactive, requiring students to be actively involved, whether participating in the board games or using other print or web-based materials. Learning moves, then, from passive listening to active involvement. The multi-sensory nature of the activities (incorporating both visual and tactile strategies, as well as auditory processing in playing the board games) also supports more active engagement and more effective learning (Levin & Long, 1981, p. 5).

## Repetition and Practice

The disciplines of cognitive psychology, neuroscience, cognitive neuroscience, and biology are among those that document in numerous studies the importance of practice and repetition in moving new information and skills into long-term memory (Sternberg, 2003, p. 183; Marzano, Pickering, & Pollock, 2001, p. 67; National Research Council, 1999, p. 113; Marzano, 1992, p. 60; Alliance for Excellent Education, 2004, p. 3; Sharron & Coulter, 1994, pp. 101-102; Sprenger, 1999, p. 74; Levin & Long, 1981, p. 34; Shaywitz & Shaywitz, 2004, p. 428; Shaywitz, 2003, p. 269; Adams, 1990, p. 133; International Dyslexia Association, 2002, p. 2; National Study Group, 2004,

p. 16; Papanicolaou, Pugh, et al., 2004, p. 411; Samuels, 2002, p. 174; Doidge, 2007, pp. 41-42; Zull, 2002, p. 78; Wolfe, 2001, p. 101; Marzano, Norford, Paynter, Pickering, & Gaddy, 2001, p. 130; McEwan, 2000, p. 48; Willingham, 2004, p. 1; Whitehurst, n.d., p. 5; and Kandel, 2006, p. 206).  Without appropriate amounts of practice (which vary according to the individual), no one develops fluency, and without fluency there is little hope that students will learn to comprehend what they read or to solve problems.  Also, clearly, without fluency students will not be able to be successful in fulfilling classroom requirements or in taking state assessments.

A major problem for many students is that many textbooks and even supplemental materials fail to include enough practice for students to master the content required in curriculum standards.  Jones, Wilson, & Bhojwani (1997) identify, for example, the effect of these omissions on mathematics achievement:

> Two deficiencies that contribute to inefficient instruction and chronic error patterns in the management of instructional examples are common to commercial math curricula.  First, the number of instructional examples and the organization of practice activities are frequently insufficient for students to achieve mastery. . . .  A second deficiency is an inadequate sampling of the range of examples that define a given concept (p. 153).

McGuinness (1997) reminds us that "Competency stems from practice (repetition).  Children willingly practice or repeat actions to obtain mastery" (p. 168).

NPL materials enable students to practice new learning and to repeat the practice in various formats for as many times as needed to lock that new learning into long-term memory.  The game format and the variety of other materials help the practice and repetition from becoming boring.  Too, the achievement of fluency and mastery gives a student an enormous ego boost, making him or her even more willing to return to the practice activities.

## Individualization

All educators know the importance of individualization in effective learning.  Bloom confirmed the validity of educators' experiences in his finding in 1984 that one-on-one tutoring is "the single most powerful form of teaching."  He continues:

> Using the standard deviation (sigma) of the control class, which was taught under conventional conditions, it was found that the average student under tutoring was about two standard deviations above the average of the control class.  Put another way, the average tutored student outperformed 98 percent of the students in the control class (p. 5).

The Alliance for Curriculum Reform (1995, pp. 15-17), the Learning First Alliance (1998, pp. 15-20), and the National Research Council in their syntheses of scientific studies note the power of one-on-one tutoring.

Given the power of individualization, educational practice is clearly moving toward a requirement of an individual education plan for each student, not just those in special education.  Increasingly, especially for at-risk students, but even for gifted/talented students, there are legislative mandates for individual plans.  Many states now require such plans for each student failing to score at the proficient level on state assessments.  Scores of studies (International Reading Association, 2001, p. 8; Flippo, 1999, pp. 48, 64; Van den Broek, 1996, p. 194-195; Sousa, 2001, p. 208; Short & Echevarria, Dec. 2004/Jan. 2005, p. 9; Dixon-Krauss, 1996, pp. 14-15; Kamil, 2004, pp. 29-30; Hay, 1997; p. 68; National Research Council, 1997, pp. 124-125; Alliance for Excellent Education, 2004,

p. 1; Caine & Caine, 1991, p. 13; Neuman & Roskos, 1998, p. 7) generally agree with the observations of Torgesen (2004) that "the exact mix of instructional activities that is most effective almost certainly varies depending on the individual needs of each child" (p. 363).

In an ideal, affluent world, the tutorial lesson model is the one all schools would and should use. The expense, however, is prohibitive if the teacher is limited to the chalkboard and basal texts for instruction. NPL print materials can be selectively assigned to individual or small groups of students with similar needs for the necessary repetition and practice on one or more standards-based topics. The same is true for the web-based activities. The teacher can set up a practice lesson for one student, a small group, or the entire class, if needed. Each student, then, receives the benefits of expert one-on-one tutoring even as a member of a room full of students.

## Multi-Sensory Strategies

Mercer and Mercer (2005) explain that multi-sensory processing is "based on the premise that some students learn best when content is present in several [emphasis added] modalities. Frequently, kinesthetic (movement) and tactile (touch) stimulation is used along with visual and auditory modalities" (p. 306). Therefore, all the relevant senses are employed for each student so that neural pathways that enable people to learn and remember are accessed and strengthened, regardless of the individual's weaknesses or strengths in learning. The most salient of the scientific research findings on multi-sensory efficacy (Wolfe, 2001, p. 135; Wolfe, 1998, p. 61; Molholm, Ritter, Murray, et al., 2002, p. 115; Mauer, 1999, p. 383; Wolfe & Brandt, 1998, p. 10, Caine & Caine, 1991, p. 86; Given, 2002, p. 81; National Center for Learning Disabilities, n.d., p. 1; Tileston, 2000, pp. 21-22; Levine & Swartz, 1995, p. 2; Peterson, Fox, Rosner, Minton, & Raichle, 1988, p. 589; Lachmann, 2002, p. 177, Sousa, 2001, p. 94; Snowling, 1987, p. 147; Kujala, Karma, et al., 2001, p. 2; and Sternberg, 2003, p. 205), which are overtly related to the achievement of fluency and to the development of memory (long-term recall), can be summarized by Herrell (2000):

> The use of multiple intelligences strategies supports the students' learning of new materials because it allows them to use the processing systems in which they integrate knowledge most effectively. By providing multiple ways for the students to demonstrate their understanding, their confidence in their own abilities is fostered and their anxiety is reduced (p. 144).

The NPL materials have been constructed in ways to make them visually appealing and to require the interactive engagement of students through their kinesthetic and tactile senses. The visual sense is also employed in the numerous opportunities to read questions and answers, as well as directions. The auditory sense is engaged when students participate in the board games or cooperative learning teams. Questions are read aloud and answered aloud—and discussed, of course.

Sternberg (2003), a cognitive scientist, also makes this important point in his summary:

> To summarize, retrieval interacts strongly with encoding. If you are studying for a test and want to recall well at the time of testing, organize the information you are studying in a way that appropriately matches the way in which you will be expected to recall it. Similarly, you will recall information better if the level of processing for encoding matches the level of processing for retrieval (p. 206).

In other words, we are more likely to be able to retrieve information if we are prompted to do so in the same modality in which we encoded the learning. Aware of this research finding, the NPL developers designed all their

assessment items to look as much like standardized test questions as possible, both in their structure and in the ways the questions are posed. Students develop, then, not only content mastery, but "test-wiseness," also important to proficient performance on assessments.

## Parental Involvement

Many research studies confirm the importance of parents in whether a child learns. For example, Gray & Fleischman (Dec. 2004/Jan. 2005) found that "When parents are involved, students tend to achieve more regardless of socioeconomic status, ethnic/racial background, or the parents' educational level" (p. 85). In 2000 the National Parent-Teacher Association (PTA) summarized research as follows:

> The most accurate predictors of student achievement in school are not family income or social status, but the extent to which a student's family is able to (1) create a home environment that encourages learning; (2) communicate high, yet reasonable expectations for the child's achievement and future career; and (3) become involved in the child's education at school and in the community (p. 13).

An earlier research synthesis from the Alliance for Curriculum Reform (1995) made similar conclusions:

> Dozens of studies in the U.S., Australia, Canada, England, and elsewhere show that the home environment powerfully influences what children and youth learn within and outside school. This environment is considerably more powerful than the parents' income and education in influencing what children learn in the first six years of life and during the 12 years of primary and secondary education.

Schools, then, according to Taylor, Pearson, et al. (2000), if they are to be effective, must make "more of an effort to reach out to parents" (p. 158). Reflecting this research, NewPath Learning makes available to schools a "Take-Home Edition" of its board games. Each game includes review cards, materials for four players, the classroom presentation CD, and a free 90-day online subscription, plus the Teacher-Parent guide. This package enables schools easily to extend time-on-task for an individual student, but also to involve the family in the learning. The student will also likely benefit when parents see the kind of learning that the school expects for their child and can reinforce those expectations through participation with him or her in the activities.

## Summary

NewPath Learning Program is solidly grounded in scientific evidence of what works to support student mastery of curriculum standards:

- The content in the activities and upon which the assessments are based are derived from the curriculum standards themselves, and NewPath alignment includes the standards from all the states. Teachers and administrators can be confident that whatever activity is assigned to students is a part of the mandated curriculum for their district or state.

- NPL assessment items emphasize content vocabulary (concepts) and are written in academic English— both found in research to be areas of need, especially for students who are learning disabled, limited-English, and/or economically disadvantaged.

- Both print and electronic products include guided and independent practice activities, plus assessment and corrective feedback—characteristics of direct instruction and mastery learning models found repeatedly to be effective in improving academic achievement.

- NPL's assessments are the kinds of meaningful measurements that teachers need to improve their instruction and to assign appropriate interventions and practice to the whole class, small groups, and even individual students. They can be used for daily or periodic quizzes, continuous progress monitoring, and/or benchmarking progress of individual students or groups of students in mastering the curriculum standards.

- An underlying goal of the NPL product design was to create materials that would motivate students to learn. The game format incorporates many of the conditions that typically promote high engagement of students. Goals are clear, time passes quickly, there is sufficient challenge, students receive immediate feedback, they have a sense of control, they develop a growing sense of mastery and confidence—and they have fun.

- NPL's products reflect the research that sets criteria for effective academic games. Many of these criteria are exactly the same as the characteristics of motivational activities.

- Several features of the NPL products make it possible to extend time-on-task—one of the most consistently recommended strategies of researchers on how to improve student achievement.

- Researchers note that additional time is not all that is needed, but, rather, that students be actively engaged in their learning. Student engagement in NPL games and other activities is also documented in the research on motivation and on game-based learning.

- Probably no other finding in cognitive research is more important than the one on the importance of practice in moving new knowledge and skills to long-term memory. NPL products provide the tools for teachers to provide multiple and varied practice opportunities for students to master curriculum standards.

- Individualized instruction is the single most effective form of learning.  NPL materials make it possible for teachers to individualize both practice and assessment activities for students, one-at-a-time, or in small groups with similar needs.

- As research reveals more and more about how it is that people learn, it is increasingly clear that multi-sensory processing strategies are more effective than instruction focusing on only one modality, usually the teacher's preferred style.  NPL products incorporate multiple senses in the various activities, increasing the likelihood that students can retrieve information and apply it.

- Knowing the critical importance of parental involvement in student learning, NPL also developed take-home activities that engage not only the student, but potentially the whole family—especially important in homes lacking economic resources and in families where English is not the native language.

- NPL products can be effectively used in the regular classroom (Tier I instruction), but also in the diversity of other learning settings—small group learning centers, homework, Title I, English-as-a-Second Language, dyslexia programs, Response-to-Intervention, before- and after-school initiatives, pull-out tutoring for test preparation, summer school or intersessions, and special education.  Too, the web-based version is easily accessible for parents wishing to provide tutoring resources for their children, for homeschooling, and/or for family literacy across the curriculum.  Another popular application is the use of both print and electronic products in community-based youth activity programs.

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