Guidelines for the Evaluation of Instructional Materials in Science

Instructional materials are an important and persistent resource in US classrooms. They represent the intersection of standards, disciplinary knowledge and practices, and pedagogy. In light of the Framework for K–12 Science Education (National Research Council, 2012) and the Next Generation Science Standards (NGSS; Lead States, 2013), decision-makers need consistent information about the quality of instructional materials in science and the extent to which they embody the NGSS (NRC, 2013). To offer this consistent information, a system for evaluating instructional materials should be valid and reliable. With the support of the National Science Foundation, BSCS has developed guidelines for the creation of tools and processes to evaluate instructional materials and result in valid and reliable information about their quality. Tables 1 and 2 provide overviews of key components of these guidelines, which are contained in a report release by BSCS in May 2017. Table 1 describes characteristics of measures for the evaluation of instructional materials.

Table 1 Guidelines for assessing the quality of instructional materials.

The evaluation system	
1. includes both tools and processes.	
2. includes a guide for evaluators.	
3. specifies a summary report that justifies the evaluation results and offers suggestions for modifying instructional materials to enhance their quality.	
The evaluation system should be supported by Tools that	**The evaluation system should include Processes that**
4. specify what to look for as evidence for each Evaluative Criterion.	7. identify appropriate units of analysis.
5. have clearly defined scoring guidelines for capturing evidence from materials.	8. involve dialogue and consensus-building among a team of evaluators.
6. include forms for documenting specific evidence of the Evaluative Criteria and suggestions for improvement.	9. assure consistency across evaluators.

The information provided through the application of these measures can only be as good as the criteria by which the instructional materials are evaluated. The NRC *Framework* and the NGSS provide a foundation for such criteria based on what many science educators have long advocated: the integration of science practices and disciplinary ideas, with a focus on carefully chosen disciplinary core ideas that are generative and more opportunities for authentic experiences with doing science. In practice, this means learning is guided by clearly articulated, focused learning goals that anchor rich experiences with the science and engineering practices (SEPs) *and* crosscutting concepts (CCCs) *and* disciplinary core ideas (DCIs) together—and the integration of these three domains, called *three-dimensional learning*. Table 2 briefly describes criteria that represent the vision of what instructional materials should look like as the NGSS are more widely adopted. These criteria are organized into four broad categories articulated in the form of assertions about high-quality materials that support the vision of the NRC *Framework* and the NGSS:

1. Instructional materials support NGSS-driven learning goals.
2. Instructional materials provide coherence across the three dimensions.
3. Instructional materials support science learning experiences that promote three-dimensional learning.
4. Instructional materials provide ways to monitor student learning across the three dimensions.

Table 2 Criteria for evaluation instructional materials in science.

When evaluating student materials, consider the extent to which ...	*When evaluating teacher materials, consider the extent to which ...*
NGSS-Driven Learning Goals	
1S Materials are based on learning goals. Those goals call for learning of • disciplinary core ideas, science and engineering practices, crosscutting concepts from NGSS integrated as three-dimensional learning; • the nature of science, engineering, technology, and applications of science from NGSS; and • Common Core State Standards for English language arts and mathematics.	1T Materials explain the learning goals; the rationale for selecting them; and • how they promote three-dimensional learning; • how they promote learning of the nature of science, engineering, technology, and applications of science; and • how they promote learning of the Common Core standards for English language arts and mathematics.
2S Materials use phenomena or problems to focus students on learning goals.	2T Materials explain how the phenomena or problems are used to focus students on learning goals.
3S Materials are based on scientifically accurate and grade-level-appropriate learning goals.	3T Materials situate learning goals within the progression of K-12 learning laid out by the NGSS.
Coherence across Three Dimensions	
4S Materials are designed with carefully sequenced learning goals and well-matched experiences.	4T Materials communicate the design principles and sequencing underpinning the storyline.
5S Materials provide students with opportunities to make links across the three dimensions to build coherent conceptual understanding and abilities to use the practices.	5T Materials promote teacher knowledge-building related to the storyline.
Learning Experiences across Three Dimensions	
6S Materials provide multiple opportunities for students to share and negotiate their ideas, prior knowledge, and experiences.	6T Materials support teachers in anticipating common student ideas and include guidance to elicit and challenge student thinking.
7S Materials use motivating contexts to engage students in real-world phenomena and authentic design problems.	7T Materials provide guidance to teachers for using effective teaching strategies that engage students in real-world phenomena and authentic design problems.
8S Materials are accessible to a wide range of students.	8T Materials provide suggestions for how to address a range of students' skills, needs, and interests.
Monitoring Learning across Three Dimensions	
9S Materials include accessible and unbiased formative and summative assessments of students' three-dimensional learning.	9T Materials highlight formative and summative assessments and provide tools and guidance for interpreting evidence of three-dimensional learning and using assessment results to plan for future instruction.
10S Materials include multiple opportunities for self-assessment and reflection to promote sensemaking among students.	10T Materials provide guidance for teachers to use data from assessments to provide feedback to students and promote student self-assessment and reflection.

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Associate Director for Strategic Partnerships and Professional Learning

Jody Bintz, MA, serves as Associate Director for Strategic Partnerships and Professional Learning with BSCS Science Learning. She works primarily in the areas of leadership development and teacher professional learning.

Ms. Bintz has designed and led a variety of programs to develop organizational leadership capacity and enhance the knowledge and skills of professional development leaders in various sites across the country, particularly as related to implementing the Next Generation Science Standards (NGSS). She directs the BSCS National Academy for Curriculum Leadership (NACL). This work included a six-year partnership with Washington State LASER and involved nearly 30 secondary science leadership teams and 20 state-wide leaders. She served as the principal investigator for a research study to test the influence of the NACL leadership development model on student achievement. Also as a principal investigator, she spearheaded a synthesis study focused on teacher leadership development. Bintz serves as co-principal investigator of an efficacy study of the professional development program, STeLLA (Science Teachers Learning from Lesson Analysis), and its impact on high school biology student learning and teacher practice. With a vision of developing tools and processes to advance the implementation of the NGSS, she leads a project involving collaborators from the K-12 Alliance at WestEd, the American Museum of Natural History (AMNH), Learning Innovations at WestEd, and Achieve, Inc.

Before joining BSCS, Ms. Bintz served as an instructional services consultant with Loess Hills AEA 13 in southwest Iowa. Her responsibilities included serving on the Iowa Support Team for Schools in Need of Improvement, strategic school improvement and professional development planning, and designing and leading professional development activities with K-12 science teachers focused on curriculum, instruction, assessment, technology integration, and the integration of reading strategies. Ms. Bintz taught high school science and coached in Treynor, Iowa. She received her Bachelor of Arts degree in Biology from the University of Northern Iowa and her Master of Arts degree in Science Education from University of Northern Iowa.

BSCS SCIENCE LEARNING

BSCS Science Learning
5415 Mark Dabling Blvd.,
Colorado Springs CO 80918

719.531.5550
info@bscs.org
www.bscs.org

Transforming Science Education through Research-Driven Innovation

SERVICE AGREEMENT #22-001

This agreement is between River Forest Public Schools, District 90, 7776 West Lake Street River Forest, Illinois 60305 hereafter referred to as RFPS, and BSCS Science Learning (BSCS), a Colorado not-for-profit corporation located at 5415 Mark Dabling Boulevard, Colorado Springs, Colorado, 80918-3842, hereafter referred to as BSCS.

WHEREAS, RFPS is desirous of engaging the services of BSCS to provide or perform certain services in connection with services to support RFPS in reviewing curriculum materials through the NextGen TIME process, and said agreement provides for collaborative effort by BSCS to be implemented through appropriate contractual arrangements, and

WHEREAS, BSCS agrees to participate in the project as set forth in ARTICLE I of this Agreement for the consideration stated herein,

NOW THEREFORE, the parties mutually agree to the following terms.

ARTICLE I. STATEMENT OF WORK

BSCS Project: River Forest Public Schools (RFPS)

BSCS agrees to:

- Support the RFPS instructional materials selection committee in learning and then applying NextGen TIME to candidate programs. The services will be held over one virtual and three face-to-face sessions.
    - Create, prepare and facilitate a two-hour Zoom session on April 7, 2022 to introduce participants to NextGen TIME process.
    - Create, prepare and facilitate one full day on site of Next Gen TIME on April 22, 2022 to represent evidence and analyze quality of curriculum materials.
    - Create, prepare and facilitate up to three full days on site in May 2022 (dates TBD) to apply the NextGen TIME process to selected curriculum materials.
    - Create, prepare and facilitate one full day on site in Fall 2022 (date TBD) of the Pilot phase of NextGen TIME.
- BSCS will consult with RFPS district leaders to prepare for each session.
- BSCS will provide electronic versions of materials to be printed by RFPS.

RFPS agrees to:

- provide location for the events,
- provide lunches and snacks, and
- provide all PD materials, prepare copies, and organize electronic files for all sessions.

ARTICLE II. PERIOD OF PERFORMANCE

The period of performance of this Agreement shall be from March 1, 2022 to November 30, 2022.

ARTICLE III. ALLOWABLE COSTS AND PAYMENT

In consideration of the provision and performance of the tasks described in ARTICLE I above, RFPS shall provide total payment of $20,123 (twenty thousand and one hundred twenty-three dollars) for the described services. Payment will be made based on the following:

Invoice Date	Invoice Amount
April 30, 2022	$8, 000
May 30, 2022	$10,000
October 30, 2022	$2,123

BSCS shall submit an invoice to Alison Hawley, Director of Curriculum and Instruction after the completion of each session. RFPS will remit payment for each invoice within thirty (30) days of receipt.

ARTICLE IV. PRINCIPAL PROJECT CONTACTS

The principal project contact for BSCS shall be Jody Bintz, BSCS Associate Director. The principal project contact at RFPS shall be Alison Hawley, Director of Curriculum and Instruction. The principal project contacts are not authorized to change any element of this Agreement. Any changes shall be made by written amendment, executed for the parties by their authorized officials. If any of the "principal contacts" cease to serve as principal project contacts for this Agreement, this Agreement will continue based on the information supplied between RFPS and BSCS.

ARTICLE V. PUBLICATIONS AND COPYRIGHTS

The copyright of all NextGen TIME materials presented during the sessions is held by BSCS Science Learning or represent open education resources. These materials are freely available on the nextgentime.org website and may be used in future work by RFPS.

ARTICLE VI. TERMINATION

Either party may terminate its participation in the project upon thirty (30) days written notification to the other party. Upon termination, BSCS shall make no further commitments under this Agreement and shall take all reasonable actions to cancel outstanding obligations.

ARTICLE VII. ENTIRE AGREEMENT

Both parties agree that this Agreement constitutes the entire and only Agreement between the parties for the work stated in Article I.

ARTICLE VIII. RELATIONSHIP OF PARTIES

It is understood and agreed that nothing herein contained is intended or shall be construed to in any respect create or establish the relationship of partners between the parties, or as constituting BSCS as an employee, agent, servant, or representative of RFPS for any purpose whatsoever. At all times, BSCS shall provide and carry out the work stated in ARTICLE I of this Agreement as an independent contractor.

IN WITNESS THEREOF, RFPS and BSCS have executed this Agreement.

BSCS Science Learning (BSCS)

By:_____ Date:_____

Robert Smariga, Director of Operations and Finance

River Forest Public Schools

By:_____ Date:_____

Dr. Alison Hawley, Director of Curriculum and Instruction