The National Science Foundation's investments in assessing Student Learning: What have we learned?

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The National Science Foundation (NSF) is an independent federal agency that leads research and education in Science, Technology, Engineering and Mathematics (STEM). The primary locus for STEM education issues (including student learning) resides in the Directorate for Education and Human Resources (EHR). This paper describes the National Science Foundation's orientation, current portfolio, and future direction in assessing student learning in grades K-12 and at the undergraduate level.

NSF has funded a wide range of projects on assessing student learning including:

1. Research and development on new approaches and tools;
2. Development of new kinds of tests or test banks that can be used by districts and states;
3. Approaches to helping teachers (and prospective teachers) better understand how to incorporate assessments into their classrooms;
4. International assessments (NSF has co-supported TIMSS with NCES)
5. Large-scale policy oriented studies on the effects and impacts of assessments;
6. New approaches to assessing undergraduate students' learning.

The paper will discuss examples from each of the above categories, and describe approaches that seem particularly promising.

NSF began an explicit focus on student learning in 1991 with a special solicitation to fund projects focused on research and development on how to improve our understanding of what students know and understand. One of those projects, Balanced Assessment (BA) developed tests at the elementary, middle and high school levels to determine students' understanding of mathematics as articulated in the National Council of Teachers of Mathematics' (NCTM) standards. The BA test has been used by various states and school districts, particularly those interested in using the reform mathematics curricula funded by NSF over the years. Now several NSF programs include a specific focus on student learning, including programs in Elementary, Secondary and Informal Education (ESIE), Undergraduate Education (DUE), and the Interagency Education Research Initiative (IERI).

A major thrust has been to support work at all levels that moves the field from a 20th century conception of learning based on behaviorism and generic models of learning and knowledge to a 21st vision that is based on new knowledge from the learning sciences and addresses the nature of expertise, building on pre-existing knowledge, the importance of learning with understanding and metacognition, and the degree to which expertise is domain-specific. A number of projects that attempt to build on the cognitive science knowledge base will be discussed and cover projects that work at the classroom, district or state, national and policy levels.

Finally, the paper provides a discussion of the current accountability environment both through No Child Left Behind in K-12 and increasing calls for additional accountability for student results in higher education. What kinds of impact is accountability having on teaching and learning?

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