

Formative Assessment

For teachers, few skills are as important or powerful as formative assessment (also known as progress monitoring and rapid assessment). This process of frequent and ongoing feedback on the effects of instruction gives teachers insight on when and how to adjust instruction to maximize learning. The assessment data are used to verify student progress and act as indicators to adjust interventions when insufficient progress has been made or a particular concept has been mastered (VanDerHeyden, 2013). For the past 30 years, formative assessment has been found to be effective in typical classroom settings. The practice has shown power across student ages, treatment durations, and frequencies of measurement, as well as with students with special needs (Hattie, 2009).

Another important assessment tool commonly used in schools that should not be confused with formative assessment is summative assessment. Formative assessment and summative assessment play important but very different roles in an effective model of education. Both are integral in gathering information necessary for maximizing student success, but they differ in important ways (see Figure 1).

Summative assessment evaluates the overall effectiveness of teaching at the end of a class, end of a semester, or end of the school year. This type of assessment is used to determine at a particular time what students know and do not know. It is most often associated with standardized tests such as state achievement assessments but are also commonly used by teachers to assess the overall progress of

students in determining grades (Geiser & Santelices, 2007). Since the advent of No Child Left Behind, summative assessment has increasingly been used to hold schools and teachers accountable for student progress and its use is likely to continue under the Every Student Succeeds Act.

In contrast, formative assessment is a practical diagnostic tool for routinely determining student progress. Formative assessment allows teachers to quickly ascertain if individual students are progressing at acceptable rates and provides insight into when and how to modify and adapt lessons, with the goal of making sure all students are progressing satisfactorily.

Comparing Formative Assessment and Summative Assessment

	Formative Assessment	Summative Assessment
What is it?	Diagnostic assessment tool for gathering information about student learning	Practical diagnostic tool for revealing what students have learned
When is it used?	During lesson or unit of study	End of unit of study, end of semester, or end of school year
Why is it used?	To track individual student progress so instruction can be adjusted to maximize learning	To provide evidence of what students learned to improve overall instruction and to hold teachers and schools accountable

Figure 1. Comparing two types of assessment

Both formative assessment and summative assessment are essential components of information gathering, but they should be used for the purposes for which they were designed.

Figure 2 offers a data display examining the relative impact of formative assessment and summative assessment (the latter in the form of high-stakes testing). Research shows a clear advantage for formative assessment in improving student performance.

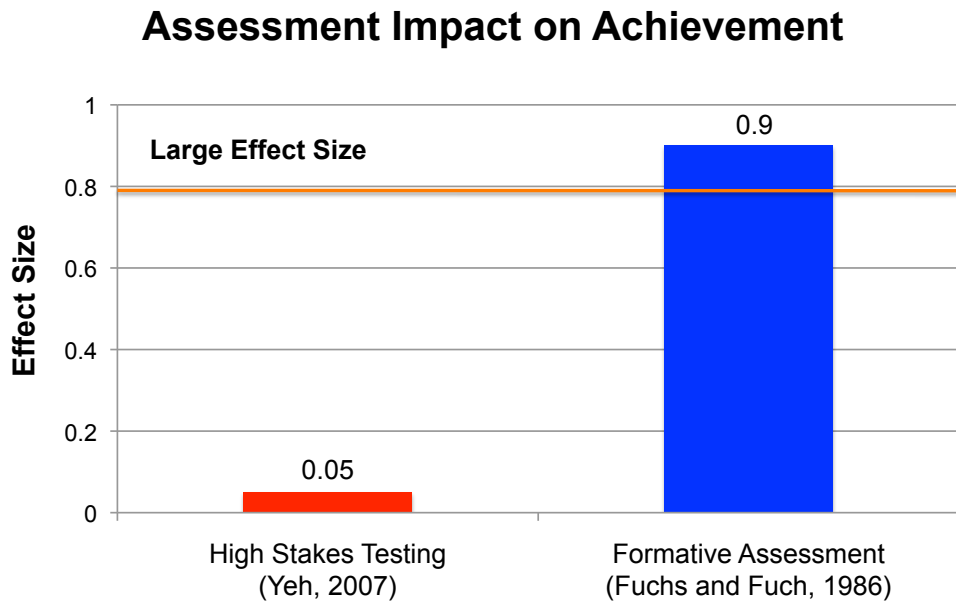


Figure 2. Comparison of formative assessment and summative assessment impact on student achievement

Research consistently lists formative assessment in the top tier of variables that make a difference in improving student achievement (Hattie, 2009; Marzano, 1998). In 1986, Fuchs and Fuchs conducted the first comprehensive quantitative examination of formative assessment. They found that it had an impressive 0.90 effect size on student achievement. Figure 3 provides the effect size of formative assessment, gleaned from multiple studies over more than 40 years of research on the topic.

Study	Average Effect Size
Black and Wiliam, 1998	0.40–0.70
Bloom, 1976	0.54
Haller, Child, and Walberg, 1988	0.71
Hattie, 2009	0.90
Fuchs and Fuchs, 1986	0.90
Kavale, 2005	0.70
Scheerens and Bosker, 1997	1.09
Walberg, 1999	0.94

Figure 3: Effect size of formative assessment

At its core, formative assessment uses feedback to improve student performance. It furnishes teachers with indicators of each student’s progress, which can be used to determine when and how to adjust instruction to maximize learning. Feedback is ranked at or near the top of practices known to significantly raise student achievement (Kluger & DeNisi, 1996; Marzano, Pickering, & Pollock, 2001; Walberg, 1999). It is not surprising that data-based decision-making approaches such as response to intervention (RtI) and positive behavior interventions and supports (PBIS) depend heavily on formative assessment.

Another important feature of well-designed formative assessment is the incorporation of grade-level norms into the assessment process. Grade-level norms are a valuable yardstick enabling teachers to more efficiently compare each student’s performance against normed standards (McLaughlin & Shepard, 1995). In addition to allowing

teachers to determine whether a student met or missed a target, grade-level norms offer teachers a clear picture of whether students are meeting important goals in the standards and quickly identify struggling students who need more intensive support.

Fuchs and Fuchs conducted the first extensive quantitative examination of formative assessment in 1986. This meta-analysis added considerably to the knowledge base by identifying the essential practice elements that increase the impact of ongoing formative assessment. The impact is equivalent to raising student achievement in an average nation such as the United States to that of the top five nations (Black & Wiliam, 1998). As can be seen in Figure 4, Fuchs and Fuchs reported that the impact of formative assessment is significantly enhanced by the cumulative effect of three practice elements. The practice begins with collecting data weekly (0.26 effect size). When teachers interact with the collected data by graphing it, the effect size increases to 0.70. Adding decision rules to aid teachers in analyzing the graphed data increases the effect size to 0.90.

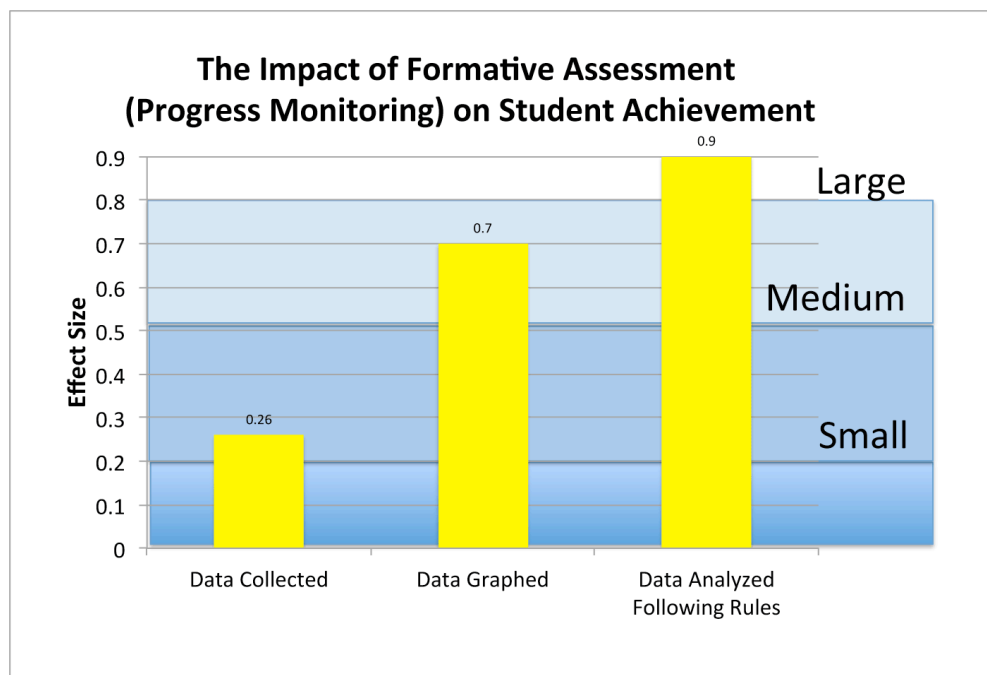


Figure 4: Impact of formative assessment on student achievement

Why Is Formative Assessment Important?

Much has been said about the importance of selecting evidence-based practices for use in schools. One of the most common failures in building an evidence-based culture is overreliance on selecting interventions and underreliance on managing the interventions (VanDerHeyden & Tilly, 2010). Adopting an evidence-based practice, although an important first step, does not guarantee that the practice will produce the desired results. Even if every action leading up to implementation is flawless, if the intervention is not implemented as designed, it will likely fail and learning will not occur (Detrich, 2014). A growing body of research is now available to help teachers identify and overcome obstacles to implementing practices accurately (Fixsen, Naoom, Blase, Friedman, & Wallace, 2005; Witt, Noell, LaFleur, & Mortenson, 1997). Formative assessment and treatment integrity checks constitute the basic tool kit enabling schools to avoid or quickly remedy failures during implementation.

The fact is, not all practices produce positive outcomes for all students. In medicine, all patients do not respond positively to a given treatment. The same holds true in education: Not all students respond identically to an education intervention. Given the possibility that even good practices may produce poor outcomes, it is incumbent on educators to monitor student progress frequently. Formal and

routine sampling of student performance significantly reduces the likelihood that struggling students will fall through the cracks.

Common informal sampling methods such as having students answer questions by raising their hands aren't sufficient. It is imperative that teachers have a clear understanding of each student's progress toward mastery of standards. This is important not just for the lesson at hand but also for future success. A systematically planned curriculum builds on learned skills across a school year. Skills learned in one assignment are very often the foundation skills needed for success in subsequent lessons. Today's failure may increase the possibility of failure tomorrow. For example, students who fall behind in reading by the third grade have been found to have poorer academic success, including a significantly greater likelihood of dropping out of high school (Celio, & Harvey, 2005; Lesnick, Goerge, Smithgall, & Gwynne, 2010).

It is only through ongoing monitoring that problems can be identified early and adjustments made to teaching strategies to ensure greater success for all students. In this way, formative assessment guides teachers on when and how to improve instructional delivery and make effective adjustments to the curriculum. This is necessary for helping struggling students as well as adapting instruction for gifted students.

In addition to formative assessment's notable impact on achievement is its impressive return on investment compared with other popular reform practices. In a cost-effectiveness analysis of frequently adopted education interventions, Yeh (2007) found that formative

assessment (which he referred to as rapid assessment) outperformed other common reform practices. He found the advantage for formative assessment striking compared with a 10% increase in spending, vouchers, charter schools, or high-stakes testing (see Figure 5).

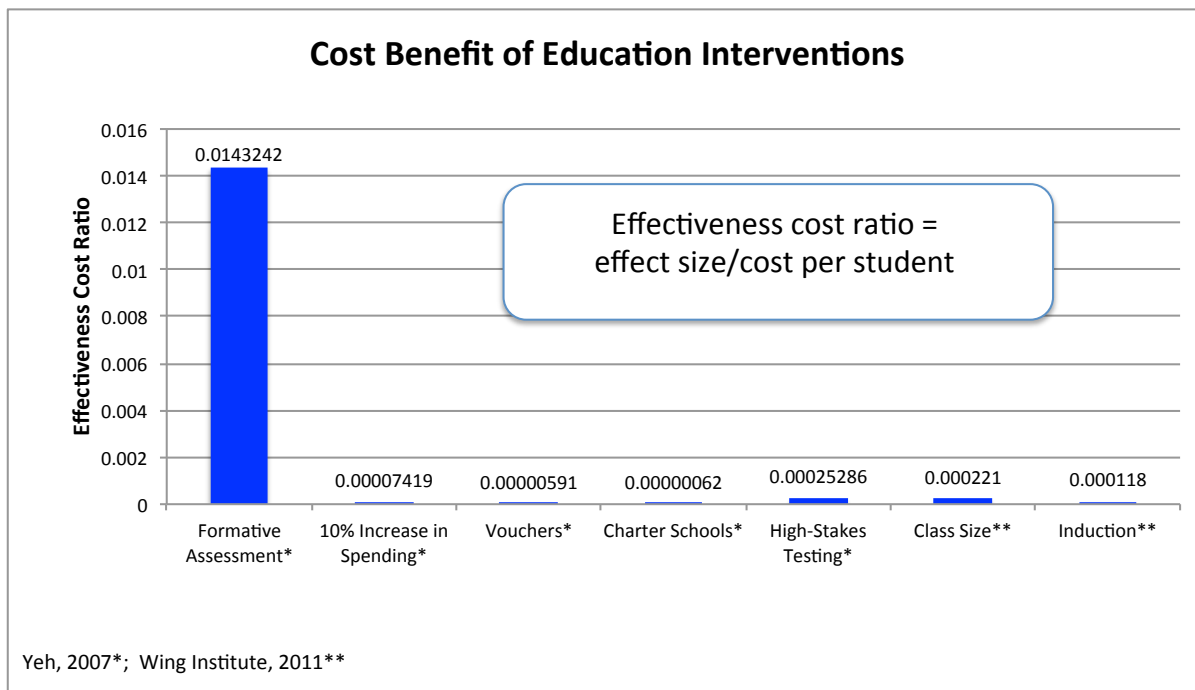


Figure 5: Return on investment of common education interventions

The Figure 5 data display compares Yeh’s 2007 and The Wing Institute analysis cost-effectiveness analysis of formative assessment with six common structural interventions.

Yeh compared the cost and outcomes of alternative practices to aid education decision makers in selecting economical and productive choices (Levin, 1988; Levin & McEwan, 2002). Educational cost-effectiveness analyses are designed to assess key educational outcomes, such as student achievement relative to the monetary

resources needed to achieve worthy results. Cost-effectiveness analyses provide a practical and systematic architecture that permits educators to more effectively compare the real impact of interventions.

Although the structural interventions identified in Figure 5 are designed to address an array of differing issues impacting schools, a fair comparison can be made because all the interventions aim to improve student achievement. In the end, decision makers need to know which approaches produce the greatest benefit for the dollars invested. A given practice may be very effective, but if it costs more than the resources available for implementation, the practice is of little use to the average school.

Summary

It is clear from years of rigorous research that formative assessment produces important results. It is also true that ongoing assessment carried out through the school year is necessary for teachers to grasp when and how to adjust instruction and curriculum to meet the various needs of struggling students as well as gifted students. Finally, cost-effectiveness research reveals that formative assessment is not only effective, but one of the most cost-effective interventions available to schools for boosting student performance.

Citations

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice*, 5(1), 7-74.

- Bloom, B. S. (1976). *Human characteristics and school learning*. New York, NY: McGraw-Hill.
- Celio, M. B., & Harvey, J. (2005). *Buried treasure: Developing a management guide from mountains of school data*. Seattle, WA: University of Washington, Center on Reinventing Public Education.
- Detrich, R. (2014). Treatment integrity: Fundamental to education reform. *Journal of Cognitive Education and Psychology, 13*(2), 258–271.
- Fixsen, D. L., Naoom, S. F., Blase, K. A., Friedman, R. M., & Wallace, F. (2005). *Implementation research: A synthesis of the literature* (FMHI Publication No. 231). Tampa, FL: University of South Florida, Louis de la Parte Florida Mental Health Institute, the National Implementation Research Network.
- Fuchs, L. S. & Fuchs, D. (1986). Effects of systematic formative evaluation: A meta-analysis. *Exceptional Children, 53*(3), 199–208.
- Geiser, S., & Santelices, M. V. (2007). *Validity of high-school grades in predicting student success beyond the freshman year: High-school record vs. standardized tests as indicators of four-year college outcomes* (Research and Occasional Paper Series CSHE. 6.07). Berkeley, CA: University of California, Berkeley, Center for Studies in Higher Education.
- Haller, E. P., Child, D. A., & Walberg, H. J. (1988). Can comprehension be taught? A quantitative synthesis of “metacognitive” studies. *Educational Researcher, 17*(9), 5–8.
- Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. New York, NY: Routledge.

- Kavale, K. A. (2005). Identifying specific learning disability: Is responsiveness to intervention the answer? *Journal of Learning Disabilities, 38*(6), 553–562.
- Kluger, A. N., & DeNisi, A. S. (1996). The effects of feedback interventions on performance: A historical review, a meta-analysis, and a preliminary feedback intervention theory. *Psychological Bulletin, 119*(2), 254–284.
- Lesnick, J., Goerge, R., Smithgall, C., & Gwynne, J. (2010). *Reading on grade level in third grade: How is it related to high school performance and college enrollment?* Chicago, IL: Chapin Hall at the University of Chicago, 1, 12.
- Levin, H. M. (1988). Cost-effectiveness and educational policy. *Educational Evaluation and Policy Analysis, 10*(1), 51–69.
- Levin, H. M., & McEwan, P. J., eds. (2002). *Cost-effectiveness and educational policy*. Larchmont, NY: Eye on Education.
- Marzano, R. J. (1998). *A theory-based meta-analysis of research on instruction*. Aurora, CO: Mid-Continent Regional Educational Laboratory.
- Marzano, R. J., Pickering, D. J., & Pollock, J. E. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Alexandria, VA: Association for Supervision and Curriculum Development.
- McLaughlin, M. W., & Shepard, L. A. (1995). *Improving education through standards-based reform. A report by the National Academy of Education Panel on Standards-Based Education Reform*. Palo Alto, CA: Stanford University Press.
- Scheerens, J., & Bosker, R. J. (1997). *The foundations of educational effectiveness*. Oxford, UK: Pergamon.

- VanDerHeyden, A. (2013). Are we making the differences that matter in education? In R. Detrich, R. Keyworth, & J. States (Eds.), *Advances in evidence-based education: Vol 3. Performance feedback: Using data to improve educator performance* (pp. 119–138). Oakland, CA: The Wing Institute.
<http://www.winginstitute.org/uploads/docs/Vol3Ch4.pdf>
- VanDerHeyden, A. M., & Tilly, W. D. (2010). *Keeping RtI on track: How to identify, repair and prevent mistakes that derail implementation*. Horsham, PA: LRP Publications.
- Walberg H. J. (1999). Productive teaching. In H. C. Waxman & H. J. Walberg (Eds.), *New directions for teaching, practice, and research* (pp. 75–104). Berkeley, CA: McCutchen.
- Witt, J. C., Noell, G. H., LaFleur, L. H., & Mortenson, B. P. (1997). Teacher use of interventions in general education settings: Measurement and analysis of the independent variable. *Journal of Applied Behavior Analysis, 30*(4), 693–696.
- Yeh, S. S. (2007). The cost-effectiveness of five policies for improving student achievement. *American Journal of Evaluation, 28*(4), 416–436.