

# What Works Clearinghouse



## Lindamood Phoneme Sequencing<sup>®</sup> (LiPS<sup>®</sup>)

### Program Description<sup>1</sup>

The *Lindamood Phoneme Sequencing*<sup>®</sup> (*LiPS*<sup>®</sup>) program (formerly called the *Auditory Discrimination in Depth*<sup>®</sup> [ADD] program) is designed to teach students the skills they need to decode words and to identify individual sounds and blends in words. Initial activities engage students in discovering the lip, tongue, and mouth actions needed to produce specific sounds. After students are able to produce, label, and organize the sounds with their mouths, subsequent activities in sequencing, reading, and spelling use the

oral aspects of sounds to identify and order them within words. The program also offers direct instruction in letter patterns, sight words, and context clues in reading. *LiPS*<sup>®</sup> is designed for emergent readers in kindergarten through grade 3 or for struggling, dyslexic readers. The program is individualized to meet students' needs and is often used with students who have learning disabilities or difficulties. The version of the program tested here involved computer-supported activities.

### Research<sup>2</sup>

One study of *LiPS*<sup>®</sup> that falls within the scope of the Students with Learning Disabilities review protocol meets What Works Clearinghouse (WWC) evidence standards. The study included 50 students with learning disabilities from eight to ten years of age in three elementary schools in Florida.<sup>3</sup>

Based on this study, the WWC considers the extent of evidence for *LiPS*<sup>®</sup> on students with learning disabilities to be small

for alphabets, reading fluency, reading comprehension, writing, and math. No studies that meet WWC evidence standards with or without reservations examined the effectiveness of *LiPS*<sup>®</sup> on students with learning disabilities in the general reading achievement, science, social studies, or progressing in school domains.

### Effectiveness

*LiPS*<sup>®</sup> was found to have potentially positive effects on alphabets, reading fluency, and math, no discernible effects on reading comprehension, and potentially negative effects on writing for students with learning disabilities.

1. The descriptive information for this program was obtained from a publicly available source: the program's website (<http://www.lindamoodbell.com>, downloaded October 2009). The WWC requests developers to review the program description sections for accuracy from their perspective. Further verification of the accuracy of the descriptive information for this program is beyond the scope of this review.
2. The studies in this report were reviewed using WWC Evidence Standards, Version 2.0 (see the WWC Procedures and Standards Handbook, Chapter III).
3. The evidence presented in this report is based on available research. Findings and conclusions may change as new research becomes available.

## Effectiveness *(continued)*

	<b>Alphabetics</b>	<b>Reading fluency</b>	<b>Reading comprehension</b>	<b>Writing</b>	<b>Math</b>
<b>Rating of effectiveness</b>	Potentially positive effects	Potentially positive effects	No discernible effects	Potentially negative effects	Potentially positive effects
<b>Improvement index<sup>4</sup></b>	Average: +9 percentile points Range: -4 to +34 percentile points	Average: +17 percentile points na	Average: +8 percentile points Range: -5 to +21 percentile points	Average: -22 percentile points na	Average: +12 percentile points na

na = not applicable

## Additional program information

### Developer and contact

Developed by Patricia Lindamood and Phyllis Lindamood, the *LiPS*<sup>®</sup> program is published by Pro-Ed and is available through a number of professional distributors and publishers. Address: 416 Higuera Street, San Luis Obispo, CA 93401. Web: <http://www.lindamoodbell.com>. Telephone: (800) 233-1819.

### Scope of use

*Auditory Discrimination in Depth*<sup>®</sup> was developed in the late 1960s and early 1970s. It was revised and renamed the *Lindamood Phoneme Sequencing*<sup>®</sup> (*LiPS*<sup>®</sup>) program in 1998. The program is frequently offered at centers or clinics, including program-endorsed Lindamood-Bell Learning Centers, and is available for purchase by the public.

### Teaching

Teachers work with students in whole class and small group activities or in small groups and one-on-one settings to help

them become aware of the mouth actions that produce speech sounds. Instructors help students verify sounds within words and teach them to self-correct in reading, spelling, and speech. The program developer recommends that instruction last four to six months for one hour a day, or four to six weeks for four hours a day. Computer-supported activities are available for the program. Lindamood Bell offers *LiPS*<sup>®</sup> workshops to train teachers, but teachers can also learn to administer the program from the *Lindamood Phoneme Sequencing*<sup>®</sup> *Teacher's Manual*.

### Cost

A kit of materials designed for one-on-one or small-group instruction can be purchased for \$350. The classroom kit costs \$541. Kits include a trainer's manual and all student materials (tiles, blocks, colored felts, and picture cards). Some of these materials are also sold separately. Information is not available on the cost of training for instructors or on how much it costs for students to receive instruction at a licensed center.

## Research

Thirty-one studies reviewed by the WWC investigated the effects of *LiPS*<sup>®</sup> on students with learning disabilities. One study (Torgesen et al., 2001) is a randomized controlled trial that meets WWC evidence standards. The remaining 30 studies do not meet either WWC evidence standards or eligibility screens.

### Meets evidence standards

Torgesen et al. (2001) examined the effects of *LiPS*<sup>®</sup> using a randomized controlled trial involving students with learning disabilities between eight and ten years of age from three public elementary schools in Florida. All students in the study had been identified by school staff as having learning disabilities on

4. These numbers show the average and range of student-level improvement indices for all findings across the study.

## Research *(continued)*

the basis of a discrepancy of at least one standard deviation between their scores on a standardized test of reading and their full-scale score on an intelligence test. Each year for three years, the researchers worked with staff from the three elementary schools to select a sample of students with learning disabilities (20 students per year). The 60 children eligible for the study were randomly assigned to one of two groups (30 per group): *LiPS*<sup>®</sup> (formerly *Auditory Discrimination in Depth*<sup>®</sup>) or *Embedded Phonics* (an instructional program developed by the authors). The interventions were provided to students in two eight-week phases: an intensive phase and an application/generalization phase. Pretest data were collected two to three weeks prior to the start of the interventions, posttest data were collected two to three weeks after completion of the eight-week intensive intervention period, and follow-up data were collected one year and two years following the posttest. Ten students were not available for the second follow-up data collection, leaving 50 students

in the analysis sample: 26 students that received *LiPS*<sup>®</sup> and 24 students that received *Embedded Phonics*.

### Extent of evidence

The WWC categorizes the extent of evidence in each domain as small or medium to large (see the WWC Procedures and Standards Handbook, Appendix G). The extent of evidence takes into account the number of studies and the total sample size across the studies that meet WWC evidence standards with or without reservations.<sup>5</sup>

The WWC considers the extent of evidence for *LiPS*<sup>®</sup> to be small for students with learning disabilities in the alphabetics, reading fluency, reading comprehension, writing, and math domains. No studies that meet WWC evidence standards with or without reservations examined the effectiveness of *LiPS*<sup>®</sup> on students with learning disabilities in the general reading achievement, science, social studies, or progressing in school domains.

## Effectiveness Findings

The WWC review of interventions for *LiPS*<sup>®</sup> addresses student outcomes in nine domains: alphabetics, reading fluency, reading comprehension, general reading achievement, writing, math, science, social studies, and progressing in school. The study included in this report covers five domains: alphabetics (including the constructs of phonological awareness, word attack, and letter-word identification), reading fluency, reading comprehension, writing, and math. The findings below present the authors' estimates and WWC-calculated estimates of the size and the statistical significance of the effects of *LiPS*<sup>®</sup> on students with learning disabilities.<sup>6</sup>

*Alphabetics.* Findings from the Torgesen et al. (2001) study were based on comparisons of *LiPS*<sup>®</sup> students and control group students (who participated in an intervention titled *Embedded Phonics*) on eight measures of alphabetics, including four measures of phonological awareness, three measures of word attack skills, and one measure of letter-word identification. The study authors found statistically significant effects favoring the *LiPS*<sup>®</sup> group for two of the eight measures, including the Lindamood Auditory Conceptualization Test and the Word Attack subtest from the Woodcock Reading Mastery Test–Revised. WWC analyses, which were corrected for multiple comparisons, confirmed these statistically significant positive findings. Neither the study

5. The extent of evidence categorization was developed to tell readers how much evidence was used to determine the intervention rating, focusing on the number and size of studies. Additional factors associated with a related concept—external validity, such as the students' demographics and the types of settings in which studies took place—are not taken into account for the categorization. Information about how the extent of evidence rating was determined for *LiPS*<sup>®</sup> is in Appendix A6.
6. The level of statistical significance was reported by the study authors or, when necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Torgesen et al. (2001), a correction for multiple comparisons was needed, so the significance levels may differ from those reported in the original study.

## Effectiveness *(continued)*

authors nor the WWC found statistically significant effects for the other six measures of alphabets. According to WWC criteria, *LiPS*<sup>®</sup> has potentially positive effects on alphabets for students with learning disabilities.

*Reading fluency.* Torgesen et al. (2001) found statistically significant effects favoring the *LiPS*<sup>®</sup> group for two measures of reading fluency: the Reading Accuracy and Reading Rate subtests from the Gray Oral Reading Test–III. WWC analyses found neither of these comparisons to be statistically significant; however, the WWC-calculated average effect across the two outcomes was large enough to be considered substantively important according to WWC criteria (that is, an effect size of at least 0.25). Thus, the WWC found *LiPS*<sup>®</sup> to have potentially positive effects on reading fluency for students with learning disabilities.

*Reading comprehension.* Torgesen et al. (2001) found no statistically significant effects on either of the two measures of reading comprehension: the Passage Comprehension subtest of the Woodcock Reading Mastery Test–Revised and the Reading Comprehension subtest of the Gray Oral Reading Test–III. The WWC-calculated average effect size across the two outcomes was not large enough to be considered substantively important. According to WWC criteria, *LiPS*<sup>®</sup> has no discernible effects on reading comprehension for students with learning disabilities.

**The WWC found *LiPS*<sup>®</sup> to have potentially positive effects on alphabets, reading fluency, and math, no discernible effects on reading comprehension, and potentially negative effects on writing for students with learning disabilities**

## Improvement index

The WWC computes an improvement index for each individual finding. In addition, within each outcome domain, the WWC computes an average improvement index for each study and an average improvement index across studies (see WWC Procedures and Standards Handbook, Appendix F). The improvement index represents the difference between the percentile rank of the average student in the intervention condition and the percentile rank of the average student in the comparison condition. Unlike the rating of effectiveness, the improvement index is entirely based on the

*Writing.* Torgesen et al. (2001) found, and the WWC confirmed, a statistically significant effect favoring the control group on the Spelling subtest from the Kaufman Test of Educational Achievement. According to WWC criteria, *LiPS*<sup>®</sup> has potentially negative effects on writing for students with learning disabilities.

*Math.* Torgesen et al. (2001) found no statistically significant effect on the Calculation subtest from the Woodcock-Johnson Psycho-Educational Battery–Revised. WWC analyses confirmed that there was no statistically significant effect; however, the effect on the Calculation subtest was positive and large enough to be considered substantively important according to WWC criteria. Thus, the WWC concludes that *LiPS*<sup>®</sup> has potentially positive effects on math for students with learning disabilities.

## Rating of effectiveness

The WWC rates the effects of an intervention in a given outcome domain as positive, potentially positive, mixed, no discernible effects, potentially negative, or negative. The rating of effectiveness takes into account four factors: the quality of the research design, the statistical significance of the findings, the size of the difference between participants in the intervention and the comparison conditions, and the consistency in findings across studies (see the WWC Procedures and Standards Handbook, Appendix E).

size of the effect, regardless of the statistical significance of the effect, the study design, or the analysis. The improvement index can take on values between –50 and +50, with positive numbers denoting favorable results for the intervention group.

Based on one study, the average improvement index for alphabets is +9 percentile points with a range of –4 to +34 percentile points across eight findings; the average improvement index for reading fluency is +17 percentile points based on two findings; the average improvement index for reading comprehension is +8 percentile points with a range of –5 to +21 percentile

**The WWC found *LiPS*<sup>®</sup> to have potentially positive effects on alphabets, reading fluency, and math, no discernible effects on reading comprehension, and potentially negative effects on writing for students with learning disabilities**

*(continued)*

points across two findings; the improvement index for writing is –22 percentile points based on one finding; and the improvement index for math is +12 percentile points based on one finding.

### Summary

The WWC reviewed 31 studies on *LiPS*<sup>®</sup> for students with learning disabilities. One of these studies meets WWC evidence standards; the remaining 30 studies do not meet either WWC

evidence standards or eligibility screens. Based on the one study, the WWC found that *LiPS*<sup>®</sup> has potentially positive effects on alphabets, reading fluency, and math, no discernible effects on reading comprehension, and potentially negative effects on writing for students with learning disabilities. The conclusions presented in this report may change as new research emerges.

### References

#### Meets WWC evidence standards

Torgesen, J. K., Alexander, A. W., Wagner, R. K., Rashotte, C. A., Voeller, K., & Conway, T. (2001). Intensive remedial instruction for children with severe reading disabilities: Immediate and long-term outcomes from two instructional approaches. *Journal of Learning Disabilities, 34*(1), 33.

#### Studies that fall outside the Students with Learning Disabilities review protocol or do not meet WWC evidence standards

Alexander, A., Anderson, H., Heilman, P., Voeller, K., & Torgesen, J. (1991). Phonological awareness training and the remediation of analytic decoding deficits in a group of severe dyslexics. *Annals of Dyslexia, 41*(1), 193–206. The study is ineligible for review because it does not use a comparison group.

American Federation of Teachers. (1999). *Building on the best, learning from what works: Five promising remedial reading intervention programs*. Washington, DC: Author. The study is ineligible for review because it is not a primary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.

Biemiller, A., & Siegel, L. S. (1997). A longitudinal study of the effects of the *Bridge Reading Program* for children at risk for reading failure. *Learning Disability Quarterly, 20*(2), 83–92. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.

Brown, M. S. (1997). *The Auditory Discrimination in Depth program at the college level*. Unpublished master's thesis, West Virginia University, Morgantown. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.

Burke, C., Howard, L., & Evangelou, T. (2005). *A project of hope: Lindamood-Bell Center in a school project*. Final evaluation report. San Diego, CA: SANDAG. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Colon, E. P. (2006). Utility of the *Lindamood Phoneme Sequencing Program (LiPS)* for classroom-based reading instruction. *Dissertation Abstracts International, 67*(1-A), 131. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.

Conway, T., Heilman, P., Gonzalez-Rothi, L., Alexander, A., Adair, J., Crosson, B., et al. (1998). Treatment of a case of phonological alexia with agraphia using the *Auditory Discrimination in Depth (ADD)* program. *Journal of the International Neuropsychological Society, 4*(1), 608–620. The study is ineligible for review because it does not use a comparison group.

Eden, G. F., Jones, K. M., Cappell, K., Gareau, L., Wood, F. B., Zeffiro, T. A., et al. (2004). Neural changes following remediation in adult developmental dyslexia. *Neuron, 44*(3), 411–422.

## References (continued)

- The study is ineligible for review because it does not use a sample aligned with the protocol—the sample is not within the specified age or grade range.
- Gunn, B. K. (1996). An investigation of three approaches to teaching phonological awareness to first-grade students and the effects on word recognition. (Doctoral dissertation, University of Oregon, 1996). *Dissertation Abstracts International*, 57(09A), 205–3889. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.
- Kennedy, K., & Backman, J. (1993). Effectiveness of the *Lindamood Auditory Discrimination in Depth Program* with students with learning disabilities. *Learning Disabilities Research and Practice*, 8(4), 253–259. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.
- Kutrubos, B. M. (1993). The effect of phonemic training on unskilled readers: A school-based study. (Doctoral dissertation, University of Denver, 1993). *Dissertation Abstracts International*, 54(07A), 309–2520. The study does not meet WWC evidence standards because the measures of effectiveness cannot be attributed solely to the intervention—there was only one unit assigned to one or both conditions.
- Lance, D. M., Beverly, B. L., Evans, L. H., & McCullough, K. C. (2003). Addressing literacy: Effective methods for reading instruction. *Communication Disorders Quarterly*, 25(1), 5–11. The study is ineligible for review because it is not a primary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Lordi, D. L. (2004). The impact of a multi-sensory approach toward the improvement of reading and language processing skills in fourth- and fifth-grade students with specific reading difficulties and language processing disorders. (Doctoral dissertation, Union Institute and University, 2004). *Dissertation Abstracts International*, 66(02A), 140–497. The study is ineligible for review because it does not use a comparison group.
- McBride, N. (2005). The effectiveness of *Second Shot* and/or *Lindamood-Bell* on reading achievement of elementary students. (Doctoral dissertation, University of Nevada, Reno, 2005). *Dissertation Abstracts International*, 67(03A), 163–884. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.
- McCullum-Butler, P. (2002). Effects of phonemic awareness training and the influence of phonemic skills on early reading success with pre-school and kindergarten. *Dissertation Abstracts International*, 62(10-A), 3293. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.
- O’Dea, D. (1999). *Improving reading and decoding skills through the use of multisensory teaching strategies*. Unpublished master’s action research project, Saint Xavier University, Chicago, IL. The study is ineligible for review because it does not use a comparison group.
- Olson, R. K., Wise, B., Ring, J., & Johnson, M. (1997). Computer-based remedial training in phoneme awareness and phonological decoding: Effects on the posttraining development of word recognition. *Scientific Studies of Reading*, 1(3), 235. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.
- Osbourne, J. K. (1998). Does a phonological intervention program using a modified *Auditory Discrimination in Depth* program make a difference in kindergarten students’ ability to manipulate phonemes? (Master’s thesis, Grand Valley State University, 1998). *Masters Abstracts International*, 36(06), 88–1453. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.
- Owen, K. E. (2004). Effects of *Lindamood-Bell* on third- and fourth-grade reading achievement in Pueblo School District No. 60 (Colorado). (Doctoral dissertation, University of Denver, 2004). *Dissertation Abstracts International*, 65(05A), 105–1719. The study is ineligible for review because it does not use a

## References (continued)

- sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.
- Paul, A. M. (2002). *The effectiveness of the Lindamood Phoneme Sequencing (LiPS) Program with “at-risk” students*. Unpublished master’s thesis, California State University, Long Beach. The study is ineligible for review because it does not use a comparison group.
- Pokorni, J. L., Worthington, C. K., & Jamison, P. J. (2004). Phonological awareness intervention: Comparison of *Fast ForWord*, *Earobics*, and *LiPS*. *Journal of Educational Research*, 97(3), 147–157. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.
- Simos, P., Fletcher, J., Bergman, E., Breier, J., Foorman, B., Castillo, E., et al. (2002). Dyslexia-specific brain activation profile becomes normal following successful remedial training. *Neurology*, 58(1), 1203–1212. The study is ineligible for review because it does not include an outcome within a domain specified in the protocol.
- Slavin, R. E., Cheung, A., Groff, C., & Lake, C., (2008). Effective reading programs for middle and high schools: A best-evidence synthesis. *Reading Research Quarterly*, 43(3), 290–322. The study is ineligible for review because it is not a primary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Additional source:**
- Slavin, R. E., Cheung, A., Groff, C., & Lake, C. (2008). *Effective reading programs for middle and high schools: A best evidence synthesis*. Educator’s summary. Retrieved February 24, 2009, from [http://www.bestevidence.org/word/mhs\\_read\\_Sep\\_16\\_2008\\_sum.pdf](http://www.bestevidence.org/word/mhs_read_Sep_16_2008_sum.pdf).
- Spence, I. (2002). Reducing the time required by dyslexic readers to become fluent: A comparison of two approaches. *Journal of Precision Teaching and Celeration*, 18(1), 2–9. The study is ineligible for review because it does not use a comparison group.
- Suydam, D. A. (1994). *The effects of the Auditory Discrimination in Depth Program on reading skills*. Unpublished master’s thesis, University of Toledo, OH. The study is ineligible for review because it does not use a comparison group.
- Thorstad, E. A. (2001). *What reading programs are most effective with students with reading disabilities?: A literature review of Lindamood Phoneme Sequencing Program, whole language, phonics, Reading Recovery, and traditional basal programs*. Unpublished master’s thesis, St. Cloud State University, MN. The study is ineligible for review because it is not a primary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Torgesen, J. K., Wagner, R. K., Rashotte, C. A., Lindamood, P., Conway, T., & Garvin, C. (1999). Preventing reading failure in young children with phonological processing disabilities: Group and individual responses to instruction. *Journal of Educational Psychology*, 91(4), 579. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.
- Tracey, D. H., & Young, J. W. (2007). Technology and early literacy: The impact of an integrated learning system on high-risk kindergartners’ achievement. *Reading Psychology*, 28(5), 443–467. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.
- Uhry, J. K., & Clark, D. B. (2004). *Dyslexia: Theory & practice of instruction* (3rd ed.). Austin, TX: Pro-Ed. The study is ineligible for review because it is not a primary analysis of the effectiveness of an intervention, such as a meta-analysis or research literature review.
- Wise, B. W., & Olson, R. K. (1995). Computer-based phonological awareness and reading instruction. *Annals of Dyslexia*, 45, 99–122. The study is ineligible for review because it does not use a sample aligned with the protocol—the sample includes less than 50% students with learning disabilities.