Personalized, Competency-Based Education

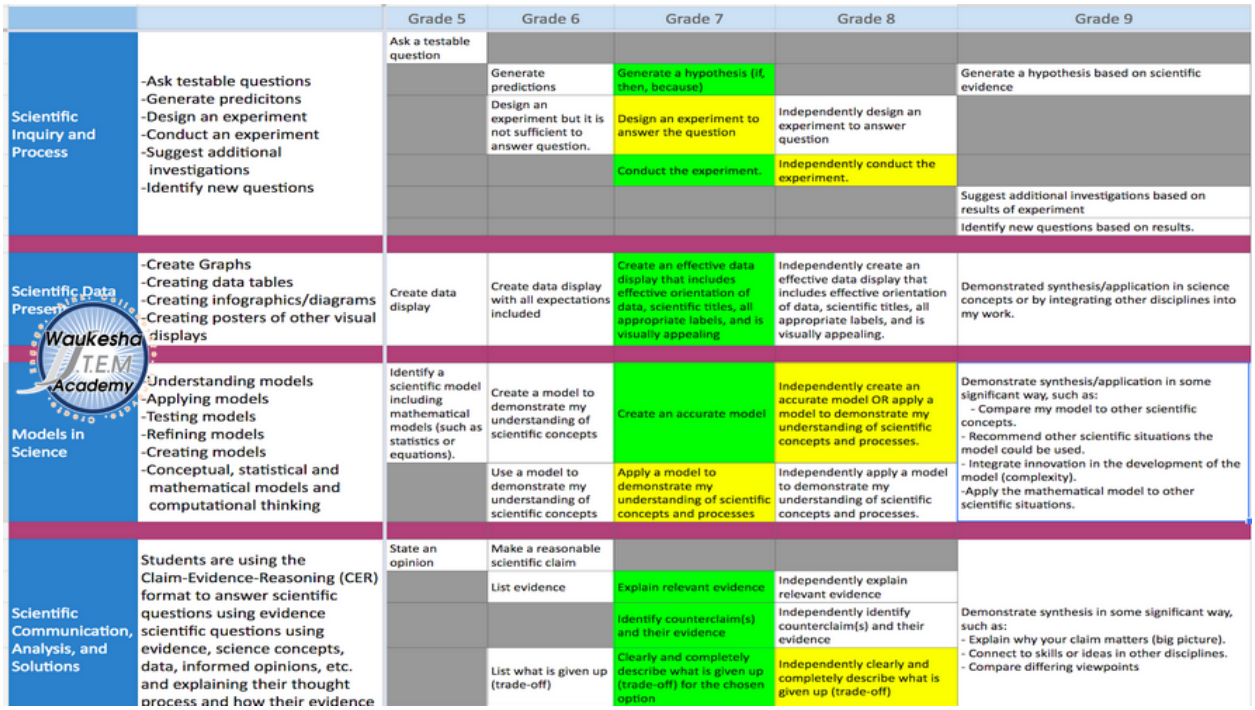
Case Study #2: Waukesha STEM Academy

Based on articles originally published at CompetencyWorks

The STEM Academy theory of action is IF students have a more accurate, timely, and precise understanding of their current level of proficiency and how to continually grow their level of individual learner needs, strengths, interests, and approaches to learning…THEN we will see an increase in student agency, efficacy, and engagement as well as an increased understanding and ownership of reporting, evidence, and feedback by students, parents, and WSA staff. At the Academy, the focus is on a sense of efficacy, ownership, agency, and independence – not just offering choice.

Applied learning opportunities are considered more engaging to students and provide more challenging learning opportunities for students to engage productively with the content knowledge and skills. On the Academy website, they explain the value of application by the following: Students are not just becoming masters of content, but rather experts in context, who not only solve real-world problems, but can come up with solutions that are unique and ground-breaking. These young lead-learners may serve as change-agents to help make our world a more efficient, productive, and safe place to live… we are growing citizens who are leaders. The focus is on five higher order skills: Engage, Collaborate, Think, Create, and Innovate.

The learner continuum (above), the backbone of the Academy's competency-based system, begins with making learning visible. It outlines the learning competencies that guide students as they move through their learning journey, with students aiming for grade level (or performance levels) based on their own readiness. However, the grade level they're working on may not be, and often is not, the respective grade level they would be in based on their age. For example, in math, the continuum is organized around number systems, geometry, and expressions. The specific competencies are then organized within each of the performance levels, and students move along the progression as they repeatedly demonstrate mastery.



		Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
Scientific Inquiry and Process	-Ask testable questions -Generate predicitons -Design an experiment -Conduct an experiment -Suggest additional investigations -Identify new questions	Ask a testable question				
			Generate predictions	Generate a hypothesis (if, then, because)		Generate a hypothesis based on scientific evidence
			Design an experiment but it is not sufficient to answer question.	Design an experiment to answer the question	Independently design an experiment to answer question	
				Conduct the experiment.	Independently conduct the experiment.	
						Suggest additional investigations based on results of experiment
						Identify new questions based on results.
Scientific Data Presentation	-Create Graphs -Creating data tables -Creating infographics/diagrams -Creating posters of other visual displays	Create data display	Create data display with all expectations included	Create an effective data display that includes effective orientation of data, scientific titles, all appropriate labels, and is visually appealing	Independently create an effective data display that includes effective orientation of data, scientific titles, all appropriate labels, and is visually appealing.	Demonstrated synthesis/application in science concepts or by integrating other disciplines into my work.
Models in Science	-Understanding models -Applying models -Testing models -Refining models -Creating models -Conceptual, statistical and mathematical models and computational thinking	Identify a scientific model including mathematical models (such as statistics or equations).	Create a model to demonstrate my understanding of scientific concepts	Create an accurate model	Independently create an accurate model OR apply a model to demonstrate my understanding of scientific concepts and processes.	Demonstrate synthesis/application in some significant way, such as: - Compare my model to other scientific concepts. - Recommend other scientific situations the model could be used. - Integrate innovation in the development of the model (complexity). -Apply the mathematical model to other scientific situations.
			Use a model to demonstrate my understanding of scientific concepts	Apply a model to demonstrate my understanding of scientific concepts and processes	Independently apply a model to demonstrate my understanding of scientific concepts and processes.	
Scientific Communication, Analysis, and Solutions	Students are using the Claim-Evidence-Reasoning (CER) format to answer scientific questions using evidence scientific questions using evidence, science concepts, data, informed opinions, etc. and explaining their thought process and how their evidence	State an opinion	Make a reasonable scientific claim			
			List evidence	Explain relevant evidence	Independently explain relevant evidence	
				Identify counterclaim(s) and their evidence	Independently identify counterclaim(s) and their evidence	Demonstrate synthesis in some significant way, such as: - Explain why your claim matters (big picture). - Connect to skills or ideas in other disciplines. - Compare differing viewpoints
			List what is given up (trade-off)	Clearly and completely describe what is given up (trade-off) for the chosen option	Independently clearly and completely describe what is given up (trade-off)	

Competency-based pathways enable "students to enter at different places in their educational pathway and move at different paces based on their respective readiness-level." The Academy is designed to meet students at their readiness level. Principal James Murray explains, "On paper, this campus is grades six through eight. That's about where that antiquated theory ends, though. Students enter our school with skills that stretch from second grade and extend beyond tenth, eleventh, and twelfth grade. Basically, we've eliminated grades based on your age… there is no born-on date for progress and success. We help students own the fact that when they arrive here, they are on a 540-day journey, with each student entering at a different place and moving at a different pace." An information system tracks student academic progress and skill proficiencies based on demonstration of mastery in real time and are shared with staff, students, and parents.

The shared pedagogical philosophy at the Academy begins with making learning visible. This starts with an agreed-upon workflow process that has students able to access 'playlists' or the resources they need for the unit or progression of skills, followed by students planning for and engaging in learning. The next stages are skill building and practice tasks and experiences with formative feedback, which are then followed by summative work where students submit artifacts that demonstrate their proficiency for a specific level of skill. Finally, the learner continuum is used to monitor and share student progress to help support a competency-based learning system. And the cycle begins again.

The specific instructional strategies vary based on a combination of student needs and the teacher's professional judgment about what will be the most effective delivery and modality for students. There are different instructional modalities, including direct instruction,

complementary and adaptive educational software, Socratic seminars, problem-based learning, and project-based learning. There is an emphasis on students applying their learning through the design process, creating things, capstones projects, and project-based learning.

Support to teachers starts with time for planning. Given the high degree of interdependence of math skills, with students needing to access prerequisite concepts and processes, the math team has 80 minutes [together] every day for planning and strategizing to provide support to all students. “When we sat back and reflected on our schedule for about the hundredth time in Year 3,” Murray says, “we recognized that we truly needed to be responsive to our teachers’ needs and not just our students’, or burnout was sure to follow. Similar to how a teacher would ask a student how they learn best, I asked our staff how they would work best, and they gave some amazing feedback and a vision. This vision blended with our students’ needs and brought upon our new daily and weekly framework, which is quite fluid to support the needs of all learners in the school.” Feedback was then gathered from students, staff, and parents to continue to grow the best possible framework for optimal learning and teaching conditions.

Facilities and resources are organized around active learning. The rooms have been designed to have flexible, open space carved into smaller areas by bookshelves, desks, a variety of seating options, and temporary doors. There are several rooms set up for projects. There are one-to-one devices, 3D printers, laser engravers, CNC routers, saws, drills, digital learning platforms, and several 55” TVs.