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**Wisconsin Instructional Resources Review Tool for Science**

The Wisconsin Department of Public Instruction and Wisconsin Society for Science Teachers prepared this rubric for educator teams to use to evaluate science education textbooks or other **large-scale** sets of instructional resources. It could also be used to guide adaptation of current sets of resources and determine **professional development** needs. Because the criteria is aligned to the [Next Generation Science Standards](http://www.nextgenscience.org/) and the [NRC Framework for K-12 Science Education](http://www.nap.edu/read/13165/chapter/1), a **comprehensive understanding** of these documents, including the progressions of learning detailed in them, **must** be in place prior to using this tool. Groups should adapt this tool based on local needs and vision.

**The NRC Framework clearly emphasizes the following shifts in science education that should be present in instructional resources:**

1. **Three-dimensional learning** – students engage in science and engineering practices to learn content, while relating and understanding that content through the lens of crosscutting concepts.
2. **Explaining phenomena and designing solutions** – students investigate the world around them to explain phenomena and use their scientific understanding to design solutions to problems.
3. **Engineering design and the nature of science** – students do authentic work of scientists and engineers, explicitly seeing themselves in those roles and understanding what that entails.
4. **Coherent learning progressions** – within a grade and from K-12, three-dimensional learning builds on past experience, avoiding redundancy and building connections across disciplines.
5. **Connections to English/language arts and mathematics** – students’ learning reflects real-world contexts as it explicitly uses practices and understandings from mathematics and English/language arts.

**DPI recommends the following elements of a textbook/instructional resources review process using this tool:**

* Teams reviewing texts could include teachers, administrators, community members, Institute of Higher Education (IHE) representatives, and students.
* If they do not have one, schools should establish a vision for students’ science education to ensure that instructional resources selected align with this vision.
* Teams should collaboratively review a series of lessons or units, then review another set of lessons, checking for consistent quality throughout instructional resources. Team members should use these lessons/units to provide examples and evidence for analysis in each category (row).
* No material will meet all of these Next Generation criteria, so **it is important to consider the characteristics holistically, not as checklists**. Therefore, before you evaluate, you will need to consider which among these categories are your **non-negotiables**.
* In the end, teams will want to evaluate instructional resources based on where the majority of alignment evidence falls. The final analysis, written on the last page of this document, should include **claims** for how well these instructional resources align with the school’s vision and standards, and whether the team wants to consider them for adoption. The team should provide **evidence** and **reasoning** in relation to that consideration, continually **relating it back to the district’s K-12 vision for science education.**
	+ A sample statement within the final analysis might be: “To engage students and empower them to make science-based decisions in their life after formal schooling, they need to investigate and make sense of real-world phenomena at a deep level. In these instructional resources, students do that in the investigations noted on pages 30, 72, 112, and 152 of the reviewed resource. This type of work appears to be a consistent element of these instructional resources.”
	+ Crafting statements like the above sample in relation to all relevant portions of your vision for science education will support decision-making about instructional resources adoption.

This evaluation tool draws heavily from the [EQuIP rubric](http://www.nextgenscience.org/resources/equip-rubric-lessons-units-science) and [PEEC alignment](http://www.nextgenscience.org/resources/ngss-peec-alignment) tools, developed by [Achieve](http://achieve.org/).

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| **Characteristic** | **Less Like…** | **More Like…** | **Questions, Examples/Evidence, & Comments** |
| **A) Approach to Phenomena** | * Organized by big content ideas, each section/chapter has lab idea(s) that largely confirm learning about that content.
* Student work confirms theories and equations and/or generally follows a set procedure.
* Student learning is centered on facts; content is an end in itself.
* Learning has limited explicit connection to students’ day-to-day lives and questions.
* Learning may be difficult, but is not conceptually rigorous.
 | * Learning is organized around essential questions and investigating meaningful phenomena within a storyline.
* Students have opportunities to design investigations and build evidence for scientific models that explain phenomena.
* The primary goals are making sense of the world and solving problems, **not** *covering* content.
* Students have opportunities to initiate explorations linked to what they think is important, what they wonder about, and what is happening in their local context.
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| **B) Three Dimensional** | * Instructional resources emphasize the use of ***a***scientific method.
* Students make predictions but have little grounding for them or the outcomes are obvious.
 | * Students engage in multiple **scientific and engineering practices** (no longer “*a* scientific method”) to learn about the world around them and solve problems.
* Learning is framed by **crosscutting concepts** (cross-disciplinary science ideas).
* A blend in practices, **disciplinary core ideas**, and crosscutting concepts is evident in how material is presented, not just what students are asked to do.
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| **C) Crosscutting Concepts** | * Concepts are not intentionally connected from unit to unit; they tend to be presented in silos.
* Big ideas of science are treated as a separate chapter or lesson.
 | * As an integral part of their work, students make sense of and ask questions of phenomena across disciplines using the lens of crosscutting concepts.
* Crosscutting concepts frame scientific inquiry and illustrate connections across scientific disciplines, with consistent, explicit use of that language (i.e., cause and effect, scale, systems, etc.).
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| **D) Clear Learning Objectives Linked to Essential Questions**  | * Each lesson has objectives for student learning. The objectives are typically about learning particular content.
* Content-based questions begin and/or end each lesson, unit, and/or chapter.
 | * Multiple lessons work together towards objectives/enduring understandings that include practices, core ideas, and crosscutting concepts. Performance expectations inform objectives.
* Lessons include essential and additional questions that prompt sense-making of phenomena and means for doing so.
* Students understand how objectives and questions connect to big ideas of the unit.
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| **E) Clear Progression Across and Within Grades with Focused Content** | * Content and use of the scientific method gets progressively more advanced from grade to grade.
* Instructional resources provide details on a broad range of content at each grade level.
* Information is scientifically accurate.
 | * There is a clear progression of disciplinary core ideas, practices, and crosscutting concepts within a grade and from grade to grade.
* Instructional resources focus on narrow, coherent, and developmentally appropriate sets of content at each grade level, supporting a vertical progression of conceptual understanding.
* Information is scientifically accurate.
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| **F) Teacher Supports** | * Instructional resources include guidance on how to teach the lessons and use the resources as a whole.
* Specifies instructional resources to be used and provides instructional resources when kit-based.
* Potential safety concerns are listed.
* Demonstration ideas are provided.
 | * Embedded professional development provides tailored supports at ES, MS, and HS, such as additional content background information, learning progressions, coherent storylines, and guidance on conducting three-dimensional investigations.
* Supports research-based instructional practice.
* Student preconceptions are identified with guidance for how to work with them.
* Specifies materials to be used; provides quality, durable equipment if kit-based.

Potential safety concerns are listed and explained. |  |
| **G) Dialogue and Communication, Links to CCSS ELA** | * Instructional resources provide for group work and written lab reports.
* Whole-class and individual questions are provided.
* Students respond to formative and summative questions that are largely content-based.
* Text presents vocabulary to learn.
 | * Supports for structured whole-class and small group communication and dialogue are part of every lesson and investigation.
* Notebooking supports are provided.
* Investigations ask students to formally and informally present and defend their claims with evidence, attending to audience and using proper vocabulary.
* Argumentation is an expectation.
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| **H) Links to CCSS Math** | * Students use formulas and make calculations.
* Students graph their data and make sense of various displays of data.
 | * Students create and evaluate mathematical models in their explanations and understanding of scientific phenomena.
* Instructional resources focus on a conceptual understanding of simulations and models, allowing for students to manipulate, evaluate, and create such models through computational thinking.
* Students create, interpret, use, and evaluate graphical displays of data, ensuring accurate explanations.
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| **I) Engineering**  | * Instructional resources provide some examples of engineering as applications of science knowledge.
 | * Students engage in engineering design (defining problems with criteria and constraints, designing and testing solutions, etc.) to solve meaningful problems.
* Engineering work extends and deepens student understanding of science content and practice, and students see how science and engineering function together.
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| **J) Nature of Science and Diversity of Perspective** | * Students only learn about the nature of science (how science is practiced and discussed) in one chapter.
* Students learn about the work of significant scientists from history.
 | * The nature of science is embedded throughout student learning from a current and historical context.
* Instructional resources connect students to the content and practice of actual scientists and engineers, including current and past work by a diverse group of scientists and engineers. Students see people like themselves.
* Students are given real-world opportunities to work like scientists and engineers, emphasizing that STEM fields require perseverance and a growth mindset.
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| **K) Differentiation: Meet Needs of All Learners** | * Instructional resources provide some ideas to differentiate learning processes, required products, and/or content; examples might include an easier version of an assessment or less complicated project options.
* Writing is the primary response mode.
* Resources are provided in Spanish or other languages as needed.
* Concepts learned and lab activities are largely presented in one way with one pathway through them.
 | * Instructional resources include specific strategies for engaging and supporting *all* students.
* Students consistently have multiple pathways/modalities for showing their understanding of concepts, and have choices in learning that allow them to connect to meaningful aspects of their culture and community.
* Instructional resources emphasize high standards for learning and the products that represent learning.
* Connecting to and supporting diverse interests and learning needs are infused throughout, including other languages and reading levels.
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| **L) Formative Assessment** | * Instructional resources provide student questions related to each lesson and quizzes across multiple lessons. Assessments largely focus on understanding the content, but may connect to some areas of practice such as interpreting graphs.
* Assessments are related to learning objectives.
 | * Provide structured supports for ongoing assessments linking to practices, core ideas, and crosscutting concepts, with guidance for using the data to determine next steps.
* Provide specific strategies for how to support students struggling with concepts and skills.
* Comes in several formats, related to learning objectives and progressions, with examples of how students might demonstrate proficiency in multiple modes.
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| **M) Summative Assessment** | * Summative tests include lengthy lists of content-based questions, with some open-ended explanation and reasoning required.
* Typically provided at the end of each chapter or unit.
 | * Emphasizes authentic assessments such as portfolios, projects, performance tasks, and hands-on work, where the line between assessment and typical learning activities is blurred.
* Allows for student work across the three dimensions, not just working with each separately.
* Includes differentiated assessment options with multiple means for expressing understanding.
* Provides quality rubrics that emphasize a true progression of learning, not relying on such categories as sometimes, never, or always to differentiate levels of learning.
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| **N) Technology and Instructional Resources Connections** | * Includes links to related websites.
* Ideas for integrating technology are provided.
 | * Instructional resources guide students’ use of technological tools for research, data collection and analysis, modeling, collaboration, communication, etc.
* Technology tools and connections support depth of learning and other benefits that could not be accomplished otherwise.
* Students have opportunities to determine when and how to best use technology tools.
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| **O) Other Characteristics Determined Locally** |   |   |   |

**Final Analysis**

It is critical for districts to conduct this evaluation thoroughly and thoughtfully. A superficial review of texts and instructional resources will likely have long-reaching consequences for teachers and students. Notably, all characteristics may not be equally weighted in your analysis. Teams of educators will have to determine which characteristics and evidence are most important based on their context and needs.

* **Recommendation(s) for these resources:**Examples: pilot, adopt, adopt at grade(s) \_\_\_, do not adopt, use but not as core material for unit, return to publisher, etc.
* **Our evidence-based reasoning for how this resource aligns with our school’s/district’s vision for science education includes**:
Example: “To engage students and empower them to make science-based decisions in their life after formal schooling, they need to investigate and make sense of real-world phenomena at a deep level. In these instructional resources, students do that in the investigations noted on pages 30, 72, 112, and 152 of the reviewed resource. This type of student engagement appears to be a consistent element of these instructional resources.”

* **Additional comments/questions:**