

## *Very Physical Science* **Integrating Movement with Everyday Science**

### I. Introduction

#### **Purpose:**

Science concepts can be demonstrated through movement. Dance makes science concepts more tangible, emphasizes communication and reflects social climate. Our purpose is to show dance as a way to demonstrate magnets, assembly line, chain reaction, circuit, lever, and inclined plane. The performance includes physical science concepts from the tiniest atoms & molecules, to the most enormous such as energy, inertia and gravity.

Audience participants, pre-selected by faculty, are involved with three segments. For each lecture demonstration, three groups of four students (a total of twelve), will be seated in the front row of the performing area. Each group will be called forward for a short demonstration of movement material that is performed with the company dancers.

At the conclusion of this lecture demonstration the students will have seen:

- Science vocabulary demonstrated in movement.
- Four related sections: Kinetic & potential energy, technology, Energy & Force, and Matter.
- Student participants working collaboratively with the company dancers.
- Dance as a unique art form that is fun and that communicates ideas.



## II. The lecture demonstration

### A. Warming up to science by using movement

Dancers need to do warm up exercises to prepare their bodies. Various warm-up movements are associated with specific sporting activities. We can also warm-up our brains by thinking about some science basics:

1. What is an element?
2. What is an inclined plane?
3. What is a lever?
4. What is inertia?
5. When does a skydiver have the greatest potential energy? When does a skydiver have the greatest kinetic energy?

Student volunteers will help us to explore examples of Potential and Kinetic energy, as compared to Stillness and Movement. In dance, the stillness of preparation helps us to expend the kinetic energy of performance.



We can make an atmosphere or a mood for a dance. The mood or atmosphere can be a **metaphor**----a way of describing something by comparing it to something else. In today's performance we use movement as a way to describe science. The movement metaphor may suggest a central idea such as a magnet. The central idea is shown multiple times to establish repetition. The repetition accumulates and organizes several views of a single phenomenon into one compositional idea.

## B. Technology

1. Technology refers to any machine or process that makes work easier or that helps people get something that they want or need.
2. Technology is not just another word for machine, however. A book is an example of technology. So is pen and paper. What simple machines have been with us for a long time?



This is our demonstrated list of technological concepts that affect life daily and the corresponding dance vocabulary:

Magnets	flex/extend; gather/spread; cluster/disburse
Assembly line	isolated individual movements
Chain reaction	canon form, one action follows the next
Circuit	pathways in space
Lever	weight sharing/lifting
Inclined Plane	diagonals

## C. Physics

In modern science, the borderline between chemistry and physics has become fuzzy. Chemistry is the science of what things are made of, what identifies them, and how they change. Physics is the study of matter and motion.

1. Physics definitions that are interchangeable with dance language:
  - a. Energy is the ability to do work. Work is done when a Force is used to move an object.
  - b. Centrifugal force causes an object going around in a circle to move away from the center.
  - c. Gravity is the force that pulls objects to the earth.
  - d. Equilibrium means balance. In chemical reactions, an equilibrium is reached when no further measurable change occurs.
  - e. Inertia is a resistance to change in motion; that is, the tendency of an object to keep moving the same path or to stay still if not moving.

Student volunteers dance with us to further demonstrate Energy and Work, Centrifugal Force, and Inertia.

2. There are two major components of the Earth: matter and energy. The energy that we use on Earth ultimately comes from the sun. This energy is used to provide food for plants, heat our homes, power the wind, and ultimately create fossil fuels. Once energy is used, it must be replaced. All the matter that is on/in the Earth already exists here. That means that there is a finite amount of air, water, minerals, and rocks on this planet. In order for changes in matter to occur, such as the growth of plants and animals or the build up of soil, these materials must be reused or recycled.
3. Definitions that can be expressed by using movement metaphors that compare small to large, long amount of time to shorter amounts of time:
  - a. Matter is stuff—anything taking up space that you can see, hear, feel touch or taste. And occurs as a solid, liquid or gas.
  - b. Atoms-smallest particle of any element.
  - c. Molecule—a tiny structure made up of two or more atoms.
  - d. Element—a substance that cannot be broken down into a simpler substance
  - e. Compound—a substance whose molecules have two or more elements.
  - f. Vacuum is space with no matter in it.

#### E. Closure

Finding movement connections to science makes learning fun. Our goals have included:

- identifying and demonstrating movement elements.
- making connections between dance and science.
- benefiting and motivating student learners
- demonstrating ways to organize movement to express a concept



#### SUPPLEMENTARY MATERIALS

Blaydes, Jean. *Advocacy: A Case for Daily Quality Physical Education*.  
[www.actionbasedlearning.com](http://www.actionbasedlearning.com)

Gilbert, Anne Green. *Creative Dance for All Ages*. Reston VA: AAHPERD, 1992.

Gilbert, Anne Green. *Teaching the Three Rs Through Movement Experiences*.  
Englewood Cliffs, NJ: Prentice-Hall, Inc, 1977.

Hannaford, Carla. *Smart Moves: Why Learning is Not All in Your Head*. Virginia, Great  
Ocean Publishers, 1997. [www.twblearn.com](http://www.twblearn.com)

Mirus, Judith; White, Elena; Bucek, Loren E.; Paulson, Pamela. *Dance Education  
Initiative Curriculum Guide*. Minnesota Center for Arts Education, 1996.

#### Video

Gilbert, Anne Green. *Teaching Creative Dance in Schools and Studios: Companion to  
the Book Creative Dance for All Ages*. [www.creativedance.org](http://www.creativedance.org)

#### Discography

*Breathing Rhythms*. Glen Velez. Sounds True MM00120D. (CD)

*Virginia Roots: The 1929 Richmond Series*. Outhouse Records 2002 (CD)

*Day Music Night Music*. Ned Rorem Phoenix PHCD 123 (CD)

*Mozart for a Merry Christmas*. Philips 289 456 454-2 (CD)

*Lou Harrison: A Portrait*. Argo 455 590-2 (CD)

*Planet Drum*. Mickey Hart. RCD 10206 (CD)

*Rhythms of the Chakras.* Glen Velez. Sounds True M006D (CD)

#### **4. Dance Skills and Terms**

**Active Stillness:** attentive non-movement.

**Axial or non-locomotor movement:** movement that happens around the axis of the body, movements that do not travel from one spot.

**Body:** The human body is the expressive instrument for dance. Body awareness includes knowledge of body parts and actions.

**Dance** is the art in which human movement is the medium for sensing, understanding, and communicating. In dance there is a conscious involvement with movement.

**Locomotor Movement:** actions that travel you through the room. Basic locomotor movements include walk, run, hop, jump, leap, gallop, slide, and skip.

**Negative Space:** the areas around a dancer's body not occupied by a body part. If a dancer makes both arms into a circle far away from the chest, the space inside the arms is negative space.

**Pathway:** the design made in the air or on the floor by traveling. Pathways appear as straight lines, curved lines, or combinations of straight and curved.

**Relationship:** Relationship in dance has to do with proximity ranging from close, fluctuating, grasping, touching, or far to passing. You can have a relationship with another dancer or a relationship of one part of your body to another. For example, you can have a relationship of elbow to knee.

**Level:** movement range in relationship to body axis and where the movement occurs in space.

**Movement Quality:** how movement is performed in terms of weight, time, flow and space.

**Contact Information:**

**Jane Franklin, MFA, CMA**  
**3700 S. Four Mile Run Drive**  
**Arlington VA 22206**  
**703-298-3235**  
**FAX 703-212-7680**  
**info@janefranklin.com**