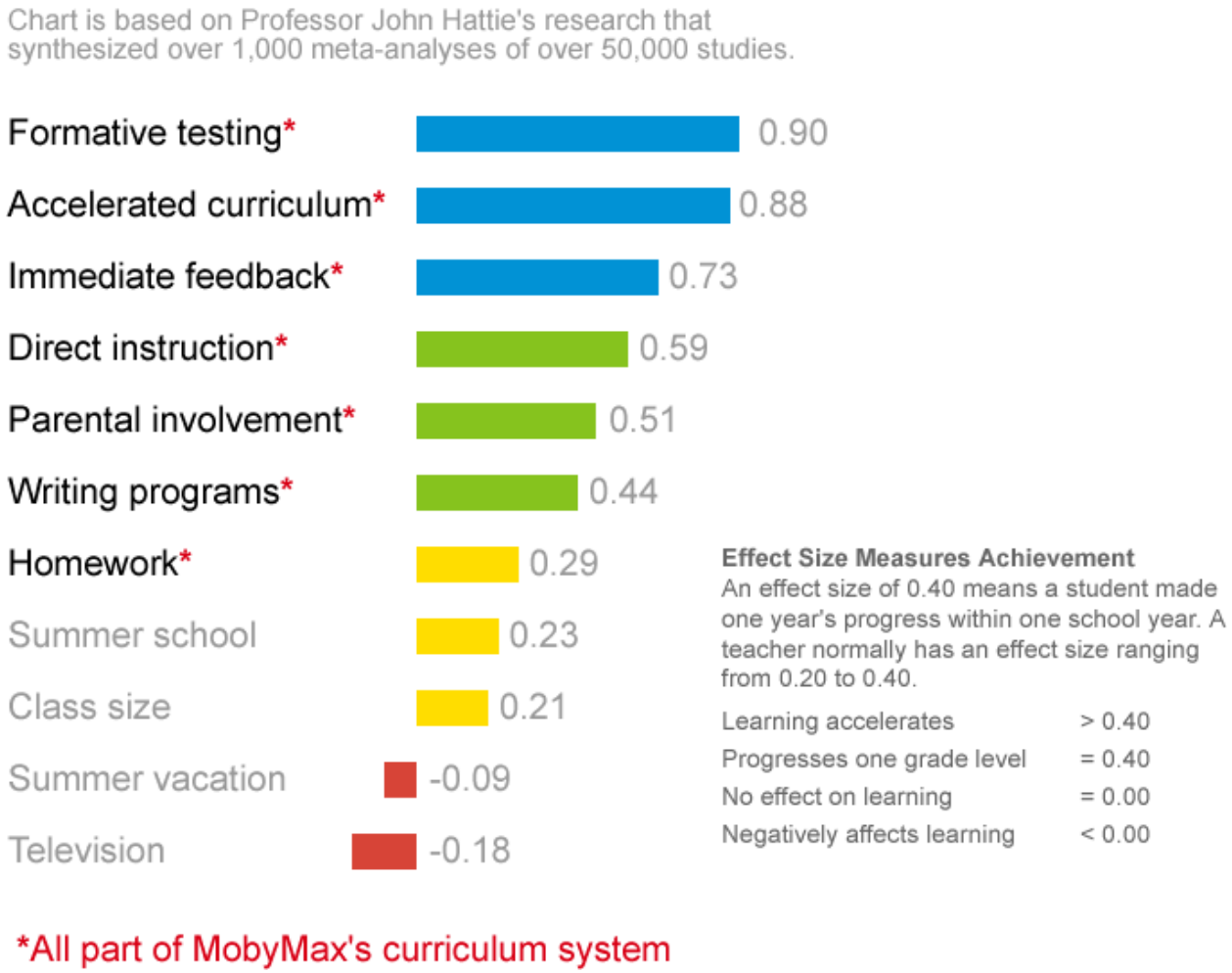
2X Learning

Principles of Scientific Based Research in MobyMax

Students who have spent just 20 hours using MobyMax average one full grade-level increase in both math and language. These results are due largely to MobyMax's pedagogy, which incorporates multiple research-based techniques that have proven highly effective in increasing student achievement.

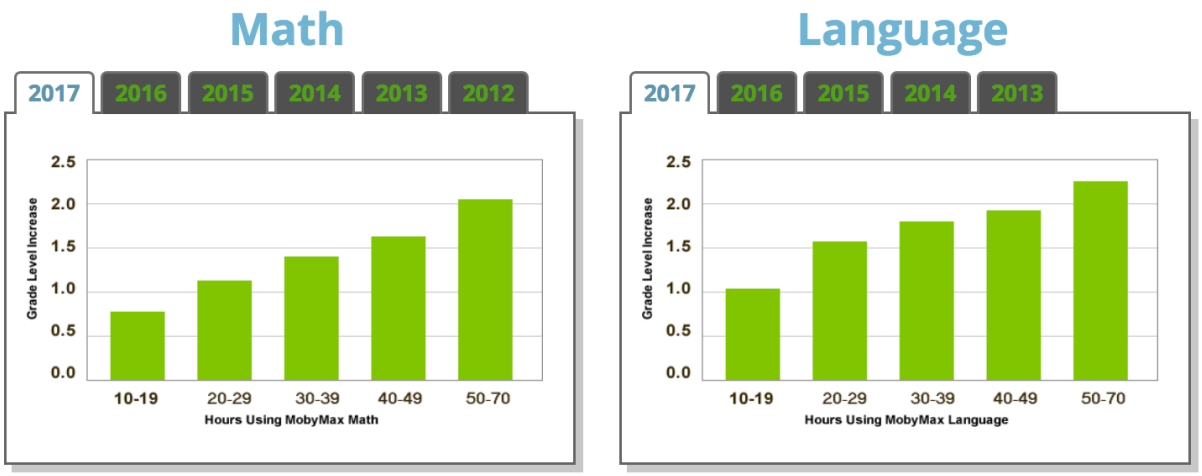
MobyMax's pedagogy and curriculum system incorporate the most effective practices for increasing student outcomes as identified by Professor John Hattie's exhaustive research of over 800 meta-analyses.



*All part of MobyMax's curriculum system

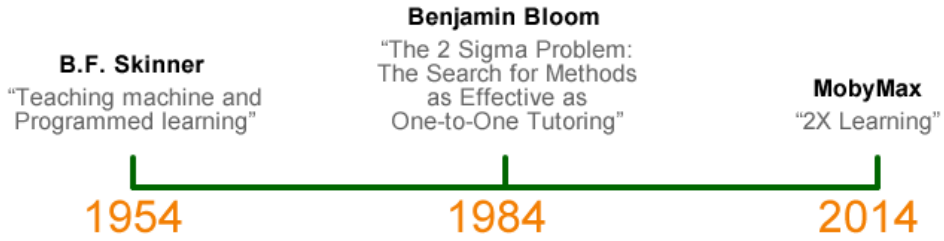
Consistent MobyMax Results

Built on the back of research that identifies what works best for students and teachers, MobyMax's pedagogy has produced consistent gains in student achievement in both math and language over the past 5 years.



The 60 Year History of 2X Learning

The potential for 2X learning has been realized by prominent researchers for the last 60 years.



Formative Assessment

There are four decades worth of empirical evidence attesting to the instructional dividends of the formative assessment process. Reviews of more than 4,000 research studies show clearly that when formative assessments are well implemented in the classroom, it can essentially double the speed of student learning.

In fact, research shows that the formative assessment process is so effective that different teachers can use it in diverse ways and still produce great results with their students.

MobyMax takes formative assessment to a whole new level by continually monitoring student progress from the moment a student begins the diagnostic placement test in a subject. Teachers can immediately see every exercise a student has completed and make informed instructional decisions based on Moby's easy to use data dashboards.

Accelerated Curriculum

Moving gifted students through the curriculum at an accelerated rate has been shown to yield significant gains in student achievement (Kulik and Kulik, 1984). Acceleration vastly outperforms enrichment in terms of student outcomes for gifted students, and some research suggests that this effect may extend to non-gifted students as well. MobyMax capitalizes on this research by differentiating learning for each student, filling in any gaps in student learning first and then allowing the student to move through the curriculum at an individualized pace. When a student fails to master material, they receive remedial instruction, and conversely, when a student is able to demonstrate rapid mastery, they are able to move forward more quickly.

Mastery Learning

The use of formative assessment for student feedback paired with appropriate corrective procedures in the classroom has dramatically improved student performance in all subject areas. In a 1984 study, renowned education scholar Benjamin Bloom determined mastery learning students performed one standard deviation above the average student, outscoring 84% of students in conventional classrooms.

What's more, 70% of mastery learning students attained summative achievement reached by only 20% of conventional classroom students, while also showing significantly more time on task in their respective learning environment.

MobyMax students are mastery learners. By providing thorough and effective feedback through diagnostic tests and formative assessments, MobyMax automatically implements the appropriate corrective procedures for each individual student. Teachers are easily able to monitor student progress towards mastery of specific standards by grade and subject.

Immediate Feedback

After reviewing 8,000 studies John Hattie (1992) concluded, "The most powerful single modification that enhances achievement is feedback. The simplest prescription for improving education must be 'dollops of feedback'."

The timing of feedback has proven to be very important, with immediate feedback proving to be the most effective. In addition, specific feedback, such as the specific explanations that accompany every problem in MobyMax, has been proven to enhance achievement.

Direct Instruction

Direct instruction is frequently confused with rote memorization and repetitive drill, both of which can be boring and negatively affect student outcomes. However, direct instruction, when implemented correctly, has been proven to foster significant gains in student achievement and result in deep and enduring understandings (Péladeau, Forget & Gagné, 2003). Direct instruction involves providing a discrete learning target with success criteria, implementing clear modeling and guided practice, and offering ample and varied opportunities to practice and extend a specific skill while providing useful feedback. MobyMax excels at harnessing the power of direct instruction by breaking down standards into clear learning objectives for students, providing easily understood instruction in the form of teach me lessons, and presenting students with multiple experiences to practice and develop a deep understanding of specific skills while providing high-utility feedback throughout the learning process.

Parental Involvement

Research indicates that the influence of a student's home life varies widely with respect to student achievement. However, high parental expectations have consistently been shown to be one of the strongest indicators of increased student achievement (Hung & Ho, 2005). MobyMax's parent portal allows parents to monitor student progress in real time, celebrate student successes, and become more involved in their student's education through a single, easy-to-use interface.

Writing

Teaching strategies for planning, revising, editing, and writing are powerful indicators of student success (Graham & Perin, 2007). Understanding the power of writing instruction, MobyMax has implemented writing across the entire curriculum. All subjects include writing components, allowing students to gain experience with a variety of writing types and receive instruction and feedback from a variety of teachers. In addition, MobyMax has developed a standalone writing skills curriculum to harness the power of writing instruction to increase student achievement.

Homework

Homework has become a hotly contested topic in modern education. Research shows that the wrong types of homework have no meaningful impact on learning and can even undermine student motivation (Trautwein, Koller, Schmitz & Baumert, 2002). However, by providing students with

quick, rigorous, and varied exercises MobyMax is able to capitalize on research that highlights the significant gains that these types of assignments can deliver. Because every practice set in Moby is accompanied by a Teach Me lesson and immediate feedback, homework on Moby is more akin to guided and independent practice during class. The student has all the resources they need to achieve success.

Systematic Review

MobyMax's systematic review continually reinforces lessons over multiple years based upon a student's proven mastery of a concept.

Newell and Rosenbloom (1981) and Anderson (1995) found that students must receive focused practice to achieve mastery of skills and that it takes more than 24 practice sessions before students reach 80 percent mastery. They also found this practice must occur over a span of days or weeks.

MobyMax's systematic review ensures that students develop enduring understandings by utilizing a systematic review cycle to revisit previously mastered material and ensure that mastery is retained.

Goal Setting

Research shows a consistent, positive relationship between setting goals and successfully performing tasks. To this end, MobyMax integrates IEP goals directly into the student's curriculum and data reporting.

Simple Cognitive Skills

From academia to professional sports training, cognitive theory recognizes that complex knowledge is composed of simple cognitive skills and that the most efficient way to learn any complex skill is to practice each of the small, discrete skills that compose the complex task.

MobyMax's curriculum breaks complex skills into small, achievable sub-skills, spiraling knowledge throughout a lesson to achieve eventual mastery of complex skills. This pedagogy has been shown to not only increase achievement, but also improve confidence and motivation as students master each individual sub-skill.

Fact Fluency

Basic concepts like addition, subtraction, multiplication, and division are the foundation for more complex math procedures. The National Math Panel's "Foundation for Success: Final Report" (2008)

advocates that all students develop automatic recall of math facts in order to be prepared adequately for higher level math. MobyMax has incorporated fact fluency directly into its curriculum and has also created a standalone fact master module that ensures students get the practice necessary to achieve automatic recall of all math facts.

Student Data

Using data to inform instructional decisions leads to improved student outcomes (Wayman, 2005; Wayman, Cho, & Johnston, 2007; Wohlstetter, Datnow, & Park, 2008). MobyMax allows all parties involved in a student's education, including the student, to easily access student achievement data. MobyMax continuously monitors student progress with regard to mastery of the CCSS standards and displays the data in multiple, easy-to-interpret formats.

Additional Research Citations

Formative Assessment

Hamilton, L., Halverson, R., Jackson, S., Mandinach, E., Supovitz, J., & Wayman, J. (2009). Using student achievement data to support instructional decision making (NCEE 2009-4067). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Retrieved from http://ies.ed.gov/ncee/wwc/publications/practiceguides/.

William, Dylan. (2011) Embedded Formative Assessment. Indiana:Solution Tree.

Furtak, E. M., & Ruiz-Primo, M. A. (2007). Studying the effectiveness of four types of formative assessment prompts in providing information about students' understanding in writing and discussions. Paper presented at the American Educational Research Association Annual Meeting, Chicago, IL.

Shavelson, R. J., Yin, Y., Furtak, E. M., Ruiz-Primo, M. A., Ayala, C. C., Young, D. B., Tomita, M. K., Brandon, P. R., & Pottenger, F. (2008). On the role and impact of formative assessment on science inquiry teaching and learning. In J. E. Coffey, R. Douglas, & C. Stearns (Eds.), Assessing science learning: Perspectives from research and practice (pp. 21–36). Washington, DC: NSTA Press.

Shavelson, R. J., Young, D. B., Ayala, C. C., Brandon, P. R., Furtak, E. M. Ruiz-Primo, M. A., Tomita, M. K., Yin, Y. (2008). On the Impact of Curriculum-Embedded Formative Assessment on Learning: A Collaboration between Curriculum and Assessment Developers. In Applied Measurement in Education, 21: 295 – 314. Routledge.

Dunn, Karee E., and Sean W. Mulvenon. “A critical review of research on formative assessment: The limited scientific evidence of the impact of formative assessment in education." Practical Assessment, Research & Evaluation 14.7 (2009): 1-11.

Marzano, R., J. (2009). Formative Assessment & Standards-Based Grading. Indiana: Solution Tree.

William, Dylan. (2009) Assessment for Learning: Why, What and How? London: Institute of Education.

Heritage, M. (2010). Formative assessment: Making it happen in the classroom. Thousand Oaks, CA: Corwin Press.

Accelerated Curriculum

Bloom, H. S., Ham, S., Melton, L., & O'Brien, J. (2001). Evaluating the Accelerated Schools Approach: A Look at Early Implementation and Impacts on Student Achievement in Eight Elementary Schools.

Finnan, C. (1996). Accelerated Schools in Action: Lessons from the Field. Corwin Press, Inc., 2455 Teller Road, Thousand Oaks, CA 91320.

Welner, K., Burris, C., Wiley, E., & Murphy, J. (2008). Accountability, rigor, and detracking: Achievement effects of embracing a challenging curriculum as a universal good for all students. The Teachers College Record, 110(3), 571-607.

Levin, H. M. (1988). Accelerated schools for at-risk students. CPRE.

Burris, C. C., Heubert, J. P., & Levin, H. M. (2004). Math acceleration for all. Educational Leadership, 61(5), 68-72.

Mastery Learning

Bloom, B. S. (1968). Learning for mastery.

Bloom, B. S., & Carroll, J. B. (1971). Mastery learning: Theory and practice. J. H. Block (Ed.). New York: Holt, Rinehart and Winston.

Kulik, C. L. C., Kulik, J. A., & Bangert-Drowns, R. L. (1990). Effectiveness of mastery learning programs: A meta-analysis. Review of educational research,60(2), 265-299.

Block, J. H., & Burns, R. B. (1976). Mastery learning. Review of research in education, 3-49.

Guskey, T. R. (2010). Lessons of Mastery Learning. Educational Leadership,68(2), 52-57.

Guskey, T. R., & Jung, L. A. (2011). Response-to-intervention and mastery learning: Tracing roots and seeking common ground. The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 84(6), 249-255.

Grant, G. J., Fazarro, D. E., & Steinke, L. (2014). Application of Problem Based Learning and Mastery Learning to Multimedia Education. Online Journal for Workforce Education and Development, 7(1), 7.

Morgan, K. (2011). Mastery Learning in the Science Classroom: Success for Every Student. NSTA Press

Jena, P. C., & Rana, A. K. (2012). Effect of direct instruction and mastery learning on academic achievement of senior secondary school science students: an experimental study on Chhapra District of Bihar. Educational Quest-An International Journal of Education and Applied Social Sciences, 3(1), 9-15.

Immediate Feedback

Krause, Ulrike-Marie (2009). The effects of cooperative learning and feedback on e-learning

Opitz, Bertram (2011). Timing Matters: The Impact of Immediate and Delayed Feedback on Artificial Language Learning

Li, Shaofeng (2010). The Effectiveness of Corrective Feedback in SLA: A meta-Analysis

Feyzi-Behnagh (2012). The Effectiveness of a Pedagogical Agent's Immediate Feedback on Learners' Metacognitive Judgments during Learning with MetaTutor

Dihoff, Roberta E. (2003). The Role of Feedback During Academic Testing: The Delay Retention Effect Revisited

Epstein, Michael (2002). Immediate Feedback Assessment Technique Promotes Learning and Corrects Inaccurate First Responses

Epstein, Michael (2006). Adjunctive role for immediate feedback in the acquisition and retention of mathematical fact series by elementary school students

Samuels, S. Jay (2010). The Effects of Immediate Feedback on Reading Achievement

Direct Instruction

Adams, G. L., & Engelmann, S. (1996). Research on Direct Instruction: 25 Years beyond DISTAR. Educational Achievement Systems, 319 Nickerson Street, Suite 112, Seattle, WA 98109.

Becker, W. C., & Gersten, R. (1982). A follow-up of Follow Through: The later effects of the Direct Instruction Model on children in fifth and sixth grades. American Educational Research Journal, 19(1), 75-92.

Stein, M., Silbert, J., & Carnine, D. (1997). Designing effective mathematics instruction: A direct instruction approach. Merrill.

Becker, W. C., & Carnine, D. W. (1980). Direct instruction: An effective approach to educational intervention with the disadvantaged and low performers. Advances in clinical child psychology, 3, 429-473.

Baumann, J. F. (1984). The effectiveness of a direct instruction paradigm for teaching main idea comprehension. Reading Research Quarterly, 93-115.

Parental Involvement

Williams, B., Williams, J., & Ullman, A. (2002). Parental involvement in education.

van Esch, W., & Walberg, H. J. (1993). Parental involvement in education. F. Smit (Ed.). Institute for Applied Social Sciences.

Henderson, A. T. (1987). The Evidence Continues to Grow: Parent Involvement Improves Student Achievement. An Annotated Bibliography. National Committee for Citizens in Education Special Report.

Epstein, J. L. (2001). School, family, and community partnerships: Preparing educators and improving schools. Westview Press, 5500 Central Avenue, Boulder, CO 80301.

Anderson, K. J., & Minke, K. M. (2007). Parent involvement in education: Toward an understanding of parents' decision making. The Journal of Educational Research, 100(5), 311-323.

Writing

McLeod, S. H., & Soven, M. (1992). Writing across the curriculum. Sage Publications.

Stock, P. L. (1986). Writing across the curriculum. Theory Into Practice, 25(2), 97-101.

Hyland, K. (2007). Genre pedagogy: Language, literacy and L2 writing instruction. Journal of second language writing, 16(3), 148-164.

Bangert-Drowns, R. L. (1993). The word processor as an instructional tool: A meta-analysis of word processing in writing instruction. Review of Educational research, 63(1), 69-93.

Edwards, L. (2003). Writing Instruction in Kindergarten Examining an Emerging Area of Research for Children with Writing and Reading Difficulties. Journal of Learning Disabilities, 36(2), 136-148.

Homework

Cooper, H. (1989). Synthesis of research on homework. Educational leadership, 47(3), 85-91.

Cooper, H., Robinson, J. C., & Patall, E. A. (2006). Does homework improve academic achievement? A synthesis of research, 1987–2003. Review of educational research, 76(1), 1-62.

Cooper, H., Lindsay, J. J., Nye, B., & Greathouse, S. (1998). Relationships among attitudes about homework, amount of homework assigned and completed, and student achievement. Journal of educational psychology, 90(1), 70.

Paschal, R. A., Weinstein, T., & Walberg, H. J. (1984). The effects of homework on learning: A quantitative synthesis. The Journal of Educational Research, 97-104.

Epstein, J. L. (1988). Homework Practices, Achievements, and Behaviors of Elementary School Students. Report No. 26.

Systematic Review

Roediger, Henry (2006). Test-Enhanced Learning Taking Memory Tests Improves Long-Term Retention

Smith, Troy A (2010). Learning from feedback: Spacing and the delay-retention effect

Balota, David A., Janet M. Duchek, and Jessica M. Logan. "Is expanded retrieval practice a superior form of spaced retrieval? A critical review of the extant literature." The foundations of remembering: Essays in honor of Henry L. Roediger, III (2007): 83-105.

Cepeda, Nicholas J., et al. "Distributed practice in verbal recall tasks: A review and quantitative synthesis." Psychological bulletin 132.3 (2006): 354.

Carpenter, Shana K., Harold Pashler, and Nicholas J. Cepeda. "Using tests to enhance 8th grade students' retention of US history facts." Applied Cognitive Psychology 23.6 (2009): 760-771.

Sobel, Hailey S., Nicholas J. Cepeda, and Irina V. Kapler. "Spacing effects in real-world classroom vocabulary learning." Applied Cognitive Psychology 25.5 (2011): 763-767.

Logan, Jessica M., and David A. Balota. "Expanded vs. equal interval spaced retrieval practice: Exploring different schedules of spacing and retention interval in younger and older adults." Aging, Neuropsychology, and Cognition 15.3 (2008): 257-280.

Goal Setting

Moeller, Aleidine J. (2012). Goal Setting and Student Achievement: A Longitudinal Study

Murayama, Kou (2009). The joint influence of personal achievement goals and classroom goal structures on achievement-relevant outcomes

Wilson, Kristin (2012). A study on student achievement of classes that set goals and self-monitor their achievement

Shannon, King R. (2011). Examining the role of goal setting and self-monitoring on sixth grade students' motivational beliefs and performance

Smithson, Marla (2012). The positive impact of personal goal-setting on assessment

Stronge, James H. (2009). Student achievement goal setting: Using data to improve teaching and learning

Hamilton, Laura (2009). Using student achievement data to support instructional decision making

Patel, Namisha (2012). Utilizing goal setting strategies at the middle level: Helping students self-regulate behavior

Carroll, A., Durkin, K., Hattie, J., & Houghton, S. (1997). Goal setting among adolescents: A comparison of delinquent, at-risk, and not at-risk youth. Journal of Educational Psychology, 89, 441-450.

Fact Fluency

Codding, R. S., Burns, M. K., & Lukito, G. (2011). Meta-Analysis of Mathematic Basic-Fact Fluency Interventions: A Component Analysis. Learning Disabilities Research & Practice, 26(1), 36-47.

Locuniak, M. N., & Jordan, N. C. (2008). Using kindergarten number sense to predict calculation fluency in second grade. Journal of Learning Disabilities, 41(5), 451-459.

Miller, A. D., Hall, S. W., & Heward, W. L. (1995). Effects of sequential 1-minute time trials with and without inter-trial feedback and self-correction on general and special education students' fluency with math facts. Journal of Behavioral Education, 5(3), 319-345.

Poncy, B. C., Skinner, C. H., & O'Mara, T. (2006). Detect, Practice, and Repair: The Effects of a Classwide Intervention on Elementary Students' Math-Fact Fluency. Journal of Evidence-Based Practices for Schools.

Student Data

Kerr, K. A., Marsh, J. A., Ikemoto, G. S., Darilek, H., & Barney, H. (2006). Strategies to promote data use for instructional improvement: Actions, outcomes, and lessons fromthree urban districts. American Journal of Education, 112(4), 496-520.

Davies, A. (2011). Making classroom assessment work. Solution Tree. 555 North Morton Street, Bloomington, IN 47404.

Cross, K. P., & Angelo, T. A. (1988). Classroom Assessment Techniques. A Handbook for Faculty.

Nitko, A. J. (1996). Educational assessment of students. Prentice-Hall Order Processing Center, PO Box 11071, Des Moines, IA 50336-1071.