

Spider Learning, Inc.
Response to EdReports Evaluation
June 2020

At Spider Learning, our goal is to empower the art of teaching, by applying the science of learning. We strive to meet this goal through the development of research backed, pedagogically sound curricular resources and the creation of classroom management tools driven by student performance data and differentiation.

We respect the opinions of the *EdReports* team and their thorough review of the content alignment to Common Core State Standards, curricular sequencing and instructional methodologies. At the same time, we stand by our program and the curriculum model that provides the blended classroom teacher with a comprehensive repository of lesson activities and the tools to deliver them with flexibility and fidelity. That flexibility is the hallmark of our program, and, in our opinion, led to the disconnect between the objectives of the program and the *Edreports* evaluation.

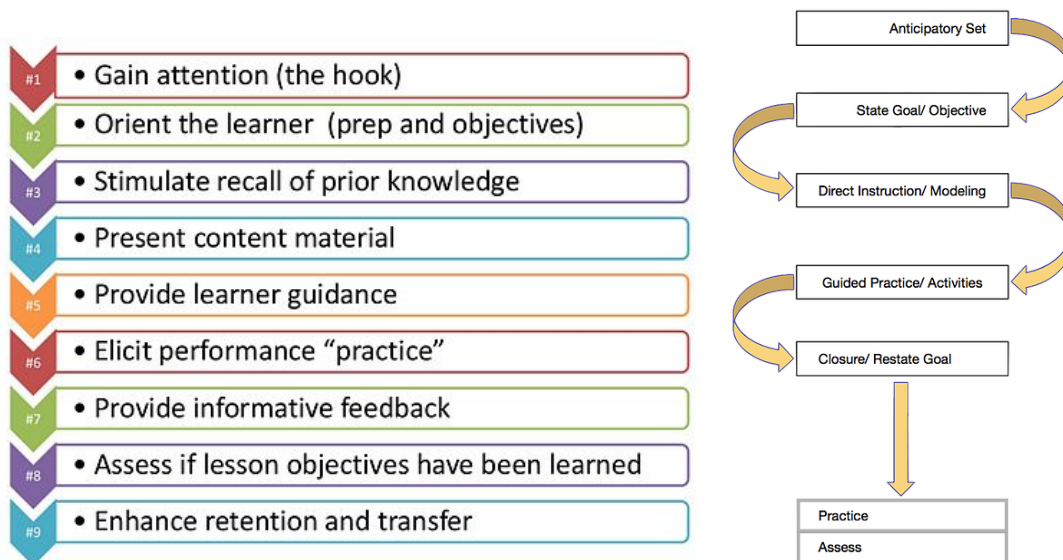
In other words, the curriculum is not designed as a sequential, day-by-day classroom experience for teachers and students asking them to progress in order from Unit 1 Lesson 1 to Unit 12 Lesson 15. Instead, Units and Lessons in the “scope and sequence” are freestanding, building the prerequisites into each lesson itself, allowing the sequence to be shifted and molded to meet the needs of a particular district, school or teacher. This model will naturally fail to meet some requirements, such as, “the materials do not attend to the progressions of the standards”, because they were not designed to be delivered in that fashion by the blended learning classroom teacher. The resources instead focus on the skills teachers need to address in their classrooms, at their discretion, under their direction and with the support every student needs to succeed. Diagnostic and formative assessment is a vital part of this equation and the reason Pre-Tests and Exit Tickets following each instructional section are built into *every lesson* of the Spider Learning resources.

A review of the research behind the curriculum model and the measurable performance results it has generated are critical to a thorough understanding of the program and a balanced approach to its evaluation.

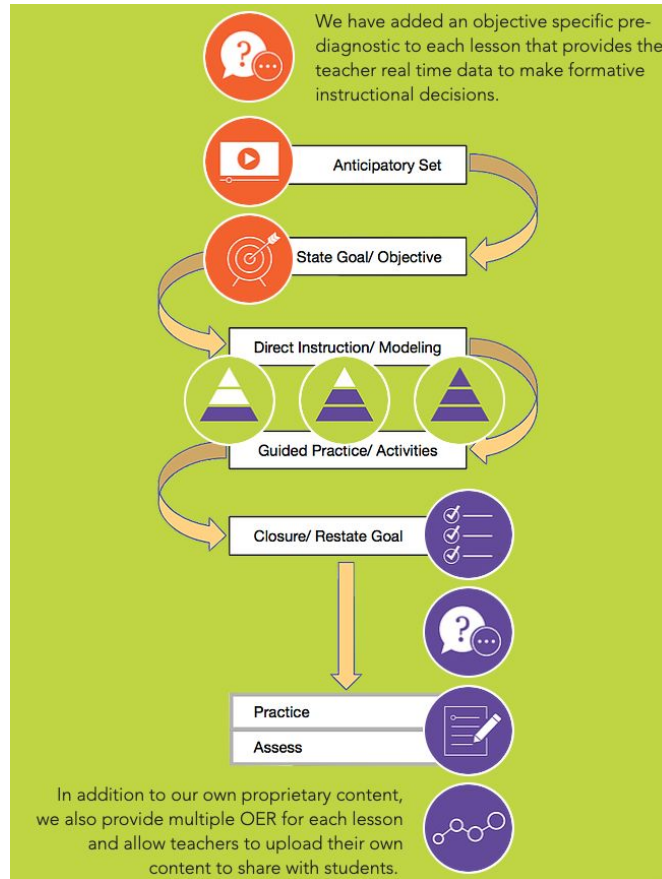
Research Supporting the Lesson Design

Gagné's Nine Events of Learning

Robert Gagné proposed a series of nine events that result in the most effective instructional design based on a behaviorist view of the learning process. The instructional design for our coursework and related Online Resource Bundles considered these events to ensure the most effective set of teacher resources be in place for every lesson that may be used by teachers. We intentionally infused these nine events with Bloom's and Webb's studies related to taxonomy, depth of knowledge and rigor.



Our Online Resource Bundles provide the tools that a blended classroom teacher needs to most effectively manage these nine events while ensuring that the teacher's expertise can be utilized to best take advantage of their experience and their mastery of the art of teaching. This combination of resources, *both digital and human*, position the blended classroom as the most dynamic learning environment possible.



Bloom's Taxonomy and Webb's Depth of Knowledge

A mainstay for over 50 years, Bloom's Taxonomy helps teachers formulate lessons that practice and develop thinking skills over a wide range of cognitive complexity. (Bloom, 1956) Although later revised by a team of education researchers headed by Anderson and Krathwohl (2001), the overall intent of the taxonomy remains: Categorize questions and activities according to their levels of abstraction. However, Bloom's Taxonomy suffers limitations when selecting test items and formulating questioning strategies because it uses verbs to differentiate taxonomy levels — many verbs appear at multiple levels and do not clearly articulate the intended complexity implied by the taxonomy. A new model of rigor, depth of knowledge (DOK), fills this void. The resulting combination of Bloom's Taxonomy and depth of knowledge — cognitive rigor — forms a comprehensive structure for defining rigor, thus posing a wide range of uses at all levels of curriculum development and delivery.

Students learn skills and acquire knowledge more readily when they can transfer their learning to new or more complex situations, a process more likely to occur once they have developed a deep understanding of content (National Research Council, 2001). Therefore, ensuring that a curriculum aligns to standards alone will not prepare students for the challenges of the

twenty-first century. *Teachers must therefore provide all students with challenging tasks and demanding goals*, structure learning so that students can reach high goals, and enhance both surface and deep learning of content (Hattie, 2002).

Formative Assessment and Technology-Enhanced Questions

Study findings reinforce the power of formative assessment, or at least one important element of it: Students whose teachers spend more time and who more frequently engage in analyzing and providing feedback on student work achieve higher learning than students whose teachers spend less time and who less frequently do so. Teachers' attention to student learning as evidenced in classroom work - whether through observations of students in classroom discussions or analyses of student responses in science notebooks, other written responses, or end-of-investigation assessments - is associated with higher student performance.

The strength of this relationship is striking in light of the weaknesses in teachers' initial content-pedagogical knowledge, as documented in pre-test scores for this study. It seems obvious that sound formative assessment practice requires adequate content-pedagogical knowledge. In other words, it is hard to imagine how teachers with weak knowledge of subject matter content and of the nature of students' progression through the content can appropriately analyze student work, or make appropriate decisions for next steps. Path analysis results from this study weakly support this supposition, as teachers' content knowledge showed an indirect relationship with student learning through teachers' use of assessment.

Technology-Enhanced Items (TEIs) offer many potential benefits over SR (selected-response) items. The most significant is that TEIs have the potential to provide improved measurement of certain constructs, specifically high-level constructs, because they require students to produce information, rather than simply select information, which is often a more authentic form of measurement (Archbald & Newmann, 1988; Bennett, 1999; Harlen & Crick, 2003; Huff & Sireci, 2001; Jodoin, 2003; McFarlane, Williams, & Bonnett, 2000; Sireci & Zenisky, 2006; Zenisky & Sireci, 2002). A second benefit is that TEIs reduce the effects of test-taking skills and random guessing (Huff & Sireci, 2001). A third benefit is that TEIs have the potential to provide richer diagnostic information by recording not only the student's final response but also the interaction and thought process that lead to that response (Birenbaum & Tatsuoka, 1987). CR items have always offered these benefits, but TEIs allow these benefits to be leveraged on items administered via computer that can be automatically and instantly scored. A fourth potential benefit of TEIs is a possible reduction of cognitive load from non-relevant constructs, such as the reading load for items designed to measure mathematics or science, and the cognitive load required to keep various item constructs in memory (Mayer & Moreno, 2003). Finally, TEIs tend to be more engaging to students, an important consideration in an era when students frequently feel over-tested (Strain-Seymour, Way, & Dolan, 2009; Dolan, Goodman, Strain-Seymour, Adams, & Sethuraman, 2011). More recently, a group of researchers explored SR (selected-response), CR (constructed-response), and TE (technology-enhanced) items in the context of seventh grade mathematics and Algebra I. The CR/TE test was reviewed by experts

and found to be similar to the SR test in terms of measuring the intent of the standards and the depth of knowledge.

Impact of the Program

As one example of the results seen by schools using our program, a pilot program was analyzed in detail.

HIGH SCHOOL ALGEBRA 1 BLENDED CLASSROOM PILOT

Objective: Utilize Spider Learning's Algebra 1 Online Resource Bundles and our Classroom Command Center to increase student engagement and to personalize learning.

Implementation: Classroom teachers designed strategies where students were able to focus on maximizing their time engaged with learning new content via our digital resources (ORBits). This would ensure students always had appropriately leveled resources to keep them focused and engaged, while simultaneously allowing the teacher to monitor their live performance data by using the Classroom Command Center. When the teacher determined a student needed support based on the Command Center dashboard they would intervene and support that student.

Results:

96 High School Algebra 1 enrollments;

- 87 students were below basic or basic on previous high stakes math exams when entering high school (this is high due to Algebra 1 being offered at the middle school level for advanced students);
- 7 students had no previous testing data;

98.9% participation rate on State mandated exit/competency exam (95/96);

77 HS students passed (ie. proficient or advanced) the Algebra state exam;

- **Approximately an 81% pass rate;**
- **Up from normal school passing rate of 65-70% for the high schools involved;**

89.5% of the students increased at least one level of competency when compared to their previous performance levels on state math tests.