



STEAM GLOSSARY

In December 2017, Governor Jim Justice issued a proclamation instructing the West Virginia Department of Education (WVDE) to establish the West Virginia Advisory Council for a Comprehensive Approach to STEM Education. The Advisory Council's purpose is to ensure STEM work across the state is coordinated, connected, and inclusive. In February 2018, WVDE convened a joint meeting of the Advisory Council workgroups to build a shared understanding of the vision, mission, and goals; refine workgroup activities and outputs; and develop work plans to achieve goals. In May 2019, the Advisory Council workgroups completed their work, and submitted a report to WVDE detailing recommendations to promote STEM in West Virginia. This STEAM Glossary was developed by the Advisory Council to clarify common language around STEM in WV.

A

Asynchronous Learning – A general term used to describe forms of education, instruction, and learning that do not occur in the same place or at the same time. The term is most commonly applied to various forms of digital and online learning in which students learn from instruction—such as prerecorded video lessons or game-based learning tasks that students complete on their own—that is not being delivered in person or in real time. Yet asynchronous learning may also encompass a wide variety of instructional interactions, including email exchanges between teachers, online discussion boards, and course-management systems that organize instructional materials and correspondence, among many other possible variations.

It should be noted that the term asynchronous learning is typically applied to teacher-student or peer-to-peer learning interactions that are happening in different locations or at different times, rather than to online learning experiences that do not involve an instructor, colleague, or peer. For example, the popular language-learning software Rosetta Stone is often purchased and used by individuals who want to acquire new language skills, but it is also increasingly used by world-language teachers in schools. When teachers use the software as an instructional tool to enhance language acquisition or diagnose learning weaknesses, this process would typically be considered a form of asynchronous learning. If someone uses the software on their own—i.e., without additional instruction or support from a teacher, and not as an extension of a formal course—it would likely not be considered asynchronous learning.



B

Blended Learning – A combination of different modes of learning. Blended learning is often used to refer specifically to combination courses that use both in-classroom and online distance learning techniques.

C

Coaching – The act of teaching and directing through advice and encouragement. A coach is most traditionally recognized in areas of sports, but motivational and inspirational coaches emerged during the 20th century.

Coding – Coding refers to creating computer programming code. In a more general sense, the word coding is used to refer to assigning a code or classification to something.

Collaboration – The ability to work effectively with diverse teams; be helpful and make necessary compromises to accomplish a common goal.

Collaborative Learning – A term covering many different approaches to education, all of which use joint effort between groups of students, or students and their instructors. Related to cooperative learning, collaborative learning can include group projects and collaborative writing, among other tasks.

Complex Question – An open-ended question that promotes higher-order thinking skills and requires students to synthesize information from multiple sources.

Computational Thinking – A problem solving process that includes (but is not limited to) the following characteristics:

- » formulating problems in a way that enables us to use a computer and other tools to help solve them;
- » logically organizing and analyzing data;
- » representing data through abstractions such as models and simulations.
- » automating solutions through algorithmic thinking;
- » identifying, analyzing, and implementing possible solutions with the goal of achieving the most efficient combination of steps and resources; and
- » generalizing and transferring this problem-solving process to a wide variety of problems.

Computer Science – Computer science is the study of both computer hardware and software design. It encompasses both the study of theoretical algorithms and the practical problems involved in implementing them through computer hardware and software. The study of computer science has many branches, including artificial intelligence, software engineering, programming, and computer graphics. The need for computer science as a discipline has grown as computers become more integrated into our day-to-day lives and technology continues to advance.



Computer Literacy – The terminology and range of skills required to successfully use computers and other devices associated with computers.

Cooperative Learning – A switch from more traditional, curriculum-focused methods of education. Cooperative learning environments support students learning, both as self and within the group.

Creative Thinking or Ideas – The ability or power used to produce original thoughts and ideas based upon reasoning and judgement.

Critical Thinking – The ability to acquire information, analyze and evaluate it, and reach a conclusion or answer by using logic and reasoning skills.

D

Design Thinking – is a process for creative problem solving, with a human-centered core. This ideology encourages users to focus on the people they are creating a solution for, which leads to better products, services, and processes. Design thinking encourages users to pull together what's desirable from a human standpoint with what is economically viable and technologically feasible.

Differentiated Instruction – Differentiated instruction is a teacher's response to learners' needs including respectful tasks, flexible grouping and ongoing assessment. Teachers can differentiate content, process or product based on students' readiness, interests and learning profiles. A process of designing lesson plans that meets the needs of the range of learners; such planning includes learning objectives, grouping practices, teaching methods, varied assignments and varied materials chosen based on student skill levels and learning preferences. Differentiated instruction focuses on instructional strategies, instructional groupings and use of an array of materials.

Digital Citizen – A person who uses technology and the Internet effectively and responsibly.

Digital Etiquette – The conventional rules or personal behaviors pertaining to courteous online practices.

Digital Literacy – the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skill.

Divergent Thinking – Thinking that moves in diverging directions so as to involve a variety of aspects and which sometime leads to novel ideas and solutions.



E

Education Reform – A movement or plan that brings or attempts to bring an entire change of the system of educational theory and practice across society or community lines.

Educational Technology – Using multimedia technologies or audiovisual aids as a tool to enhance the teaching and learning process.

E-learning – Computer and communications technology facilitated to enhance learning. E-learning can be utilized through home computers, software, television, and mobile technology such as tablets and smart phones. Communications technology uses email, internet access, online discussion forums and team learning systems for students and teachers to communicate.

Electronic Portfolio – Primarily known as a digital or e-portfolio, an electronic portfolio is a portfolio found on electronic media and services in an educational context. It is a record of personal information, primarily including proof of knowledge and capability.

Engagement – How a student does or does not feel toward learning and his or her learning environment.

Evidence – Facts, figures, details, quotations or other sources of data and information that provide support for claims or an analysis that can be evaluated by others; should appear in a form and be derived from a source widely accepted as appropriate to a particular discipline, as in details or quotations from a text in the study of literature and experimental results in the study of science.

Experiential Education – Better known as learning by doing or hands-on learning, experiential education is the process of engaging students actively in an experience with benefits and consequences in an authentic manner. Students discover and experiment in a hands-on environment, allowing them to gather the knowledge personally rather than simply through hearing or reading the experiences of others. Experiential education allows students to develop new attitudes and skills by reflecting on their experiences afterward, which can facilitate new theories and ways of thinking about problems. The process of experiential education highly relates to constructivist learning theory.

H

Higher Order Thinking Skills – Higher order thinking skills include critical, logical, reflective, metacognitive, and creative thinking. They are activated when individuals encounter unfamiliar problems, uncertainties, questions, or dilemmas.



Individualized Instruction – The instructional method where instructional materials, media, content and learning pace are solely based on the individual learner’s interests and abilities.

Innovation – An improvement of existing technological product, system, or method of doing something.

Inquiry Education – Also known as inquiry method, inquiry education is centered on students. It is a method of education that is focused on asking questions: students that have meaningful questions are encouraged to ask them, especially if they do not have an easy answer. During the questioning time, teachers are encouraged to stay as silent as possible, facilitating more questions rather than giving answers.

Instructional Design – Also referred to as instructional systems design, instructional design is an analytic process of developing instruction and analyzing learning needs. Designers frequently use instructional technology to develop instruction. Design models usually require a specific method that, when followed, transfer skills, attitude, and knowledge to students.

Instructional Leadership – The behaviors and actions of individuals or groups within the educational field, characterized by skill and knowledge in curriculum and instructional methodology. This includes resources to meet a school’s mission, one-on-one communication, communication in both small and large groups, and an established clear, articulated vision for the institution.

Instructional Technology – Created as a response to labor shortage problems in the United States during WWII. The need of skilled labor workers to fill factories was a definite need, and instructional technology created a manner of training workers efficiently.

Integrated Curriculum – Content and activities are presented in an interdisciplinary approach connecting STEM subjects together for the benefit of modeling for the teachers how STEM teaching and learning is different from the traditional areas of science, technology engineering and mathematics. Furthermore the activities will be models of those which can be transferred into the classroom and are grade appropriate for the target audience.

Integrated Learning – The theory that describes movement to integration of lessons that will assist students in cross-curricula connections. It is a concept in higher education and is different from the “integrated curriculum” movement in elementary and secondary schools.



L

Lesson Seed – Ideas that can be used to build a lesson. They are designed to generate evidence of student understanding and to give teachers ideas for developing their own activities. Lesson seeds are not meant to be all-inclusive, nor are they substitutes for instruction.

Lifelong Learning – A philosophy that is summed by the concept believing that it is “never too soon or too late for learning.” The concept seeks to provide people with opportunities for learning throughout life and in various contexts, whether it be in school, at work, or through recreational activity.

Lifelong Education – Pedagogical form frequently attained through e-learning, continuing education, and correspondence courses. It can also include postgraduate programs for improving skill sets and work retraining. It shares similar goals with internal training at corporations.

M

Makerspace – An area in a school or community where a maker mentality is encouraged. This could be a stand-alone classroom, or it could be a small space integrated into a general classroom. Makerspaces are stocked with tools needed for maker’s projects, which can include 3-D printers, shop tools such as a band saw, or low-tech supplies like glue and cardboard.

Mastery Learning – The instructional method that holds the presumption all children are capable of learning, provided they have the appropriate conditions. It is a method in which students that have not advanced to a particular objective will stay in place until they can demonstrate the proficiency to move on.

Mentoring – The transmission of knowledge in a subject area by a more experienced person to an individual who has less experience, through the enabling of a more comprehensive understanding of the subject content, and by providing guidance and support.

Metacognition – Is defined as “cognition about cognition,” or “knowing about knowing.” It can take many forms; it includes knowledge about when and how to use particular strategies for learning or for problem solving.

Model – A detailed visual, mathematical, or three-dimensional representation in detail of an object or design, often smaller than the original. A model is often used to test ideas, make changes to a design, and to learn more about what would happen to a similar, real object.



O

Outdoor Education (aka adventure education) – Commonly refers to organized learning experiences that occur outdoors, often involving residential or journey-based experiences where students can participate in different challenges including group games, hiking, and canoeing. Outdoor education uses the theories and philosophies put forth in experiential education.

P

Pedagogy – The art and science of teaching, from the Greek paidagogos. The Latin for pedagogy is education, and is much more widely used, though they are interchangeable.

Primary Source – An original or direct source of information characterized as informational text.

Problem Finding – Discovery of problems. Part of the process that also includes problem shaping and solving. Requires insight and intellectual vision, involving creativity application, into finding the missing piece.

Problem Shaping – Revisiting and revising questions to begin or continue the process of finding a solution. Part of a larger process including problem finding and solving. Often involves critical thinking applications.

Problem Solving – A part of thinking, problem solving happens when a system cannot proceed from one state to its desired goal. Part of the process that includes problem finding and shaping.

Problem-Based Learning (PBL) – A concept of active learning, currently being adapted for primary through secondary education. Defining characteristics of PBL include being driven by open-ended problems, collaborative working in small groups, and the use of facilitators rather than teachers.

Procedural Knowledge (aka know-how) – The direct knowledge of how to perform a task. This differs from other forms of knowledge as it can apply to a task directly, rather than propositional knowledge in problem solving.

Process-Oriented Experiences – Activities in which students participate that require thinking, communicating, organizing, interacting, making decisions and solving problems, individually and in groups.

Product – A tangible artifact produced by means of either human or mechanical work, or by biological or chemical processes.

Professional Learning Communities (PLC) – A collegial group of educators who are united in their commitment to student learning. They share a vision, work and learn collaboratively and visit and review other classrooms.



Project Manager – A person who plans and organizes the resources necessary to complete a project.

Prototype – A full-scale working model used to test a design concept by making actual observations and necessary adjustments.

Portfolio – A collection of various samples of a student's work throughout the school year that can include writing samples, examples of math problems, products created from projects, and results of science experiments.

Q

Qualitative – Of, relating to, or involving measurement of quality or kind without extensive mathematical analysis.

Quantitative – Relating to, or expressible in terms of quantity.

R

Researchable Question – A clear and concise question that has a means of which to be answered through investigation. Researchable questions include questions that aid in specifying and prioritizing requirements and/or constraints of a problem or challenge.

Rubric – Refers to a grading or scoring tool. A rubric is a tool that lists the criteria to be met in an assignment. A rubric also describes levels of quality for each of the criteria. These levels of performance may be written as different ratings (e.g., Excellent, Good, and Needs Improvement) or as numerical scores (e.g. 4, 3, 2, 1).

S

Secondary Source – Information on a topic written by someone who did not participate or experience the topic first-hand

Self-directed – Monitoring one's own understanding and learning needs; demonstrating initiative to advance professional skill levels; defining, prioritizing and completing tasks without direct oversight.

Service Learning – The method of combining academic curriculum with meaningful community service. Specifically, service learning integrates instruction and reflection with meaningful community service to teach civic responsibility, facilitate lifelong civic engagement, and enrich learning experiences, in addition to strengthening communities in which service learning occurs.



Simulated Workplace – is the creation of an educational environment that empowers students and changes the culture of a traditional CTE classrooms into student-led companies that emulate the future workplace of its participants. Students are presented with opportunities to master both technical and soft skills and earn industry-recognized credentials while taking on leadership roles that enhance a student's ability to not only acquire but to sustain gainful employment.

Spatial Thinking – Thinking that finds meaning in the shape, size, orientation, location, direction or trajectory, of objects, processes or phenomena, or the relative positions in space of multiple objects, processes or phenomena. Spatial thinking uses the properties of space as a vehicle for structuring problems, for finding answers, and for expressing solutions (National Research Council, 2006).

STEAM – An acronym for the transdisciplinary integration of the five disciplines of Science, Technology, Engineering, the Arts, and Mathematics. STEAM education places a priority on the study of science and math with purposeful integration of technology, the arts, and the engineering design process. STEAM education is an opportunity for students to collaboratively solve engaging and relevant problems using innovation and creativity. The engineering design process allows students to identify problems, design possible solutions, test and evaluate those solutions until the best solution is discovered. STEAM in the classroom engages students in real-world situations and allows students to experience solution-finding for problems that are relevant to the world in which they live.

STEAM Centric – The development or modification of units, lessons, or activities to reflect the definition of STEAM education.

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STEAM Proficient Students – STEAM-proficient students are able to answer complex questions, investigate global issues, and develop solutions for challenges and real-world problems while applying the rigor of science, technology, engineering, the arts, and mathematics content. STEAM proficient students are logical thinkers who are technologically, scientifically, and mathematically literate.

STEAM Team – A group of people with a full set of complementary skills required to complete a task, job, or project. Team members

- » operate with a high degree of interdependence,
- » share authority and responsibility for self-management,
- » are accountable for the collective performance, and
- » work toward a common goal and shared reward(s).



Subject Matter Expert – A professional who has acquired knowledge and skills through study and practice over the years, in a particular field or subject, to the extent that his or her opinion may be helpful in fact finding, problem solving, or understanding of a situation.

T

Technical Audiences – Audience consisting of practitioners in the field of engineering, technology, design, business, and other workforce-related disciplines.

Technological Tool – A device used by humans to complete a task. These tools may include rulers, protractors, computer software, CAD programs, etc.

Technology Literacy – The ability to use, manage, understand and assess technology.

Thematic Units – A unit of study that has lessons focused on a specific topic, sometimes covering all core subject areas. It is often used as an alternative approach to teaching history or social studies chronologically.

Transdisciplinary – In the transdisciplinary approach to integration, teachers organize curriculum around student questions and concerns. Students develop life skills as they apply interdisciplinary and disciplinary skills in a real-life context. Two routes lead to transdisciplinary integration: project-based learning and negotiating the curriculum.

V

Virtual Schools – Accredited schools that teach a full-time (or nearly full-time) course of instruction, primarily or entirely over the Internet, designed to lead to a degree.

W

Work-Based Learning – Education opportunities that reinforce core curriculum subjects through internships, apprenticeships, or other programs that place the student in an authentic work environment.

