Kentucky Department of

EDUCATION

Science Instructional Resources Consumer Guide

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Introduction

The Kentucky legislature charged the Kentucky Department of Education (KDE) with creating a consumer guide to aid in local selection of high-quality instructional resources (HQIRs) and to provide for public participation in the process (KRS 156.405). Because districts direct the process to evaluate and select instructional resources per KRS 160.345, within the Curriculum Development Process in the *Model Curriculum Framework*, the KDE has set out to:

- Communicate the definition of and rationale for HQIRs;
- Promote the use of standards-aligned HQIRs to support implementation of the locally developed curriculum; and
- Provide guidance and tools for evaluating, selecting and implementing standards-aligned HQIRs at the local level.

HQIRs are a means by which local curriculum aligned to the *Kentucky Academic Standards (KAS)* becomes an actionable foundation for improving the way students experience learning in the state of Kentucky, and selecting a primary HQIR enables districts and schools to make a marked shift toward equitable, vibrant learning experiences for all students. A local curriculum anchored in a HQIR supports the learning goals, outcomes and core competencies that students must demonstrate to reach the grade-level expectations within the *KAS*. It also provides teachers with an array of pedagogical supports to help meet the needs of all learners.

Current research recommends districts adopt and implement a primary HQIR as the print, nonprint or electronic medium designed to assist student learning and support implementation of a high-quality curriculum. The research shows:

- Aligned to state standards, a HQIR can reduce variability in the quality of instruction across classrooms (SREB, 2017), and students in classrooms that used one HQIR for four consecutive years outpaced comparison students by a margin of 38 percentile points — equivalent to four additional years of learning (Steiner, 2018).
- Teachers creating their own lessons rarely results in a fully sequenced, coherent learning experience over time and across systems (Steiner, 2018), and 75 percent of teacher created or selected resources are found to be below grade-level (TNTP, 2018).
- Teachers without access to HQIRs spend 7-12 hours per week searching for resources online (Goldberg, M. 2016).
- Switching from a low to a high-quality instructional resource can boost student achievement more than other, more popular interventions (Steiner, 2018).
- When students who started the year behind had greater access to grade-appropriate assignments, they closed the outcomes gap with their peers by more than seven months. (TNTP, 2018)

Students and teachers deserve access to high-quality instructional resources (HQIRs) designed to help students reach the grade-level expectations within the *KAS*. When teachers have access to HQIRs, it increases their pedagogical knowledge. Access to comprehensive HQIRs also enables teachers to adapt lessons to meet the diverse needs of students and to focus their time, energy and creativity on bringing lessons to life and engaging students with grade-level content.

Selecting instructional resources to support implementation of a locally developed curriculum is a key component of the Curriculum Development Process. Curriculum teams should use their instructional vision developed in Phase 2 of the Curriculum Development Process as their guide for identifying, evaluating and selecting HQIRs. The instructional vision for teaching and learning in each content area ensures decision-makers select resources that will serve local priorities and meet the needs of all learners.

The work of selecting instructional resources may be completed by the curriculum team, or the district may choose to form a sub-committee to undertake this task. If a sub-committee is charged with the evaluation and selection of HQIRs, members of the team must understand the instructional vision to ensure selected resources align to that vision. In addition, the sub-committee should receive ongoing support and collaboration with the curriculum team throughout the selection process.

Overall, this consumer guide is intended to help decision-makers at Kentucky districts and schools select high-quality science instructional resources that meet the unique needs of students, educators and families within their local communities. Specifically, the purpose of the guide is to provide:

- An overview of the characteristics and markers of high-quality science instructional resources, and
- The four key steps districts may utilize as they seek out resources, evaluate their effectiveness and ultimately select them for use in schools.

Characteristics of High-Quality Science Instructional Resources

An effective instructional vision for science must account for elements specific to the *KAS* and to a local context; it also must be equitable. To identify and be **aligned with** what is unique in the ***Kentucky Academic Standards*** *for Science*, and to equitably ensure **vibrant student learning experiences**, the content and considerations in this section should be used to crosscheck an instructional vision draft. This ensures selection criteria derived from an instructional vision account for all the components of the *KAS for Science* and can fully inform HQIR evaluation.

KDE's General Definition of High-Quality Instructional Resources

The KDE defines High-Quality Instructional Resources (HQIRs) as materials that are:

- Aligned with the *Kentucky Academic Standards (KAS)*;
- Research-based and/or externally validated;
- Comprehensive to include engaging texts (books, multimedia, etc.), tasks and assessments;
- Based on fostering vibrant student learning experiences;
- Culturally relevant, free from bias; and
- Accessible for all students.

KDE's Markers of High-Quality Science Instructional Resources

The markers for science listed below are interdependent and interrelated, and all must be represented within an instructional resource for it to be deemed high-quality. The markers for high-quality science resources include:

1. **Three-Dimensional Science**
   Instructional resources are designed for three-dimensional learning and assessment in a way that is consistent with the *KAS for Science.* From page 6 of the *KAS for Science,* students should be provided multiple opportunities to engage with the interconnectedness of the three dimensions of science as they work to make sense of the natural world.
   - Instructional resources are designed to integrate the Science and Engineering Practices (SEPs), Disciplinary Core Ideas (DCIs), and Crosscutting Concepts (CCCs) into student learning. High-Quality Instructional Resources provide:
     - Consistent opportunities for students to use and apply all of the grade-level standards, including each of the respective elements of each dimension,
     - Multiple and repeated use of the grade-level appropriate science and engineering practices and crosscutting concepts, across the varying domains and contexts (disciplinary core ideas), and
     - Consistent opportunities for students to use the three dimensions together in a coherent sequence for purposes of sensemaking.
   - Instructional resources are designed to elicit direct, observable evidence for three-dimensional learning.
     - Formative assessments are aligned to the objectives of the respective learning sequence/opportunity, and provide teacher guidance and supports to interpret student responses, diagnose opportunities for instructional support, and provide strategies for instructional support for students.

- Summative assessments are aligned to the objectives of the respective learning sequence/opportunity
- The collection of formative and/or summative assessments must consistently address the three dimensions
- Summative assessment system provides opportunities for students to transfer knowledge and skills through performance tasks that require students to figure out novel or related phenomena.

2. **Investigating Phenomena**
   Phenomena are events in the natural or designed world that can be explained or predicted using science knowledge and principles. From page 6 of the *KAS for Science,* all students at all grade levels must experience multiple sustained and authentic learning opportunities to investigate phenomena. Instructional resources leverage science phenomena and engineering problems in the context of driving learning and student performance with the three dimensions.

   - In instructional resources, phenomena are more than a hook to engage students' interest. They should contain the content and concepts from the standards being learned **and should be used throughout to drive instruction**. They are an answer to why are we learning "this?", as students develop their understanding of science concepts when they use the science and engineering practices to make sense of and figure out authentic phenomena.
   - Quality phenomena are:
     - Presented in a manner that provides a common entry point for students in the classroom; for students to be able to ask questions about and to start their sensemaking process,
     - Connected to a disciplinary core idea, ensuring grade-level appropriate focus for the learning sequence/opportunity,
     - Engaging and relevant, so that students can share their related experiences, interests and materials can support teacher use of that information to support student access and connection,
     - Complex and engaging, so that students can engage in development and use of the three dimensions of the standards over time as they iterate on their explanations and/or models of phenomena, making thinking visible and perhaps in multiple modes, and
     - Used in assessment as an opportunity for students to demonstrate their knowledge and skills with the three dimensions in a novel context.

3. **Defining and Solving Engineering Problems**
   Instructional resources should demonstrate the linkage between learning science and learning engineering. From page 8 of the *KAS for Science*, engineering design in the earliest grades introduces students to "problems" as situations that people want to change. They can use tools and materials to solve simple problems, use different representations to convey solutions, and compare different solutions to a problem and

determine which is best. In the *KAS*, Engineering Design reveals itself through a variety of structures: as Disciplinary Core Ideas (e.g., ETS1.A), but also through the Science and Engineering Practices (e.g., Constructing explanations and **designing solutions**) and Crosscutting Concepts. It exists within grade-level and grade-band standards and supports students in building and applying science knowledge as they identify, understand, and solve problems of the natural or designed world.

- In instructional resources, the standards with engineering connections (E.g., DCI-ETS1.A) should be present and used by students explicitly in grades where those standards arise.
- In instructional resources, the problems that students are set to solve should ensure that students have opportunities to:
    - Define problems that are related to focal core science ideas at their grade level,
    - Build and apply core science ideas required for the development of solutions to identified problems, and
    - Leverage other science and engineering practices and crosscutting concepts as they build an understanding of the problem and develop/test solutions.
- Engineering design problems should require students to develop and apply core scientific knowledge, limiting reliance on trial-and-error, tinkering, and similar design challenges to enhance the advancement of students' understanding and application of scientific knowledge.

4. **Science for All: Access to Standards for All Learners**

   Instructional resources must provide supports to help ensure equitable access across all student populations. This access is defined on page 3 of the *KAS for Science* as, equitable access to high-quality educational standards provides common expectations for all students and equips students with the strong science-based skills, including critical thinking and inquiry-based problem-solving, to be scientifically literate and succeed in college, careers, and citizenship. From page 8 of the *KAS for Science* the definition continues towards the outcome of the standards as, all students will possess sufficient understanding … to engage in public discussion … and be critically educated consumers of scientific information. The Kentucky Academic Standards for Science, written as performance expectations, imply that students will be active participants in the scientific and engineering process. The inclusion of the science and engineering practices offers rich opportunities and demands for language learning while they support science learning for all students.

   - High-Quality Instructional Resources ensure:
       - Grade-level expectations (student work and assessment) for all student populations,

- Scaffolds, differentiation, intervention, and support are provided across learner differences and student populations to support both teachers and students, and
- That their design attends to the progression and coherence of the KAS for Science, which are rooted in research, to ensure access to science content and skills for all students at the earliest grade(s) as necessary building blocks for access to future content and skills.

Equity Lenses for High-Quality Science Instructional Resources

Students deserve access to HQIRs that are engaging, accessible and inclusive of the cultural diversity and perspectives of their communities. The KDE is committed to providing guidance that supports the selection of resources that are **culturally relevant, free from bias, and accessible for all students** to further the KDE's diversity, equity, and inclusion efforts. Below are five equity lenses schools and districts may use during resource selection to help promote equitable learning environments for all students:

- Resources meet the high-quality instructional markers laid out in the KDE definition of High-Quality Instructional Resources.
- Resources recognize, celebrate and leverage students' cultures and identities and provide opportunities to broaden perspectives by learning about other cultures.
- Resources provide opportunities for students to lead learning that is meaningful and relevant to them, both in connection with their local context and communities and the broader global context of the world.
- Resources provide engagement with grade-level content and the *KAS* for all students.
- Resources allow students to engage and demonstrate learning in a variety of ways.

To support schools and districts in selecting equitable resources, a detailed table of the equity lenses provides guidance on what to look for in science resources. Throughout the Consumer Guide, there are connections to the lenses and suggestions for how to use them in each step of the selection process.

Remember, no one instructional resource will be perfect. Selection committees should use the KDE's definition of HQIRs, the science markers and the equity lenses to help evaluate the strengths and weaknesses of instructional resources to make the best decision about the resources selected. School and district leaders should use the analyses of those strengths and weaknesses to inform additional supports needed (such as high-quality professional learning, implementation supports and supplemental resource selection) for effective implementation of the locally developed curriculum and the selected HQIRs.

Identifying, Evaluating and Selecting High-Quality Science Instructional Resources

The process of identifying, evaluating and selecting high-quality instructional resources involves multiple steps to ensure decision-makers adopt resources that will serve local priorities and meet the needs of all learners. The remainder of this guide outlines four steps school and district resource committee teams may follow as they seek resources, evaluate their effectiveness and ultimately select them for use in schools.

Each subsection includes general guidance, key questions and recommended tools users may download and edit for use with their district review committees (e.g., guidance documents and data collection tools).

Step 1: Determine Selection Criteria

To help determine selection criteria, the committee should use their instructional vision that considers KDE's definition of HQIRs, the science markers and the equity lenses included in section two of this guide.

As with crafting an instructional vision, the curriculum team should again engage educators and stakeholders upfront in meaningful ways to capitalize on the knowledge and expertise they can bring to the decision-making process. Gathering input from educators and other stakeholders is an essential component of the selection process and should reflect the diverse voices of the school and/or district (including families, students, teachers, support staff and community members). Taking time to gather this input will help build support for and investment in the work and ensure the perspectives of those affected by the selection decision inform the process.

Key Questions

- **Stakeholder Inclusion:**
  - How will we communicate the importance of selecting a primary high-quality instructional resource (HQIR) to support development of the local curriculum?
  - How will we gather stakeholder input to help inform possible selection criteria?
    - What do we want to learn from each stakeholder group?
    - How are we going to get this input?
    - Who is responsible for gathering input?
    - When and how will we see the collected information? (Instruction Partners, 2019)
    - How will stakeholder input inform drafting of selection criteria?
- **Selection Criteria Considerations:**
  - How well do the selection criteria represent the most important aspects of the instructional vision?

        - Alignment to the Kentucky Academic Standards
        - Alignment to Current Research
        - Local Context
    - How are important local initiatives and pedagogical practices (e.g., portrait of a learner, project-based learning, cooperative learning, workshop model, standards-based grading) represented in the selection criteria?
    - Based on the instructional vision, what specific supports are needed in a resource to help teachers make the instructional shifts necessary to provide the desired student experience?
    - Has the instructional resources consumer guide been used to cross-check the instructional vision and selection criteria?
        - HQIR Markers for the Content Area
        - Equity Lenses for the Content Area

Key Tools

- Developing Selection Criteria
- Data Collection Tool
- Sample Stakeholder Questions for Science
- Equity Lenses for Science

Step 2: Identify Potential Primary HQIRs

Once the team has determined the selection criteria, the next step is to identify **research-based and/or externally validated** resources for review. Educators have more options than ever from which to find instructional resources to try to meet their local priorities; however, in such a crowded marketplace, finding high-quality instructional resources that are aligned to the *Kentucky Academic Standards for Science* and meet specific school and district needs can be difficult.

EdReports is a recommended starting point for school and district review teams to research available resources. It provides free reviews of K-12 instructional resources and offers comprehensive information about indicators of quality from a variety of publishers. Contacting other districts or schools to gather anecdotal information can also help ground findings in a Kentucky context.

After identifying primary HQIRs of interest, the team is ready to narrow the choices down to those that have the potential to meet the instructional vision and the needs of the teachers and students in the district. The narrowing process allows the committee to not only learn about potential resources through research but also to compare characteristics of resources to determine how well they can serve the selection criteria.

Key Questions

- Based on EdReports reviews, which resources for this content area are rated green according to indicators for their three gateways?
- Of the green-rated resources, which 2-3 do we want to further evaluate using our selection criteria?

Key Tools

- EdReports Reports Center
- How to Read an EdReports Review
- EdReports Compare Tool and Compare Tool Overview
- Video Tutorial: Navigating EdReports to Identify Potential HQIRs
- Considerations for Adopting Science HQIRs in the Current Market

Step 3: Evaluate Potential Primary HQIRs

Once EdReports has been used to identify two to four potential resources, the district should establish a process for examining each of the resources being considered to determine the best option for meeting the local selection criteria. As a part of the process, the team will need to create an organizer around their selection criteria to capture evaluation notes.

Because HQIRs are **comprehensive** and include a range of **texts, tasks and assessments**, teams should also engage publishers to request samples and set up presentations. The time spent with publishers can be used to have them answer questions the committee has developed that specifically align to the instructional vision and the identified selection criteria.

Key Questions

- **Review Considerations:**
  - How will the team collect evaluation notes and final ratings? What format for an organizer might work best (for evaluation organizer examples, please see Key Tools).
  - What is the timeline team members will have to conduct the reviews?
  - Who will set up meetings with vendors and what questions will guide those conversations (Sample HQIR Vendor Questions in Key Tools below)?
  - What materials/resources will reviewers need access to and how will they get access?
- **Stakeholder Inclusion:**
  - How will stakeholders be provided opportunities to review and give input on the 2-3 potential high-quality instructional resources under consideration?

Key Tools

- Science Instructional Resources Alignment Rubric (Used when needing to evaluate a potential primary resource not evaluated by EdReports.)
- Considerations for Adopting Science HQIRs in the Current Market
- Sample HQIR Vendor Questions for Science
- Sample Evaluation Organizers

Step 4: Select Primary HQIR

The evidence gathered from the evaluation process is used to inform the review committee as they make a final selection. Resource review committees should examine the evidence collected from the evaluation activities in light of the identified selection criteria. **Ultimately, no one primary instructional resource is likely to provide the full supports necessary to reach the grade-level expectations within the *KAS for Science*, the local articulated vision and the identified selection criteria.** Therefore, districts may select a primary HQIR but then determine there is a need to purchase supplemental resources to fill identified gaps. The Science Instructional Resources Alignment Rubric and the Kentucky Digital Learning Guidelines can help inform selection of potential supplemental resources.

Once made, the decision and next steps should be shared with all stakeholders. Finally, a plan should be established for the procurement and distribution of the resources to get them into teachers' hands and for the committee to use as they move into developing the curriculum documents.

Key Questions

- **Selection Considerations:**
  - What are the comparative strengths and weaknesses of identified HQIR options (selection criteria, alignment to stakeholder feedback, initial and recurring costs, vendor supports, etc.)?
  - What work will need to be engaged to implement each option, and what are potential implications of the choices on other initiatives and on staff capacity?
  - For any identified gaps (e.g., with the *KAS*, the equity lenses, local initiatives) in the selected primary HQIR, what additional resources/supports will teachers need to ensure students experience the content in a way that fulfills the instructional vision?
- **Stakeholder Inclusion:**
  - How will a rationale for the selected primary HQIR be communicated to stakeholders?
- **Logistical Considerations**
  - Where will we store the materials before distribution can occur?
  - How will we inventory materials once they arrive?

- How will we inventory and track materials once they are distributed to schools?
- Where and how will the school and/or district distribute the resources (Instruction Partners, 2019)?

Key Tools

- Decision-Making Options
- Sample Consensus Protocol

References

EdReports. (2021). *Selecting for quality: 6 key adoption steps.* Retrieved from https://www.edreports.org/resources/adoption-steps

Goldberg, M. (2016). *Classroom Trends: Teachers as Buyers of Instructional Materials and Users of Technology*. Retrieved from https://mdreducation.com/wp-content/uploads/2020/12/StateofK12Market2016_ClassroomTrends.pdf

Instruction Partners. (2019). *Curriculum Support Guide*. Retrieved from https://curriculumsupport.org/

Kentucky Department of Education. (2019). *The Kentucky Academic Standards for Science*. Retrieved from: https://education.ky.gov/curriculum/standards/kyacadstand/Documents/Kentucky_Academic_Standards_for_Science_2022.pdf

Kentucky Department of Education. (unknown). "High Quality Instructional Resources." Retrieved from: https://education.ky.gov/curriculum/standards/kyacadstand/Documents/High-Quality_Instructional_Resources.pdf.

SREB. (2017). *Alignment of instructional materials: Trends in state efforts.* Southern Regional Education Board. Retrieved from https://insights.sreb.org/reports/instructionalmaterials.pdf

Steiner, D., Magee, J., & Jensen, B. (with Button, J.). (2018). *What we teach matters: How quality curriculum improves student outcomes.* Learning First. http://learningfirst.com/wp-content/uploads/2020/07/1.-What-we-teach-matters.pdf

TNTP. (2018). *The opportunity myth: What students can show us about how school is letting them down—and how to fix it*. TNTP. Retrieved from Science Consumer Guidehttps://tntp.org/publications/view/student-experiences/the-opportunity-myth