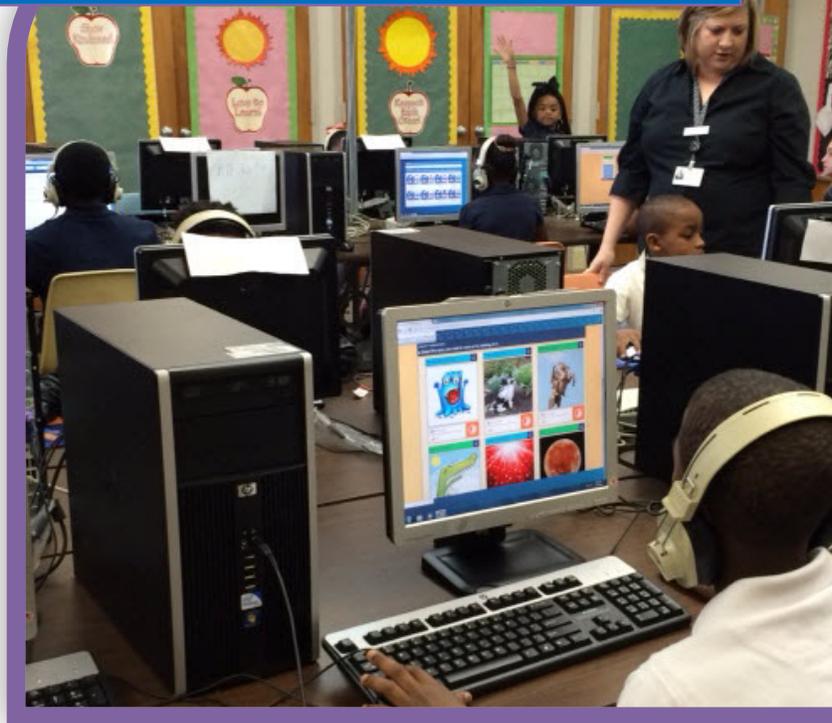




BrightFish Reading Foundational Research Basis for the Instructional Design of the Supplemental Reading Program



Contents

Research Basis for the BrightFish Reading Program.....	2
Subskill Automaticity – Word Recognition Fluency	2
Direct Vocabulary Instruction.....	3
During Reading Activities – Key Facts and Details	3
Post-Reading – Critical Thinking	4
Continuous and Positive Feedback	4
Gamification and Rewards	5
Teaching Tools and Data.....	5
Appendix A: Research Bibliography.....	6



Research Basis for the BrightFish Reading Program

Like many learned skills, reading is a multifaceted process that develops only through practice. Consider that the average middle school student reads an estimated 1 to 10 million words per year, while the struggling student may only read 100,000 (Nagy & Anderson, 1984). If we expect struggling students to read, we have to make it more accessible and provide opportunities to practice with material that is appropriate to their age, interests and skill level.

Brightfish Reading is a structured, online program that enables struggling learners to practice reading grade-level material while motivating them to improve their word recognition fluency, vocabulary and comprehension skills.

Subskill Automaticity – Word Recognition Fluency

In order to comprehend, readers need sufficient working memory available to draw out the meaning from the words they read. In their information-processing model of automaticity, LeBerge and Samuels (1974) explained that mastering reading sub-skills (such as rapid word recognition) to the point of automaticity allows readers to have the cognitive capacity to attend to the meaning of what is being read. Slow, effortful word recognition inhibits reading comprehension because it consumes the working memory needed for understanding the content of the text (Begeney, 2013).

Fluent reading requires simultaneous operation of multiple processes, including word identification and comprehension (Samuels and Farstrup, 2006). Beginning and struggling readers tend to focus inflexibly on word-level text representation, while more proficient readers tend to create semantic representations of text. This causes differential effects of repeated exposure to reading on fluency.

BrightFish Reading addresses these gaps by first breaking down each passage to word level, starting with simple 1-3 letter words and moving up through to more complex words and phrases. Students match visual and auditory targets from the stories. The BrightFish system measures accuracy and speed to determine that students have mastered automatic recognition before moving to the next, more challenging level.



(Above: students develop rapid word recognition of words from the stories they will read.)

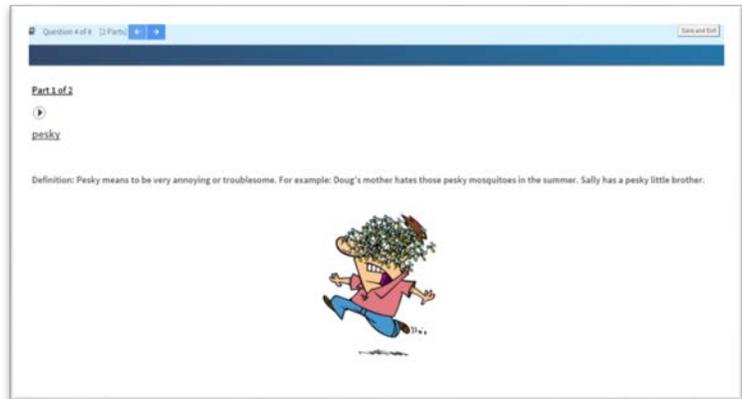
Direct Vocabulary Instruction

Once automatic word recognition is developed, students work on vocabulary knowledge. In addition to direct, explicit instruction, Stahl (2005) found that students should be given multiple opportunities to encounter words repeatedly and in a variety of contexts.

In BrightFish Reading, key words for each passage are taught explicitly so they are understood in context. Explicit instruction ensures that when a word is encountered in the text, students will recognize the word and its meaning.

Images also help students visualize the meaning of the words. Students learn the definition of each word, see examples of usage in different contexts, sort similar and opposite words and use the words in a sentence. Read-aloud options provide further support.

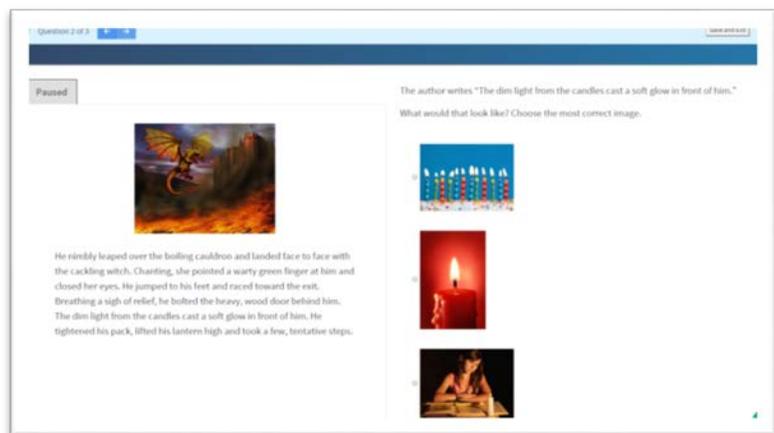
(**Right:** students read the definitions of words, supported by images and examples of usage in context.)



During Reading Activities – Key Facts and Details

Now that students have mastered rapid word recognition and key vocabulary, they move to the final layer – comprehension. Research shows that word recognition practice combined with comprehension training is significantly more effective than word recognition or comprehension training alone (Berninger et al 2003) and produces lasting effects.

Students work on individual paragraphs, focusing on the facts and details in surface-level comprehension exercises called “during reading” activities. Having developed rapid word recognition, students’ working memory is available to deal with answering questions about what the author is writing about. With repeated exposure to the text from simple words and phrases to now facts and details, the meaning of the passage becomes accessible. Students are ready to move to the real goal of reading – to derive deeper meaning.



(**Above:** Students read paragraphs and identify facts and details contained in a 5th grade story.)

Post-Reading – Critical Thinking

Once students have progressed to this point in the training sequence, they are able to think about connections, cause and effect, author’s purpose and literary features.

Brightfish Reading completes students’ learning with a series of high-level comprehension activities that feature graphic organizers and free-form writing to complete students’ internalization of the meaning of a text. After reading the full story, students work on a broad range of practice activities using common assessment item types, including multiple choice, constructed response and technology enhanced. Once all activities are completed, each student fully comprehends the text at grade level.

(Below: Students read the full text and demonstrate high-level critical thinking, including inferencing and evaluation.)

The screenshot displays a digital reading assessment interface. At the top, it indicates 'Question 4 of 5' with navigation arrows and a 'Save and Exit' button. The main content area is divided into two sections. On the left, a 'Paused' button is visible above a reading passage. The passage describes a character's journey through a dark, dangerous environment, mentioning a cauldron, a witch, a dragon's roar, and a sword. Below the text is a small illustration of a dragon. On the right, a question asks: 'How do you think the main character was feeling during the story? Explain using examples from the text.' Below the question is a large text input box and a 'Next Question' button. A small green logo is in the bottom right corner of the interface.

Continuous and Positive Feedback

Structured, deliberate practice is effortful, so in order to make it effective, additional support is needed. According to K. Anders Ericsson, a major ingredient to effective practice is immediate informative feedback. Brightfish Learning hired experienced educators to create just that. Our BrightFish Reading software responds to each students’ response with either descriptive positive feedback (to help students understand why the answer is correct) or instructive corrective feedback (so that students understand why they are incorrect). Each response is customized to the activity and supported by audio and video elements.

Gamification and Rewards

Struggling students need motivation. A variety of rewards systems are built into the BrightFish Reading program to keep students striving to meet goals. While the ability to tackle content previously out of reach will be a powerful reward, many students will respond to the collection of points redeemable for “game time” that are built into our program. All game play is earned and learning-based.

Easy to Use Teaching Tools

BrightFish Reading is designed for teachers to use in the classroom, lab or as part of after-school or supplementary programs. Students can use the program on any device, even at home, for frequent practice. Online class management and reporting tools help teachers get started right away and track how students are progressing against their goals. Data is captured with every keystroke that students make as they work through BrightFish Reading. Teachers can use this information to monitor progress and remediate missed concepts and learning goals. The management system features a suite of customizable tools for easy calendar organization as well as quiz and feedback creation editors.

BrightFish Reading – Bringing Grade-level Reading to Struggling Learners

At Brightfish Learning, we are very mindful of what struggling students cope with every day on both an instructional and motivational level. Our goal is to make grade-level content accessible and provide the structured and deliberate practice that will help students meet curriculum standards and close the achievement gap within classrooms.



Appendix A: Research Bibliography

Research influential in the design and development of the Brightfish Reading program:

Ackerman, P.L. (1987). Individual differences in skilled reading: An integration of psychometric and information processing perspectives. *Psychological Bulletin*, 102, 3-27.

Adams, M. J. (1990). *Beginning to read: Thinking and learning about print*. Cambridge, MA: MIT Press.

Arnold, N.G. (1996/97). Learned helplessness and attribution for success and failure in LD students. *Their World*, National Center for Learning Disabilities.

Beck, Isabel L., McKeown, M.G., & Kucan, L. (2013). *Bringing Words to Life: Robust Vocabulary Instruction*. New York: Guilford Press.

Berninger, V., Vermeulen, K., Abbott, R., McCutchen, D., Cotton, S., Cude, J., et al. (2003, April). Comparison of three approaches to supplementary reading instruction for low-achieving second-grade readers. *Language, Speech, & Hearing Services in Schools*, 34(2).

Brophy, J. (1998). *Motivating Students to Learn*. Boston, MA: McGraw Hill.

Calfee, R.C., & Piaoikowski, D.C. (1981). The reading diary: Acquisition of decoding. *Reading Research Quarterly*, 16, 346-373.

Clark, Ruth C. & Mayer, Richard (2016). *E-learning and the science of instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning*. San Francisco: John Wiley & Sons, Inc.

Coles, G. (2000). *Misreading reading*. Portsmouth, NM: Heinemann.

Dirksen, Julie (2012). *Design for how people learn*. Berkeley, CA: New Riders.

Doehring, D.G. (1976). The acquisition of rapid reading responses. *Monographs of the Society of Research in Child Development*, 41, No.2.

Doehring, D.G., Hoshko, I.M. & Bryans, B.N. (1979). Statistical classification of children with reading problems. *Journal of Clinical Neuropsychology*, 1, 5-16.

Ehri, L.C. (1979). Linguistic insight: Threshold of reading acquisition. In T. Waller, & G. MacKinnon (Eds.). *Reading research: Advances in theory and practice* (pp.63-114). New York: Academic Press.

Ericsson, K. Anders, Krampe, R.T., Tesch-Romer, C. (1993). The Role of Deliberate Practice in the Acquisition of Expert Performance. *Psychological Review*, Vol. 100. No. 3.

Fox, B. & Routh, D. K. (1975). Analyzing spoken language into words, syllables, and phonemes: A developmental study. *Journal of Psycholinguistic Research*, 4, 331-342.



Gee, James P. (2014). *What Video Games Have to Teach Us About Learning and Literacy*. New York: St. Martin's Press.

Goswami, U., & Bryant, P. (1990). *Phonological skills and learning to read*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Grabe, M. (1985). Attributions in a mastery instructional system: Is an emphasis on effort harmful? *Contemporary Educational Psychology, 10*, 113-126.

Graves, Michael F. (2009). *Essential Reading on Vocabulary Instruction*. International Reading Association.

Herman, P.A. (1985). The effect of repeated readings on reading rate, speech pauses, and word recognition accuracy. *Reading Research Quarterly, 20*, 553-565.

Horton, William K. (2012) *E-learning by Design*. San Francisco: John Wiley & Sons, Inc.

Juel, C. (1988). Learning to read and write: A longitudinal study of 54 children from first through fourth grades. *Journal of Educational Psychology, 80*(4), 437-447.

Kame'enui, Edward J. & Baumann, J.F. (Eds.), (2012). *Vocabulary Instruction: Research to Practice*. New York: Guilford Press.

Kaplan, A. (2014). *The Brain-Boosting Benefits of Gaming*. Minneapolis: Lerner Publishing Group, Inc.

LaBerge, D. (1973). Attention and the measurement of perceptual learning. *Memory and Cognition, 1*, 268-276.

LaBerge, D., Peterson, R.J. & Norden, M. (1977). Exploring the limits of cueing. In B.S. Dornic (Ed.) *Attention and performance VI* (pp. 285-306). Hillsdale, NJ: Lawrence Erlbaum.

LaBerge, D. (1979). The perception of units in beginning reading. In L.B. Resnick & P.A.. Weaver (Eds.), *Theory and practice of early reading, Vol. 3* (pp. 31-51). Hillsdale, NJ: Erlbaum.

LaBerge, D., & Samuels, S.J. (1974). Toward a theory of automatic information processing. *Cognitive Psychology, 6*, 293-323.

McIntyre, T. (1989). *A resource book for remediating common behavior and learning problems*. Boston, MA: Allyn & Bacon.

Morais, J., Bertelson, P., Cary, L., & Alegria, J. (1987). Literacy training and speech segmentation. In P. Bertelson (Ed.), *The onset of literacy: Cognitive processes in reading acquisition* (pp. 45-64). Cambridge, MA: MIT Press.



Nagy, W., & Anderson, R. (1984). The number of words in printed school English. *Reading Research Quarterly*, 19,

National Reading Panel. (2000). *Report of the National Reading Panel: Reports of the subgroups*. Washington, DC: National Institute of Child Health and Human Development Clearinghouse.

Perfetti, C.A. (1985). *Reading Ability*. New York: Oxford University Press.

Pressley, Michael (2000). What should comprehension instruction be the instruction of? In M.L. Kamil, P.B. Mosenthal, P.D. Pearson, and R. Barr (Eds.), *Handbook of Reading Research, III*. Mahwah, NJ: Lawrence Erlbaum Associates.

Pressley, Michael (2002). Comprehension strategies instruction: A turn-of-the-century status report. In C.C. Block & M. Pressley (Eds.), *Comprehension instruction: Research-based best practices*. New York: Guilford Press.

Reid-Lyon, G. (1998). "Why reading is not a natural process." *Educational Leadership/March*, 14-18.

Rieben, L., & Perfetti, C.A. (1991). *Learning to read: Basic research and its implications*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Samuels, S.J. (1981). Characteristics of exemplary reading programs. In J. Guthrie (Ed.), *Comprehension and teaching: Research reviews* (pp255-273).

Samuels, S.J. & Farstrup, A.E. (Eds.), 2006. *What Research has to say about Reading Instruction*. Newark, DE: International Reading Association.

Samuels, S.J. & Pearson, P.D. (1988). *Changing school reading programs*. Newark, DE: International Reading Association.

Share, D.L. (1995). Phonological recoding and self-teaching: Sine qua non of reading acquisition. *Cognition*, 55, 151-218.

Shaywitz, S.E., Shaywitz, B.A., Pugh, K.R., Fulbright, R.K., Constable, R.T., Mencl, W.E., Shankweiler, D.P., Liberman, A.M., Skudlarski, P., Fletcher, J.M., Katz, L., Marchione, K.E., Lacadie, C., Gatenby, C., & Gore, J.C. (1998). Functional disruption in the organization of the brain for reading in dyslexia. *Proc. Natl. Acad. Sci. USA*, 95, 2636-2641.

Stahl, S. (2005). Four problems with teaching word meanings (and what to do to make vocabulary an integral part of instruction). In E. H. Hiebert and M. L. Kamil (Eds.), *Teaching and learning vocabulary: Bringing research to practice*. Mahwah, NJ: Lawrence Erlbaum.

Snow, C., Burns, S., and Griffin, P. (eds.) (1998). *Preventing reading difficulties in young children*. Washington, DC: National Academy Press.



Stanovich, K.E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly*, 21, 360-407.

Stanovich, K.E. (1992). Speculations on the causes and consequences of individual differences in early reading acquisition. In P.B. Gough, L.C. Ehri, & R. Treiman (Eds.), *Reading acquisition* (pp.307-342). Hillsdale, NJ: Lawrence Erlbaum Associates.

Stanovich, K.E. (1994). Romance and reality. *The Reading Teacher* 47, 280-291.

Stuart, M. and Coltheart, M (1988) Does reading develop in a sequence of stages? *Cognition*, 30, 139-181.

Vadasy, Patricia F. & Nelson, J.R. (2012). *Vocabulary Instruction for Struggling Students*. New York: Guilford Press.

Vandervelden, M.C., & Siegal, L.S. (1995). *Reading and understanding: An introduction to the psychology of reading*. Cambridge, UK: Hartnolls Ltd.

Wagner, R.K., Torgesen, J.K., & Rashotte, C.A. (1994). The development of reading related phonological processing abilities: New evidence of bi-directional causality from a latent variable longitudinal study. *Developmental Psychology*, 30, 73-87.

Zheng, R. & Gardner, M.K. (Eds.), (2016). *Handbook of Research on Serious Games for Educational Applications*. Hershey, PA: IGI Global.

