Kentucky Science Assessment System

A balanced assessment system is a set of interacting and complementary assessment components focused on serving the various needs of different users of assessment information for the common purpose of improving both teaching and learning.

The following pages describe the current thinking about a comprehensive science assessment system that seeks a variety of types of evidence of student learning to best understand and support student learning from K through grade 12. The system is based on Kentucky educator ideas, comments, and feedback, The National Academies of Sciences, Engineering and Medicine's Board on Testing and Asessment's (BOTA) seminal report: *Developing Assessments for Next Generation Science Standards*, the National Research Councils' *A Framework for K-12 Science*, as well as 'thinking partner' ideas contributed by WestEd.

Commissioner Pruitt has formed a number of work groups to help design a new statewide accountability system as he leads the Kentucky Department of Education in the implementation of the new Every Student Succeeds Act (ESSA) requirements. It is possible that changes to how the science assessment system fits into the new accountability system will occur as additional thoughts and ideas are surfaced and as Commissioner Pruitt and the Kentucky Board of Education approve the new accountability system.

One thing, however, will not change—and that is the focus on the day to day interactions of students and teachers, in each grade preK-12, around the 3 dimensions of the Kentucky Academic Standards for Science. As Commissioner Pruitt stated in his blog on November 20, 2015, "If our goal is to ensure that **every** student has the opportunity to choose his or her own direction after high school, we must provide them with all the opportunities we can including the arts, career-technical education, **science** and social studies, just to name a few….All shareholders in Kentucky have a moral obligation to develop a system that represents a quality education for **all** students."

Component	Purpose	Users	Uses	Challenges/Limitations	Implementation Requirements/ Administration
CEA (Classroom Embedded Assessment) (Supporting <u>both</u> teaching and learning) Design Features: varies; *any means (process/form) of gathering evidence of student learning <u>in order to</u> make adjustments to both teaching and learning strategies	Ongoing process to provide opportunities for seeking and interpreting evidence of 3-dimensional science learning for use by learners and their teachers to decide where the learners are in their learning, where they need to go and how best to get there [*it is not necessarily a 'thing' (i.e., a test) but rather a *<u>process</u>* used by both teachers AND students of gathering information, analyzing the information, and using it to move teaching and learning forward] *Practice in a classroom is formative to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers, <u>to make decisions</u> about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have taken in the absence of the evidence that was elicited. (Wiliam, 2009)*	Teachers Students Parents	Day to day decisions regarding 'next best steps' for instruction and adjusting learning experiences to close the performance gap with useful feedback that supports each student Real time information/feedback for students (and teachers) to let them know how they are doing against a defined target and how to continue to advance ('next best steps' for learning/studying) Meaningful and descriptive information for parents to understand what is expected of their child and what specifically the child has accomplished and any additional support needed	Educator capacity for: ● understanding of assessment literacy – especially the capacity to engage in the process of formatively assessing student learning by 1. Clarifying, sharing, and understanding learning intentions and criteria for success; 2. Engineering effective classroom discussions, activities, and learning tasks that elicit evidence of learning; 3. Providing feedback that moves learning forward; 4. Activating learners as instructional resources for one another; 5. Activating learners as owners of their own learning. (*Black and Wiliam, Inside the Black Box, 1998, 2010*) ● defining a continuum of learning ● determining dependable evidence ● developing and effectively utilizing tools to gain defensible and dependable evidence of student learning ● recognizing the concept/purpose of CEAs as not just THINGS but PRACTICES/PROCESSES and the decisions/inferences that can/should be made Administrator capacity for: • acknowledging and reinforcing the fundamental value of CEAs as not just THINGS but a PROCESS manifested in practice—for every grade K-12 • resolving the need for teachers to collaborate to make sense of student work/adjust their day to day practice in response to student work	**All grades – K-12 - continuously throughout each academic year**

Component	Purpose	Users	Uses	Challenges/Limitations	Implementation Requirements/ Administration
TCT (Through-Course Task) (Supporting <u>both</u> learning and teaching) Design Features: tasks of varying structures and length focused primarily on revealing student competencies around Science & Engineering Practices (SEPs) and Cross-Cutting Concepts (CCCs) – untethered from the Performance Expectations (PEs)	Provide an opportunity for teacher teams to deepen their understanding of 3 dimensional learning and teaching by engaging in a <u>*collaborative process*</u> to plan for task use, facilitate the task with students, and calibrate understanding of student performance Provide a snapshot of student learning/thinking/application of the 3 dimensions of the standards that can be calibrated against expected competency levels of same age/grade students Enable collection of student work in order to illustrate by example various levels of student performance based on identified success criteria Provide examples of grade level appropriate 3 dimensional tasks and success criteria that facilitate effective learning and teaching for each grade level Identify quality areas of implementation and areas needing further support (for professional learning supports only)	Teachers Students Parents Schools Teachers State	Calibrate expectations for student attainment of the 3 dimensions of standards, as well as the ability to integrate the 3 dimensions Identify the supports each student needs to progress in their learning Elicit evidence to support ongoing formative processes in the classroom Inform effective instructional/assessment designs for use in classrooms/curriculum design Create a set of student work samples that enable teachers to clearly identify expected levels of attainment for students at every grade level Utilize tasks and student work within professional learning experiences (i.e., student work protocols, lesson study, etc.) to enhance teachers' capacity for facilitating 3 dimensional learning and teaching	KDE/educator capacity to: • understand the continuum of student conceptual development in science (all 3 dimensions) throughout the course of a school year and over the course of the grade band(s). • develop strong 3 dimensional tasks • facilitate work with vendor and/or practitioners to provide appropriate scoring criteria/resources to place students on a continuum of attainment of the targeted skills and concepts • facilitate the development of scoring resources that clearly articulate task specific expectations for teachers <u>and students</u> to score work and to identify next steps for learning and teaching • support curation/design of new tasks by Kentucky teachers • convene teacher calibration teams and sessions KDE/School/District capacity to: • communicate clearly and effectively to all parents, community members, other shareholders the components of the system	**Every grade K-high school**

Component	Purpose	Users	Uses	Challenges/Limitations	Implementation Requirements/ Administration
SSA (Statewide Summative Assessment) (Accountability) Design Features: clusters of items based on a phenomena/ stimulus; gr 4 based on K-4 standards; gr 7 based on 5-7 standards; HS based on gr 8 – HS standards; varied item types; some clusters will be common, others matrixed; estimation of 20-30 minutes per cluster	Provide a sampling of a school's science program level of achievement (based on Kentucky's Academic Standards-KAS-for Science) and identify percentage of students meeting expected levels of attainment particularly as they explain phenomena, use models, and solve problems using practices, core ideas, and crosscutting concepts Identify level of science achievement Sample expected student science competencies (based on KAS for Science) to identify the level of achievement attained	Schools Districts Community members State Parents Teachers Students Schools Districts	Determine program effectiveness; revise/refine curriculum; identify priorities for improvement/professional learning/growth; communicate the status of the school's program to community members Assign accountability ratings Identify their child's/student(s)' level of achievement/proficiency against the expected standards; identify needed supports for individuals or groups of students as they consider expectations for the next year's teaching and learning	Single Statewide Summative Assessment's capacity to: • Sample standards vs complete 'coverage' (due to time constraints) • Ensure fidelity of results for individual students as well as the system based on intended purpose KDE/Educator capacity to: • Communicate the purpose for which the summative assessment is designed and the appropriate (vs inappropriate) uses of the resulting information KDE/Educator/Vendor capacity to: • Facilitate the development of rich 3-dimensional clusters of items • Provide expertise and work within budget constraints	**Once per year Grades 4, 7 and HS**

Talking Points

The Kentucky Science Assessment System is a 'system' because first and foremost the emphasis must be on instruction at every classroom level, K-12, i.e., teaching and learning.

The entire Kentucky Science Assessment System is built around and applied within the context of clear, defined learning expectations based on Kentucky's Academic Standards for Science.

A deliberate effort has been made to include assessments for classroom use for every grade level, preK-12, in order for teachers and schools to better understand and support student learning progress continuously over time and evolve teacher growth and effectiveness.

In this system, it is important to realize that the components are less about defining 'tests' or 'item types' and more about the substance of information elicited from students. There are only so many ways to ask questions and design tasks. Items and tasks utilized in each component of the system may not look substantially different from traditional or past learning experiences/assessments on the surface, but the expectations for how students approach them and respond will be reflective of the three dimensions of the standards.

Throughout the system, careful consideration must be given to what inferences and claims about student science achievement can be made from the responses that students generate.

The system does include a summative assessment component, per ESSA requirements, at grades 4, 7 and HS*.
*KDE is evaluating the assessment plan for high school as a new accountability system is designed.

Classroom Embedded Assessments (CEAs) support both *teaching and learning*** and are for classroom/school use only (note: *KDE may invite submissions of student work for research purposes only*). Teachers and principals gain information about learners' strengths and needs so that they can revise next teaching/instructional steps. Students use the information to gain a clearer picture of expectations and utilize feedback to help them reach the expectations.

**Teaching precedes learning in this component as CEAs are intended to be an integral part of TEACHING that is designed intentionally to elicit evidence of particular learning targets/objectives in order to move learning forward.

It will be important that educators avoid 'lethal mutations' (i.e., significant misunderstanding/misrepresentation of the concept/purpose of CEAs as not just THINGS but PRACTICES/PROCESSES and the decisions/inferences that can/should be made) or the power of the CEAs to impact teaching and learning at every level, preK-12, may not be realized.

Kentucky's definition of formative assessment (SB 1, 2009) is: a process used by teachers and students during instruction to adjust ongoing teaching and learning to improve students' achievement of intended instructional outcomes. This process is manifested in instructional practices that both teachers and students engage in routinely.

Beware of products labeled or marketed as 'formative.' No task or test or item is inherently formative (or summative for that matter). It is the way it is USED – the process – that determines the appropriate label.

The Through Course Tasks (TCTs) are intended to provide rich experiences for students to demonstrate science skills and concepts – focusing on *learning and teaching**** - yielding information for classroom use. Success criteria are designed to:

1. Promote calibration of expectations across classrooms/schools throughout the state; and
2. Clearly articulate task specific expectations so that resulting information can be used by both students and teachers via formative processes.

***Learning precedes teaching in this component as TCTs are intended as a 'check' of student LEARNING and their ability to transfer the use of practices, core ideas, and crosscutting concepts to new phenomena. Student responses to these tasks inform teaching by enabling teachers to 'check' their own expectations of the students' ability to transfer and communicate effectively their learning by using common success criteria. Teachers may find they are not holding the same high expectations for students that the standards call for and then can adjust their teaching to address that issue.

Statewide Summative Assessment results will be most useful in reviewing each school's science curricula, courses, and programs.