Scientifically-Based Foundational Research Support for the Saxon Phonics Pedagogy

INCREMENTAL INSTRUCTION DISTRIBUTED ACROSS THE LEVEL

CITATION

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Dempster, F. (1988). The spacing effect: A case study in the failure to apply results to psychological research. *American Psychologist, 43,* 627–634.

Dempster, F., & Farris, R. (1990). The spacing effect: Research and practice. *Journal of Research and Development in Education, 23*(2), 97–101.

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Glenberg, A. M. (1979). Component-levels theory of the effects of spacing of repetitions on recall and recognition. *Memory and Cognition, 7,* 95–112.

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Rosenshine, B., & Stevens, R. (1986). Teaching functions. In M. C. Wittrock (Ed.), *Handbook of research on teaching: Vol. 3.* (376-391). New York: Macmillan.

SUMMARY

Incremental Instruction Distributed Across the Level: Literature suggests there is value in a teaching method that uses small, easily digestible chunks of information (Brophy & Everston, 1976; Ausubel, 1969). Studies by Rosenshine and Stevens (1986) and Brophy and Everston (1976) demonstrate the importance of using incremental steps when teaching new information. Hirsch (1996) points out that the human mind can handle only a small amount of new information at one time: a child's mind needs time to digest the new information, fostering memory and meaning, before it can move on to another set of information. Effective incremental development involves teaching increments several times throughout a school year. This method is called "distributed instruction" or "spaced instruction". Distributed instruction is "the tendency, given an amount of time, for spaced presentations of a unit of information to yield much better learning than massed presentations" (Dempster & Farris, 1990). Foundational research has shown that instruction that presents material over several intervals results in greater student achievement than instruction that is not distributed (English, Wellburn, & Killian, 1934). Research has also provided evidence that student recall is superior under conditions of distributed instruction than under conditions of massed instruction (Glenberg, 1979; Hintzman, 1974). Distributed instruction has been found effective in a variety of subjects, including mathematics, science, and reading comprehension (Dempster, 1988; Hintzman, 1974; Reynolds & Glasser, 1964; English, Wellborn, & Killian, 1934). Dempster and Farris (1990) concluded that distributed instruction "is one of the most remarkable phenomena to emerge from laboratory research on learning. In many cases, two spaced presentations are about twice as effective as two massed presentations, and the difference between them tends to increase as the frequency of repetition increases."

CONTINUAL PRACTICE DISTRIBUTED ACROSS THE LEVEL

CITATION

Dempster, F. (1988). The spacing effect: A case study in the failure to apply results to psychological research. *American Psychologist, 43,* 627–634.

Dempster, F. (1991, April). Synthesis of research on reviews and tests. *Educational Leadership, 48,* 71–76.

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Good, T. L., & Grouws, D. A. (1979). The Missouri mathematics effectiveness project. *Journal of Educational Psychology, 71,* 355–362.

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Pirolli, P. L., & Anderson, J. R. (1985). The role of practice in fact retrieval. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 11*(1), 136–153.

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Thorndike, E. L. (1921). The psychology of drill in arithmetic: The amount of practice. *The Journal of Educational Psychology, 12*(4), 183–194.

Usnick, V. F. (1991). It's not drill and practice, it's drill or practice. *School Science and Mathematics, 91,* 344–347.

SUMMARY

Continual Practice Distributed Across the Level: Dempster (1991) noted both that the benefits of review have been proven by research since the early part of the twentieth century and that numerous studies suggest that when reviews are incorporated into the learning process, "not only the quantity of what is learned but also the quality" is affected. Several research studies have shown that students who are taught with curriculum that uses continual practice and review demonstrate greater skill acquisition and achievement (Mayfield & Chase, 2002; Usnick, 1991; Ornstein, 1990; Hardesty, 1986; MacDonald, 1984; Good & Grouws, 1979). While most textbooks include review at the end of chapters, research has shown that review should be "systematically planned and incorporated into the instructional program. … Long-term retention is best served if assignments about a particular skill are spread out in time, rather than concentrated within a short interval" (Suydam, 1984). Additional studies have concluded that spaced (distributed) practice results in higher performance than massed practice (Dhaliwal, 1987). Good and Grouws (1979) demonstrated the positive effect of continual, systematic review with fourth-graders. Usnick (1991), Ornstein (1990), Finn (1988), and Hardesty (1986) lent support to the use of continual practice and review. Mayfield and Chase (2002) explained that research has shown that practicing mixed, incrementally introduced concepts produces greater skill acquisition and posttest achievement. A large research base supports the effectiveness of distributed practice (also known as "spaced practice") and review, demonstrating that it leads to greater achievement than massed practice (Dempster, 1988; Dhaliwal 1987). Scientific studies in cognitive science also support continual practice because it develops automaticity, increasing retrieval speed, reducing time required for recognition, and decreasing interference (Klapp, Boches, Trabert, & Logan, 1991; Pirolli & Anderson, 1985; and Thorndike, 1921).

CUMULATIVE ASSESSMENT DISTRIBUTED ACROSS THE LEVEL

CITATION

Blair, J. (2000). ETS study links effective teaching methods to test-score gains. *Education Week, 20*(8), 24.

Cotton, K. (2001). *Monitoring student learning in the classroom.* Northwest Regional Educational Laboratory. Retrieved October 8, 2002, from http://www.nwrel.org/scpd/sirs/2/cu4.html

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Fuchs, L. S. (1995). Connecting performance assessment to instruction: A comparison of behavioral assessment, mastery learning, curriculum-based measurement, and performance assessment. Eric Document (ED381984).

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SUMMARY

Cumulative Assessment Distributed Across the Level: According to Fuchs (1995), assessments enhance instruction by monitoring student learning, evaluating instructional programs, and revealing remediation needs. In particular, cumulative assessment that is frequent and distributed over time has been found to be effective. A number of studies have shown that students who are assessed frequently have higher test scores than students who are not assessed frequently (Blair, 2000; Rohm, Sparzo, & Bennett, 1986; and Peckham & Roe, 1977). Research has indicated that well-designed classroom testing programs have a positive impact on later student achievement. Benefits are noted when tests are an integral part of the instructional approach; administered regularly and frequently; collected, scored, and recorded; and used to guide immediate and focused remediation. Dempster (1991) found that higher levels of achievement occur when testing is frequent and cumulative rather than infrequent or related only to content covered since the last test. Cotton (2001) noted that students who are tested frequently and given feedback have more positive attitudes toward tests.