



USING THE FOSS ASSESSMENT SYSTEM

FOSS NEXT GENERATION IMPLEMENTATION

Assessment: Making sense of sense-making. Scientists make sense of how the natural world works. They develop, test and revise evidence-based explanations. Engineers apply that understanding to develop and improve solutions to real-world human problems. Our goal is to help every student become an effective sense maker and problem solver by doing what scientists and engineers do—at an age appropriate level—with guidance from their teachers.

The goal of assessment in the FOSS program is to provide students with information they can use to improve their sense making, and teachers with evidence of students' learning that they can use to adjust their instruction to meet the needs of every child.

Assessment happens every day. Before instruction on a FOSS module begins, students take the Survey (pretest) to reveal prior knowledge. During each lesson teachers look at work products or observe students in active investigation to ensure that they develop the intend practices, core ideas, and crosscutting concepts (embedded assessments). Teachers review samples of student work to determine what the students are thinking and what their general understanding is at that time. Based on student formative assessment data, teachers use a next-step strategy to address students' needs to move learning forward. After each investigation, students take an I-Check. This provides an intermediate check on progress. At the end of a module, students take a Posttest, which can be used to look at growth by comparing it to the Survey. When grades are necessary, there are suggestions provided in the Assessment Chapter (on FOSSweb) to turn FOSS assessment information into grades.

Help teachers shift to formative assessment. FOSS provides many tools throughout instruction to support teachers making formative assessment an integral part of learning. Assessment will only advance learning when students receive feedback they can act on to improve understanding (rather than receiving a percentage or grade). There are many teacher-led FOSS next-step activities to help students reflect on their thinking to improve.

Research supports the power of formative assessment. Black and Wiliam (1998) reviewed a large number of research papers dealing with many aspects of teaching that were believed to influence student learning. They concluded that the learning gains triggered by formative assessment were among the largest ever reported for educational interventions with the largest gains being realized by low achievers. The FOSS project took these findings to heart, and conducted two projects (funded by NSF 2002–2009) to develop an assessment system that would build on these findings.

In 2010, Margaret Heritage published an important paper for the Council of Chief State School Officers that described what formative assessment should and should not be. Her message: Assessment is only formative—moves learning forward—when it surfaces evidence of student learning and is accompanied by useful feedback. We were very gratified to see that everything Heritage described as best practice was part of the FOSS Assessment system developed through NSF funding and now part of the Next Generation edition.

Continued on the next page

1. Managing Materials
2. Using FOSS Technology
3. Creating a Culture for Science
4. Supporting Teachers with Time
5. Supporting Teachers with Professional Learning
6. Supporting Teachers with Access and Equity
7. **USING THE FOSS ASSESSMENT SYSTEM**
8. Observing Classroom Practice
9. Making Community Connections
10. Getting More Information

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We know we can improve student achievement. The challenge is to help teachers and students understand and implement the system.

Implementation. After twenty years of researching and promoting formative assessment, Dylan Wiliam prescribed a productive implementation framework that we have adopted and adapted to meet the needs of FOSS teachers.

- 1) **Choice:** Allow teachers to choose where they start. For most teachers this is the embedded assessment available for each lesson (one part). FOSS has developed a process, called the Reflective Assessment Practice that takes only 10 minutes of a teacher's time after class, and has proven time and again to provide big advantages in terms of student achievement. You can find more about this practice on FOSSweb by downloading the Assessment Chapter for any module. Another choice might be giving students the Survey before instruction and the Posttest at the end. Or in the first year (when things move more slowly because teachers are just learning the curriculum themselves), they use the I-Checks to provide evidence of progress. These benchmark assessments can be given using paper and pencil, or online (using FOSSmap). The online tests also provide practice for state tests.
- 2) **Flexibility:** FOSS provides a place to start, but teachers need to make these processes their own. So, for example, you will want to encourage teachers to stay firm on reviewing a sample of student work after class for ten minutes only (to ensure that teachers do it after every session), but how they sort the student work, or how they record the data to look at learning trends will change over time as teachers find systems that work well for them.
- 3) **Small Steps:** This may be the most important factor. We want these practices to become permanent. That means making small changes, and practicing those until a habit forms. Then teachers can add another aspect of the system they choose to include.
- 4) **Accountability:** Have teachers set small attainable goals and be accountable to you or to a teaching partner. Or find time for teachers to meet in grade level groups to study student work and to share and refine their practices over time.
- 5) **Support:** As a responsible administrator you will need to support teachers to make the mind shift from traditional assessment and grades to formative assessment, and provide time to meet in groups to discuss the implications. Because these formative classroom practices might be new to teachers, they need permission to find what works best for their students.

Developing a Growth Mindset. During the development of the FOSS Assessment System, we saw a profound shift in the culture of classrooms that fully implemented formative assessment as a teaching/learning practice. Teachers reported students asking when they would get to take the next test so they could see their progress and know what they needed to work on! Students were not afraid of making mistakes, and perseverance became a predictor of success. We didn't have a name for this shift at the time, but given Carol Dweck's work, we can now say that it was a shift to a growth mindset for both teachers and students.

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