

Glossary of Selected Science and Instructional Terms

Adaptation modification of an organism or its parts that makes it more fit for existence under the conditions of its environment.

Atmosphere the gaseous envelope of a celestial body (as a planet).

Best practice Solid everyday phrases used to describe solid, reputable, state-of-the-art work in a field. If a practitioner is following best practice, he or she is aware of **current** knowledge, technology, and procedures (Zemelman, 2005)

- **Student Centered** - The best starting point for schooling is young people's real interests: across the curriculum, investigating students' own questions should always take precedence over studying arbitrarily and distantly selected "content."
- **Experiential** - Active, hands-on, concrete experience is the most powerful and natural form of learning. Students should be immersed in the most natural form of learning. Students should be immersed in the most direct possible experience of the content of every subject.
- **Holistic** - Students learn best when they encounter whole ideas, events, and materials in purposeful contexts, not by studying subparts isolated from actual use.
- **Authentic** - Real rich, complex ideas and materials are at the heart of the curriculum. Lessons or textbooks that water-down, control, over simplify content ultimately disempower students.
- **Expressive** - To fully engage ideas, construct meaning, and remember information, students must regularly employ the whole range of communication media-speech, writing, drawing, poetry, dance, drama, music, movement, and visual arts.
- **Reflective** - Balancing the immersion in experience and expression must be opportunities for learners to reflect, debrief, abstract from their experiences what they have felt and thought and learned.
- **Social** - Learning is always socially constructed and often interactional: teachers need to create classroom interactions that "scaffold" learning.
- **Collaborative** - Cooperative learning activities tap the social power of learning better than competitive and individual approaches.
- **Democratic** - The classroom is a model community: students learn what they live as citizens of the school.
- **Cognitive** - The most powerful learning comes when students develop true understanding of concepts through higher-order thinking associated with various fields of inquiry and through self-monitoring of their thinking.
- **Developmental** - Students grow through a series of definable but not rigid stages, and schooling should fit its activities to the developmental level of the student.
- **Constructivist** - Students do not receive content: in a very real sense, they recreate and reinvent every cognitive system they encounter, including language, literacy, and mathematics
- **Challenging** - Students learn best when faced with genuine challenges, choices, and responsibility in their own learning.

Best practice classrooms Based on research, there are six fundamental ways of organizing instruction: integrative units, small group activities, representing-to-learn, classroom workshop, authentic experiences, and reflective assessment (Daniels & Bizar, 1998).

Biotechnology Any technique that uses living organisms, or parts of organisms, to make or modify products, improve plants or animals, or to develop microorganisms for specific uses.

Climate the average course or condition of the weather at a place usually over a period of years as exhibited by temperature, wind velocity, and precipitation.

Commensalism - a relationship in which one organism benefits while the other seems unaffected bird makes a nest in a tree for shelter and protection

Communication The successful transmission of information through a common system of symbols, signs, behavior, speech, writing, or signals.

Community - as all of the populations that live together in a given area

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Competition - the struggle between organisms to survive as they attempt to use the limited resources

Conductor A material capable of transmitting another form of energy (as heat or sound).

Constraint A limit to the design process. Constraints may be such things as appearance, funding, space materials, and human capabilities.

Construction The systematic act or process of building, erecting, or constructing buildings, roads, or other structures.

Consumer An organism requiring complex organic compounds for food which it obtains by preying on other organisms or by eating particles of organic matter.

Cooperative learning Students work as a group, each sharing the responsibility of the activity (Porcaro & Blair, 1997).

Decomposer Any of various organisms (as many bacteria and fungi) that return constituents of organic substances to ecological cycles by feeding on and breaking down dead protoplasm.

Design An iterative decision-making process that produces plans by which resources are converted into products or systems that meet human needs and wants or solve problems.

Design Brief A written plan that identifies a problem to be solved, its criteria, and its constraints. The design brief is used to encourage thinking of all aspects of a problem before attempting a solution.

Design Process A systematic problem solving strategy, with criteria and constraints, used to develop many possible solutions to solve a problem or satisfy human needs and wants and to winnow (narrow) down the possible solutions to one final choice.

Differentiated instruction The teacher plans and carries out varied approaches to content, process, and product in anticipation of and response to student differences in readiness, interest, and learning needs (Tomlinson, 1995).

- **Compacting** - a three step process that:
 - assesses what a student knows about material to be studied and what the student still needs to master
 - Plans for learning what is not known and excuses student from what is known
 - Plans for freed-up time to be spent in enriched or accelerated study (Tomlinson)
- **Cubing** - technique that can help student think at different levels of the taxonomy. Cubing is a technique from considering a subject from six points of view, e.g., describe it, compare it, analyze it, etc. Cubes can also be constructed with multiple intelligences such as verbal, bodily-kinesthetic, visual, etc. (Gregory, Chapman)
- **Flexible grouping** - students are part of many different groups, and work alone, based on the match of the task to student readiness, interest, or leaning profile. Teachers may create skills-based or interest-based groups that are heterogeneous in readiness level. Sometimes students select work groups, and sometimes teachers select them. Sometimes student groups are purposeful and sometimes random. (Tomlinson)
- **Jig sawing** -cooperative strategy that allows students to become experts in a facet of a topic they're particularly interested in. Students first meet in whole groups, sometimes called home-based groups. Here they review the task they must complete and clarify the goals for individuals and the group. (Tomlinson) Each student is responsible for one component of the text. Student then shares information to form a whole
- **Tiered assignments** - in a heterogeneous classroom, a teacher uses varied levels of activities to ensure that students explore ideas at a level that build on their prior knowledge and prompts continued growth. Student groups used varied approaches to explore essential ideas. (Tomlinson)

Ecosystem The complex of a community of organisms and its environment functioning as an ecological unit.

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Ecosystem as a community of organisms that live in a particular area along with their non-living surroundings.

Electric circuit The complete path of an electric current including usually the source of electric energy.

Electric current A flow of electric charge.

Energy The capacity for doing work.

Engineer A person who is trained in and uses technological and scientific knowledge to solve practical problems.

Engineering The profession of or work performed by an engineer. Engineering involves the knowledge of mathematical and natural sciences (biological and physical) gained by study, experience, and practice, applied with judgment and creativity to develop ways to utilize the materials and forces of nature for the benefit of mankind.

Engineering Design The systematic and creative application of scientific and mathematical principles to practical ends such as the design, manufacture, and operation of efficient and economical structures, machines, processes, and systems.

Environment The complex of physical, chemical, and biotic factors (as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival.

Exemplars Shows how the standards might be operationalized in the best classrooms (Glatthorn, 1998). Examples of student work that meet, exceed, or fail to meet the standard. They provide a stable and consistent feedback to students by providing a stable reference point across students and over time (Harris, 1996). Exemplars are sometimes called benchmarks.

Erosion The gradual wearing away of rock or soil by physical breakdown, chemical solution, and transportation of material, as caused, for example, by water, wind, or ice.

Food chain An arrangement of the organisms of an ecological community according to the order of predation, in which each uses the next usually lower member as a food source.

Food web- The pattern of overlapping food chains in an ecosystem

Force An agency or influence that if applied to a free body results chiefly in an acceleration of the body and sometimes in elastic deformation and other effects.

Fossil A remnant, impression, or trace of an organism of past geologic ages that has been preserved in the earth's crust.

Five E's of science instruction Engagement, exploration, explanation, elaboration, and evaluation

Gas/gas state Gas is a state of matter. Gas molecules do not hold together at all, so gas spreads out in all directions, including straight up. Gas changes both its shape and its volume very easily.

Graphic organizer - a visual representation of knowledge or information. These organizers are used as outlines for essay writing, test taking, and summarizing material (Porcaro & Blair, 1997).

Habitat The place or environment where a plant or animal naturally or normally lives and grows.

Heat The energy associated with the random motions of the molecules, atoms, or smaller structural units of which matter is composed.

Higher order thinking skills (HOTS) Cognitive domain in Bloom's taxonomy categorizes learning into six major divisions. Each upper division subsumes the previous lower ones - knowledge, comprehension, application, analysis, synthesis, and evaluation. Higher order are analyze (give motive, cause, conclude, infer, distinguish, deduce, detect), synthesize (solve, predict, draw, construct, produce, originate, propose, plan, design, synthesize, combine, develop, create), evaluate (judge, argue, decide, appraise, evaluate).

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Igneous Formed by solidification of magma.

Igneous - formed from cooled magma
intrusive - formed below the surface of Earth
extrusive - formed above the surface of Earth

Inherited To receive from ancestors by genetic transmission.

Insulator A material that is a poor conductor (as of electricity or heat).

Inquiry Asking and pursuing questions through investigating, experimenting, observing, measuring, replicating experiments, manipulating equipment, and collecting and reporting data.

Life cycle The series of stages in form and functional activity through which an organism passes between successive recurrences of a specified primary stage.

Light An electromagnetic radiation in the wavelength range including infrared, visible, ultraviolet, and X rays and traveling in a vacuum with a speed of about 186,281 miles (300,000 kilometers) per second; specifically : the part of this range that is visible to the human eye.

Liquid/liquid state Liquid is a state of matter. Liquid molecules hold together weakly, so liquids flow. Liquids do not change their volumes significantly but do change their shapes easily

Machine A device with fixed and moving parts that modifies mechanical energy in order to do work.

Magnetism A class of physical phenomena that include the attraction for iron observed in lodestone and a magnet, are inseparably associated with moving electricity, are exhibited by both magnets and electric currents, and are characterized by fields of force.

Manufacturing The process of making a raw material into a finished product; especially in large quantities.

Material The tangible substance (chemical, biological, or mixed) that goes into the makeup of a physical object. One of the basic resources used in a technological system.

Matter, states of Matter ordinarily exists in one of three physical states: solid, liquid, or gas. A given object's state depends on what the molecules are doing at the object's current temperature and pressure, i.e., are the molecules not holding together at all, holding together weakly, or holding together so tightly that they are locked into a stationary position. The transition between the states occurs at definite temperatures and pressures. A fourth state of matter, plasma (ionized gas in which the electrons are separated from the nuclei), can exist at extremely high temperatures. Plasma is found on the sun and other stars.

Medium A substance regarded as the means of transmission of a force or effect.

Metamorphic rocks Are formed from preexisting rocks that are subject to very high pressure and temperature, which result in the structural and chemical transformation of the preexisting rocks.

Metamorphic - rocks that have been changed over time by high pressure and temperatures deep inside the Earth

Metamorphosis A marked and more or less abrupt developmental change in the form or structure of an animal (as a butterfly or a frog) occurring subsequent to birth or hatching.

Mineral A solid homogeneous crystalline chemical element or compound that results from the inorganic processes of nature.

Multiple intelligences According to Howard Gardner (1987), there are 7 intelligence -linguistic/verbal, logical/mathematical, spatial/visual, bodily-kinesthetic, musical, interpersonal, and intrapersonal. Gardner says it is of the utmost importance that we recognize and nurture all of the varied human intelligences, and all of the

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combinations of intelligences. The key points in multiple intelligence theory are: each person possesses all seven intelligences; most people can develop each intelligence to an adequate level of competency; intelligences

Mutualism - a relationship in which both organisms benefit a clown fish (cleans tentacles) and sea anemone (provides hiding place)

Natural material Material found in nature, such as wood, stone, gases, and clay.

Orbit A path described by one body in its revolution about another (as by the earth about the sun or by an electron about an atomic nucleus).

Organism An individual self-sustaining unit of life or living material. Five forms of organisms are known: plants, animals, fungi, protists, and bacteria.

Parasitism - a relationship between organisms in which one organism benefits and the other is harmed not usually killed, e.g. tick(parasite) and Dog (host)

Pitch The property of a sound, and especially a musical tone, that is determined by the frequency of the waves producing it: highness or lowness of sound

Plasma/plasma state Plasma is a state of matter, often called "the fourth state." The atoms in plasma move around in all directions at high speed. Plasmas are usually very hot and they glow. The sun, northern lights, lightning, and the glowing "gases" in neon sign tubes and fluorescent lamp tubes are examples of plasmas.

Population - as all of the members of one species in a given area

Precipitation A deposit on the earth of hail, mist, rain, sleet, or snow; also : the quantity of water deposited.

Predation - an interaction in which one organism kills another organism for food

Prey - an organism that is killed and eaten by another organism

Process 1. Human activities used to create, invent, design, transform, produce, control, maintain, and use products or systems; 2. A systematic sequence of actions that combines resources to produce an output.

Producer Any of various organisms (as a green plant) which produce their own organic compounds from simple precursors (as carbon dioxide and inorganic nitrogen) and many of which are food sources for other organisms.

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

Reflection The return of light or sound waves from a surface.

Refraction Deflection from a straight path undergone by a light ray or energy wave in passing obliquely from one medium (as air) into another (as glass) in which its velocity is different.

Resource In a technological system, the basic technological resources are energy, capital, information, machines and tools, materials, people, and time.

Revolve To move in a curved path around a center or axis.

Rotate To turn about an axis or a center.

Rubric - a series of narrative statements describing the levels of quality of a product or a performance. Rubrics can be **holistic** or **analytical** (Pomperaug Regional School District, 1996).

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- **analytical rubric** - assesses summative or formative performance along several different important dimensions. There are usually multiple parts to the rubric with each part assessed separately providing for specific feedback for correctives.
- **holistic rubric** - are criterion referenced, which shows what a student knows, understands, or can do in relation to specific performance (Taggart, Phifer, Noxon & Wood, 1998)

Sedimentary Rocks formed from material, including debris of organic origin, deposited as sediment by water, wind, or ice and then compressed and cemented together by pressure.

Sedimentary - made of rock fragments (shells, rocks, bones, etc.) that have been pressed and cemented over millions of years

clastic - rocks formed from particles that are cemented and pushed together

chemical - sedimentary rocks that form when minerals crystallize from a solution

organic - sedimentary rocks that form from the remains of organisms deposited in thick layers

Simple machine The simple machines are the lever, pulley, and inclined plane, along with their most basic modifications, the wheel and axle, wedge, and screw. A complex machine is a machine made up of two or more simple machines.

Sketch A rough drawing that represents the main features of an object or scene and often made as a preliminary study.

Solar system The sun together with the group of celestial bodies that are held by its attraction and revolve around it.

Solid/solid state Solid is a state of matter. Solid molecules hold together very tightly and often line up in exact patterns, therefore, solids do not flow. Solids do not change their shapes or volumes.

Sound A kind of energy contained in vibrating matter. Sound travels through solids, liquids, and gases. The eardrums convert this vibrational energy into signals that travel along nerves to the brain, which interprets them as voices, music, noise, etc.

Species - as a group of organisms that can mate and reproduce fertile offspring

Streak The color of the fine powder of a mineral obtained by scratching or rubbing against a hard white surface and constituting an important distinguishing characteristic. Note: the streak color may be completely different from the color observed at the surface of the mineral.

Synthetic Material Material that is not found in nature, such as glass, concrete, and plastics.

Symbiosis - a close relationship between two organisms

System A group of interacting, interrelated, or interdependent elements or parts that function together as a whole to accomplish a goal.

Technology 1. Human innovation in action that involves the generation of knowledge and processes to develop systems that solve problems and extend human capabilities; 2. The innovation, change, or modification of the natural environment to satisfy perceived human needs and wants.

Technology Education A study of technology, which provides an opportunity for students to learn about the processes and knowledge related to technology that are needed to solve problems and extend human capabilities.

Texture The nature of the surface of an object, especially as described by the sense of touch, but excluding temperature. Textures include rough, smooth, feathery, sharp, greasy, metallic, and silky.

Weather The state of the atmosphere with respect to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness.

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Weight The force with which a body is attracted toward the earth or a celestial body by gravitation and which is equal to the product of the mass and the local gravitational acceleration.